

1 A. The primary functionality did not change.

2 There were variations and additional --

3 Q. Doctor, it changed over time.

4 A. It did change, yes.

5 Q. And, in fact, there was a second demonstration  
6 of DVPN; isn't that right?

7 A. I believe that's correct.

8 Q. I think it was in March of 2000?

9 A. That sounds correct.

10 Q. So that's -- March of 2000 is at least a month  
11 before the '180 patent was filed, right?

12 A. That's correct, yes.

13 Q. But you haven't offered any opinions that the  
14 DVPN technology from that meeting invalidates any claim  
15 of any VirnetX patents; isn't that right?

16 A. That's correct. I focused on the earlier  
17 demonstration.

18 Q. And that's because the later demonstration  
19 doesn't invalidate any claim of the VirnetX patents;  
20 isn't that right?

21 A. I don't know.

22 Q. Your attorney has not asked you to look at  
23 that one?

24 A. I didn't look at it, and I don't believe  
25 anyone asked me to.

1 Q. Now, back to the source code, we talked about  
2 how there were multiple codes in this case, right?

3 A. That's right.

4 Q. There was a Defendant's 3353?

5 A. I can't see it.

6 Q. Take my word for it. It's some source code.  
7 Defendant's Exhibit 3062, some more source code.

8 A. Okay.

9 Q. Can't really see it. I think there were  
10 multiple versions of the DVPN code on this one.

11 You looked at all of this code, right?

12 A. Yes, I did.

13 Q. And it had different dates?

14 A. That's correct.

15 Q. Some from 1998; some from '99; some from 2000;  
16 some from '97?

17 A. Exactly.

18 Q. All right. But then you chose Defendant's  
19 Exhibit 3061. That's the one you relied on, right?

20 A. That sounds correct, yes.

21 Q. You relied on your attorney's guidance.  
22 They're the ones that helped you identify the right  
23 source code to look at, right?

24 A. I did look at all the source code. I did have  
25 some guidance as to which was older and which was

1 younger, et cetera.

2 Q. Your attorneys helped you identify Defendant's  
3 Exhibit 3061 to look at; isn't that right?

4 A. Again, no. They provided me with all the  
5 source code.

6 Q. They told you to look at this one for your  
7 opinions in this case, didn't they?

8 A. I don't recall that being the case.

9 Q. Look at your deposition.

10 MR. McLEROY: Would you pull up Page 249  
11 of your deposition?

12 THE WITNESS: Do I have that in front of  
13 me?

14 MR. McLEROY: Oh, I don't think I've  
15 given it to you yet.

16 THE WITNESS: Thank you.

17 MR. McLEROY: If you could, Mr. Moreno,  
18 blow up the portion starting at Line 11 of Page 249.

19 Q. (By Mr. McLeroy) You remember when I took your  
20 deposition, Dr. Wicker?

21 A. Yes, I do.

22 Q. It was, I think, in New York City, right, when  
23 I came up to New York to visit you?

24 A. Yes, that's right.

25 Q. It was at your law firm's office there in

1 downtown Manhattan, right?

2 A. Yes, it was.

3 Q. And you were under oath then just like you're  
4 under oath today?

5 A. Yes.

6 Q. And I think the first question in this  
7 sequence that I asked you was: Now, was there only one  
8 version of the DVPN source code provided?

9 ANSWER: The one I looked at -- actually, I  
10 take that back. I think I saw several. But I did see  
11 the one that was associated with the public  
12 demonstration.

13 And I asked you: Well, how were you able to  
14 determine that it was associated with the public  
15 demonstration?

16 And your answer was, at that time at least:  
17 That would have been through the deposition testimony.

18 Do you see that?

19 A. Yes.

20 Q. And I followed up, skipping down a little bit.

21 Question: Whose deposition; do you remember?

22 You said: Actually, I don't. I don't  
23 remember specifically.

24 I said: Well, let me see if I can refresh  
25 your recollection. There are two guys, Sterne and

1 Kindred, from Sparta?

2           You said: That's right.

3           I said: Was it one of those two guys?

4           Your answer was: Frankly, sitting here at  
5 this late hour, I can't remember how I knew which  
6 version was actually demonstrated. It may have simply  
7 been represented to me that that was a fact.

8           Do you see that?

9           A. Yes, I do.

10          Q. And I asked you: Represented to you by the  
11 lawyers?

12          You said: Well, they're not my lawyers, but  
13 yes.

14          And I clarified: By Microsoft's lawyers?

15          And you said: Yes, that's correct.

16          Do you see that?

17          A. Yes, I do.

18          Q. That testimony is still truthful, right? You  
19 were telling the truth at the time?

20          A. Yes. I didn't know then, and I'm not sure  
21 now.

22          Q. Now, Dr. Wicker, let's assume that you and  
23 Microsoft lawyers are correct, and you actually did  
24 identify the right version of code that was used at that  
25 March 1998 demonstration.

1 A. Yes.

2 Q. Without talking to Mr. Turchi, who actually  
3 wrote the code, okay, are you absolutely certain that  
4 this source code authoritatively describes what was  
5 shown at the demonstration?

6 A. I think that the evidence is clear as to what  
7 was shown at the demonstration and the source code --

8 Q. Dr. Wicker --

9 A. -- reflects what was at the demonstration.

10 Q. Dr. Wicker, that's not my question.

11 Are you certain, with authority, that that  
12 source code was the source code used for the  
13 demonstration?

14 A. As certain as I can be.

15 Q. See what Mr. Sterne said about that when he  
16 was asked a similar question.

17 MR. McLEROY: If we can go to -- I'm  
18 sorry -- Slide 23.

19 Sorry. It's Mr. Kindred's testimony.

20 Q. (By Mr. McLeroy) He said: And, again, in  
21 order to know exactly what was demonstrated in the  
22 spring of '98, you'd need to look at the source code.  
23 Spring of '98, he was referring to March of 1998; don't  
24 you think?

25 A. Yes, I think that's right.

1 Q. He said: To know exactly what was  
2 demonstrated, yes.

3 But then he caught himself. You see that?

4 He said: Let me qualify that. And then he  
5 said: That wouldn't be authoritative either, because  
6 the demonstration didn't show everything that was in the  
7 implementation.

8 Do you see that?

9 A. Yeah. Yes, I see that.

10 Q. We didn't get to ask Mr. Turchi that question,  
11 did we?

12 A. No, not as far as I know.

13 Q. Now, a few more questions about DVPN.

14 MR. McLEROY: Your Honor, do you mind if  
15 I approach the demonstration board again?

16 THE COURT: You may.

17 MR. McLEROY: I appreciate the help.

18 Q. (By Mr. McLeroy) Unfortunately, Dr. Wicker, it  
19 looks like your markers are fading.

20 A. Yes, I noticed that.

21 Q. Invisible ink makes it harder to  
22 cross-examine, huh?

23 Secure DNS request, that's what you wrote  
24 there, right?

25 A. That's right.

1 Q. That's probably hard for the jury to see now.

2 And you showed it going from the Red Cross  
3 client to Red Cross firewall; is that right?

4 A. That's correct.

5 Q. It was that request -- that was the first  
6 thing you drew on the board, right?

7 A. I believe it was, yes.

8 Q. So that's what triggered the setting up of the  
9 VPN; that right?

10 A. Well, there were a number of steps in between,  
11 but, yes, that was the first step to what eventually  
12 caused that VPN between the two firewalls to be created.

13 Q. Dr. Wicker, that was the first step, right?

14 A. Yeah.

15 Q. That was the trigger?

16 A. It was the first step.

17 Q. It was the trigger?

18 A. The trigger is the determination step that's  
19 caused when the Red Cross firewall goes to the coalition  
20 manager and finds that there's a secure association --

21 Q. So it's your testimony that trigger means  
22 determination? Yes or no, trigger means determination?

23 A. Well, that's what -- well, I should ask you  
24 what you meant by trigger, so I can give you a good  
25 answer to your question.



1           To me, I thought -- when you said trigger, I  
2 thought that you were referring to the step that caused  
3 the establishment of VPN.

4           Q.    A trigger means first step, okay?

5           A.    Okay.

6           Q.    You say it's the DNS request the triggers this  
7 process, right?

8           A.    Well, if that's the first step --

9           Q.    Take the definition we just agreed on.

10          A.    I'm sorry?

11          Q.    If you take the definition we just agreed on,  
12 the trigger being the first step, you agree that the DNS  
13 request triggers this process?

14          A.    The DNS request is the first step.

15          Q.    That's your testimony?

16                   MR. McLEROY:    Could you go Slide 24 now?

17          Q.    (By Mr. McLeroy) This is what Mr. Saydjari  
18 said in his deposition, and he was confronted with his  
19 testimony yesterday.

20                   Do you remember when he talked about that with  
21 Mr. Cawley?

22          A.    Yes, I do.    Or I should say I read the  
23 transcript.    I actually wasn't in court.    I saw it.

24          Q.    He said:    I would doubt that they would use  
25 the DNS call to trigger.

1 Do you remember that?

2 A. Yes.

3 Q. Now, Mr. Saydjari actually attended this  
4 meeting, didn't he?

5 A. Yes, that's correct.

6 Q. He was there; he has firsthand knowledge?

7 A. I believe that's what he said, yes.

8 Q. And he was paid by Microsoft to travel down to  
9 Tyler and participate in this lawsuit, right?

10 A. Yes, they paid for his time.

11 Q. And his testimony was that I doubt they would  
12 use the DNS call to trigger.

13 See that?

14 A. Yes.

15 Q. All right. Dr. Wicker, let's move on to  
16 Aventail. We're running out of time. I'll just cover a  
17 quick point with you.

18 MR. McLEROY: Your Honor, do you mind if  
19 I switch out to the Aventail board?

20 THE COURT: No. You may.

21 MR. McLEROY: Now I know why you were  
22 handling these over there.

23 Q. (By Mr. McLeroy) You identified the client  
24 computer and the Aventail system on this board as the  
25 computer on the very far left.

1 Do you see that?

2 A. Yes, that's correct.

3 Q. That's what you labeled it?

4 MR. McLEROY: Can we put up Slide 18 of  
5 Dr. Wicker's presentation? Of Dr. Wicker's  
6 presentation, do you have that?

7 Q. (By Mr. McLeroy) Here -- and you were talking  
8 about, I believe, the context of the '135 patent. This  
9 was the client here?

10 A. No. That is a client in some situations.

11 In this particular claim, in the '180, I  
12 showed how the Aventail SOCKS Server could act as a  
13 claim.

14 Q. Okay. So depending on which claim or which  
15 patent you're talking about, you changed the label of  
16 client computer, didn't you?

17 A. No. No, I don't think that's fair.

18 Q. Dr. Wicker, you labeled the client computer as  
19 the computer on the far left here; is that right?

20 A. Yes, I did.

21 Q. All right. And then if you look at the  
22 monitor, that corresponds to the computer on the far  
23 left in your slide, right?

24 A. That's right.

25 Q. And then you show two servers. They're

1 labeled Server 1 and Server 2 up on the big board, the  
2 big board up top; is that right?

3 A. Yes, that's right.

4 Q. And then you have the SOCKS server and the  
5 SOCKS server on the board that's here in the courtroom  
6 with us, right?

7 A. Yes, that's correct.

8 Q. Those correspond to each other; is that right?

9 A. Yes. Server 1 in this diagram for proxy  
10 chaining is the same as Aventail SOCKS Server on the  
11 left as we see on the board, that's right.

12 Q. All right.

13 MR. McLEROY: And if you can take that  
14 blowup down for a second.

15 Q. (By Mr. McLeroy) Then there's a destination  
16 server on the far right, and that corresponds to what  
17 you've labeled the secure website here in your drawing;  
18 is that right?

19 A. That's correct.

20 MR. McLEROY: If you could just keep it  
21 right there.

22 Q. (By Mr. McLeroy) Now, up on your slide you  
23 prepared with the highlighting, you said: Performed by  
24 a client computer; is that right?

25 A. That's correct.

1 Q. And you highlighted the server labeled Server  
2 1; is that right?

3 A. That's right.

4 Q. In this drawing, when you were asked what the  
5 client computer is, you labeled this computer here,  
6 right? You labeled this Aventail client, right?

7 A. That's labeled as a client. It is a client.

8 Q. And those aren't the same two computers, are  
9 they?

10 A. They're both acting as clients.

11 Q. And I think what you wanted to tell me earlier  
12 was that depending on the claim or depending on the  
13 patent you're talking about, you would identify  
14 different things as a client computer; is that right?

15 A. No. No. What I'm saying is that in some  
16 situations, one could act as a client, and at the same  
17 time, another could be acting as a client. It's all  
18 relative. Client server architecture --

19 Q. But --

20 A. -- are relationships.

21 Q. So in some situations, the computer on the  
22 left is the client. And in other situations, it's the  
23 second computer from the left that's the client  
24 computer.

25 Is that your analysis in this case?

1           A.    It's more accurate to say that both can act as  
2 clients.

3           Q.    Dr. Wicker, you identified different client  
4 computers in these two drawings; that's fair, right?

5           A.    That's correct.

6           Q.    And you did the same thing when you were  
7 talking about DVPN; isn't that right?

8                    You identified client computers -- different  
9 client computers at different times with different  
10 claims, right?

11          A.    That's right. DVPN in different computers  
12 could act as clients.

13          Q.    So you didn't consistently identify the same  
14 computer as a client computer all the way through this  
15 prior art, right?

16          A.    No, I wouldn't agree with that.

17          Q.    You wouldn't agree with that?

18          A.    I consistently showed where computers could  
19 act as clients throughout.

20          Q.    You consistently identified multiple computers  
21 as the client computer; is that right?

22          A.    Multiple computers can act as clients.

23          Q.    And you had multiple computers that you  
24 identified as client computers; is that right?

25          A.    That's correct.

1 Q. And you pointed to different client computers  
2 to meet the different elements of the claims; isn't that  
3 right?

4 A. That's true.

5 Q. All right. I want to talk briefly now about  
6 the '180 patent.

7 One really big issue on the '180 patent is  
8 whether the prior art contains secure domain names; is  
9 that right?

10 A. That's correct.

11 Q. The term that was defined by the Court; is  
12 that right?

13 A. Yes, that's right.

14 Q. And you never showed the claim construction of  
15 secure domain names in your testimony, did you?

16 A. I actually described it several times. I  
17 never actually put it on the screen.

18 Q. You didn't put it on the board, did you?

19 A. No, but I explained it to the jury.

20 Q. Now, secure domain names, that term shows up  
21 in every claim of the '180 patent, right?

22 A. Yes, that's correct.

23 Q. And so if the jury decides that the prior art  
24 does not teach any secure domain names, you'd agree that  
25 none of the claims of the '180 patent are anticipated;

1 is that right?

2 A. If the jury decides that the prior art I  
3 discussed does not reveal or disclose any secure domain  
4 names, then --

5 Q. Then the claims of the '180 patent would be  
6 anticipated; is that right?

7 A. If it shows -- it has to show the capability  
8 for secure domain names. If it doesn't show that, then  
9 yes.

10 Q. Okay. Now, you believe that standard domain  
11 names, domain names that have been in existence, I think  
12 since, you testified, in the mid-'80s, that those can be  
13 security domain names.

14 That's right, isn't it?

15 A. Well, 1982, but yes.

16 Q. And you agree with me, I believe, that the  
17 prior art in this -- at issue in this case, it only uses  
18 standard domain names; is that right?

19 A. There are domain names that have the standard,  
20 fully qualified domain name structure, if that's what  
21 you mean.

22 Q. Well, let's look at your deposition.

23 MR. McLEROY: Can you put up Page 64 to  
24 65 of his deposition? Page 64, starting at Line 23.

25 Q. (By Mr. McLeroy) I asked you there --



1 MR. McLEROY: Would you put up the next  
2 two lines of the next page?

3 That would be great.

4 Q. (By Mr. McLeroy) Now, are you aware --

5 MR. McLEROY: Yes, the first five lines.

6 Q. (By Mr. McLeroy) Question: Now, are you aware  
7 of any prior art references that you rely on that use  
8 non-standard domain names?

9 Did I read that right?

10 A. Yes.

11 Q. You said: I can't think of an example of a  
12 prior art reference on which I relied that uses domain  
13 names, other than those defined as standard in the RFCs.

14 Is that right?

15 A. That's correct.

16 Q. That's consistent with what you just said,  
17 right?

18 A. Right. I still can't.

19 Q. You just believe that these standard domain  
20 names can also be secure domain names; is that right?

21 That's your opinion?

22 A. That is correct.

23 Q. And so you believe that secure domain names of  
24 the VirnetX patents, that they can overlap with the  
25 standard domain names resolved by a conventional domain

1 name server; is that right?

2 A. I'm not sure what you mean by overlap. If you  
3 could show me the Court's claim construction, I could  
4 point out how a standard domain name could satisfy.

5 Q. I'd rather show you your deposition.

6 MR. McLEROY: Can we go to Page 88 of his  
7 deposition?

8 I'm sorry. I need to give you a line  
9 number. Line 22 and continue over to 89/1. So 88/22 to  
10 89/1.

11 Yeah, that's right. Lines 22 and then  
12 carrying over to the next page, question and answer.

13 Q. (By Mr. McLeroy) Question: So it's your  
14 opinion that the inventors considered, believed that a  
15 secure DNS could overlap with a standard DNS.

16 So you used the term overlap there, right?

17 A. Yes.

18 Q. And your answer was: Yes.

19 A. Yes.

20 Q. So you will agree with me that it's your  
21 opinion that secure domain names can overlap with  
22 conventional or standard domain names; is that right?

23 A. Well, they can occupy the same DNS server,  
24 yes.

25 Q. And a name can be a secure name at the same

1 time it can be a conventional name; is that right?

2 A. I don't think at the same time, but at  
3 different times, yes.

4 Q. Okay. There's no -- nothing that precludes a  
5 secure domain name just looking at it from also being a  
6 conventional domain name; is that right?

7 A. Well, again, if it requires authorization,  
8 according to the Court's claim construction, then it's  
9 secure. If it doesn't require authorization, then it's  
10 not secure.

11 The question of whether it requires  
12 authorization may have a different answer over the  
13 course of time. So a name over the course of time may  
14 be secure at one point and not secure at another, if  
15 that's what you're asking.

16 Q. It's your testimony that the prior art only  
17 teaches standard domain names, right?

18 A. As called for in the art of -- yes, the domain  
19 names are standard.

20 Q. And it's your opinion that something that is a  
21 standard domain name can't also at the same time be a  
22 secure domain name; is that right? They can't overlap?

23 A. No. No. That's not right.

24 Q. So they can overlap?

25 A. What I said was a name can be secure at one

1 point and not secure at another.

2 A standard domain name can be secure at one  
3 point and not secure at another point in time.

4 Q. Let me -- let me do this.

5 MR. McLEROY: Would you put up Slide 31,  
6 please?

7 Q. (By Mr. McLeroy) Sorry. The font is a little  
8 small. This is from the deposition of Dr. Johnson.

9 Do you see that?

10 A. Yes, I do.

11 Q. And he was asked a question, and he answered  
12 the question: Do you agree that secure domain names of  
13 the claims of the '180 patent do not overlap with  
14 standard domain names resolved by the conventional DNS?

15 Do you see that?

16 A. Yes, I do.

17 Q. He answered the question yes, right?

18 A. That's correct.

19 Q. Dr. Wicker, how do you answer that question?

20 A. I would have to know what the context of the  
21 question was. If the question is asking me whether a  
22 given domain name can be secure at one moment and not  
23 secure at another, the answer is yes.

24 If you're asking whether a secure domain name  
25 can reside in a DNS with unsecure names, the answer is

1 clearly yes.

2 Can you restate the question? I think I've  
3 answered it.

4 Q. Dr. Johnson was able to answer the question,  
5 wasn't he?

6 And I'll tell you, I honestly didn't  
7 understand your answer.

8 A. Okay. So let's --

9 Q. I mean, can you answer the question yes or no  
10 that Dr. Johnson answered yes or no to?

11 A. Okay. If he -- if the question, as he  
12 understood it, is whether the domain name can be both  
13 secure and unsecure at the same time, clearly, that  
14 doesn't make sense. That can't be the case.

15 Q. Dr. Wicker, let's -- I guess let's get to the  
16 real issue here.

17 You don't want to disagree with Dr. Johnson's  
18 testimony; isn't that right?

19 A. Dr. Johnson is a very impressive individual.  
20 I just don't know what's being meant -- I don't know the  
21 context.

22 Q. Dr. Wicker, you would agree it would look bad  
23 if Microsoft's -- well, how many experts does VirnetX  
24 have? It's just Dr. Jones, right?

25 A. I believe you have a damages expert. I don't

1 know how many other experts.

2 Q. Let me be clear. Professor Jones is going to  
3 testify. He's offered opinions on infringement and  
4 validity; is that right?

5 A. Yes, sir.

6 Q. Now, Microsoft, on the other hand, hired  
7 Dr. Johnson to opine on invalidity and hired you to  
8 testify about -- did I mix this up?

9 Johnson, infringement; Dr. Wicker, invalidity.  
10 Sorry about that.

11 A. Yes, sir.

12 Q. I mean, you think it's important that the two  
13 separate experts Microsoft hired, that they offer  
14 consistent opinions, don't you think?

15 A. Yes.

16 Q. It would test Microsoft's credibility if it  
17 had one expert that answered this question yes, and  
18 another expert that answered this question no.

19 Don't you agree?

20 A. Yes.

21 Q. Dr. Wicker, can you answer this question yes  
22 like Dr. Johnson did?

23 A. To the extent he's saying that a standard  
24 domain name cannot be a secure name under the Court's  
25 claim construction, I don't agree.

1 Q. You don't agree with Dr. Johnson. He gave his  
2 deposition after the Court's claim construction order  
3 came out, didn't he?

4 A. Yes. There may be other context to the  
5 question that I'm not seeing.

6 Q. Dr. Wicker, you and Dr. Johnson have taken  
7 inconsistent positions on this issue, haven't you?

8 A. I don't agree. I don't know the context of  
9 the question.

10 Q. You just answered the question no, right?

11 A. As I understand it, I would say no.

12 MR. McLEROY: Pass the witness.

13 THE COURT: All right. Redirect?

14 MR. BOBROW: Thank you, Your Honor.

15 REDIRECT EXAMINATION

16 BY MR. BOBROW:

17 Q. Professor Wicker, during the  
18 cross-examination, it began some time ago with some  
19 questions about the demonstration that Mr. Pall did here  
20 in Court.

21 Do you recall that testimony?

22 A. Yes, I do.

23 Q. And do you recall that Mr. McLeroy came over  
24 to this board and pointed to the determining step of  
25 Claim 1 of the '135 patent?

1 Do you recall that?

2 A. Yes, I do.

3 Q. Then he pointed to some testimony by Mr. Pall  
4 about whether or not that determining step was typically  
5 met by the demonstration that was conducted.

6 Do you remember that as well?

7 A. Yes, I do.

8 Q. And do you remember saying that you disagreed  
9 with the question that Mr. McLeroy was asking you, but  
10 then he interrupted you and wouldn't let you explain why  
11 you disagreed with the characterization he was making?

12 Do you remember that?

13 A. Yes, I do.

14 Can you please explain now the answer that you wanted  
15 to give then, but that Mr. McLeroy wouldn't let you?

16 A. Yes. I would be happy to.

17 In the first demonstration, the one that  
18 Mr. Pall did, initially he used -- and, again, I can't  
19 remember the name of the website, but it was something  
20 like trustedwebsite.com or securewebsite.com.

21 What happened in that situation was the  
22 computer went to a phone book, found securewebsite.com,  
23 and the phone book indicated that a VPN was to be  
24 created. It determined that the secure VPN connection  
25 was necessary. It satisfied the step.



1           The subsequent demonstrations did not  
2 demonstrate that step one way or another, because  
3 eBay.com -- and this is not a secure website dot-com --  
4 were not in the phone book. It was not a question of  
5 not determining. It simply wasn't in the phone book.  
6 And so what the system did then is it went on to try  
7 different ways to resolve those names. And at one  
8 point, it tried to contact the DNS through that VPN.

9           So it wasn't a matter -- the second two didn't  
10 show that that element was not satisfied. It simply  
11 showed that Microsoft indeed is very tenacious in trying  
12 to create a connection and to resolve those things.

13           Q. Now, in your testimony earlier, you had said  
14 that the NT 4 operating system had been released in 1996  
15 with PPTP and AutoDial.

16           Do you recall that?

17           A. Yes, I do.

18           Q. And do you recall that Mr. McLeroy pointed at  
19 some computers and some software and the like dated in  
20 the year 2000?

21           Do you recall that?

22           A. Yes.

23           Q. All right. Now, in your opinion, with your  
24 computer science background and the work you've done in  
25 this case, does that equipment and software from the

1 year 2000 impact at all the operation of the executable  
2 NT 4 operating system from 1996?

3 A. It does not affect it at all.

4 Q. Can you please explain why that is?

5 A. First off, Windows 2000, the sticker that you  
6 saw, that's a later operating system. But for  
7 Mr. Pall's demonstration, he wasn't using the Windows  
8 2000 operating system. He was using Windows NT 4, the  
9 earlier one from four years back.

10 Secondly, what he was demonstrating was the  
11 software. It's hard to find computers that are -- I'm  
12 getting hired; the math is harder -- but 16, 17 years  
13 old. So they found a computer that was close and  
14 installed the old software on it.

15 So he demonstrated how the software worked,  
16 and that software was from 1996. The fact that that  
17 computer once held an older -- excuse me -- a newer  
18 operating system is irrelevant.

19 Q. All right. Now, let me shift gears, and I  
20 want to ask you another question about the NT 4 system  
21 and AutoDial to follow up on a question that you were  
22 asked by Mr. McLeroy.

23 You may recall that you were asked several  
24 questions about AutoDial reconnecting.

25 Do you remember that?

1 A. Yes.

2 Q. And do you remember asking several questions  
3 of Mr. McLeroy and providing some answers about what  
4 reconnect meant in the context of NT 4 and AutoDial and  
5 PPTP VPNs?

6 Do you remember that?

7 A. Yes, sir.

8 Q. And you were asked a question and I believe  
9 that Mr. McLeroy again came over here to this board for  
10 the '135 patent, and what he pointed to was this phrase,  
11 automatically initiating the VPN.

12 Do you remember that line of questions, sir?

13 A. Yes, I do.

14 Q. And what you were asked, I believe, was about  
15 the very first time -- the very first time that a  
16 connection is made, and I think that you said that you  
17 didn't know in the demonstration that was done how the  
18 connection was made the very first time; is that right?

19 A. Yes, that's correct.

20 Q. All right. Now, from the demonstration that  
21 you saw and your knowledge of NT 4, do you know how the  
22 VPN was initiated the times thereafter?

23 A. Yes.

24 Q. Can you please tell us how the VPNs have been  
25 initiated for the second time and the third time and the

1 fourth time and every other time thereafter?

2 A. They were initiated automatically by AutoDial.

3 Q. All right. Shifting now from the NT 4 topic  
4 to DVPN, if I may, you were asked some questions about  
5 the DVPN source code.

6 Do you recall that?

7 A. Yes, I do.

8 Q. First of all, was the DVPN source code the  
9 only information that you considered about the DVPN  
10 demonstration that occurred in March of 1998?

11 A. No. No, I relied on a lot of other  
12 information.

13 Q. Can you tell us and remind us, please, what  
14 other information you considered about the DVPN  
15 demonstration from 1998, March, besides the source code?

16 A. Sure. One example was a description of -- a  
17 presentation that described the demo. I also had a  
18 number of e-mails that described it in detail. And I  
19 had deposition testimony.

20 Q. Now, did you believe -- after your review and  
21 study of that information, all the information you  
22 considered, did you believe that that information was  
23 sufficient to show clearly and convincingly what the  
24 demonstration showed in March of 1998 sufficient to show  
25 that it anticipated the claims at issue in this case?

1 A. Yes.

2 Q. Can you please explain why?

3 A. There was sufficient evidence. And as you  
4 will recall, clear and convincing evidence is the  
5 burden.

6 And when I studied that information, I found  
7 that that burden was met. All the information pointed  
8 to a demonstration that clearly met all of the asserted  
9 claims of the patents-in-suit.

10 Q. Now, I'd like to shift topics again and turn  
11 to the Aventail software.

12 MR. BOBROW: And, Chris, if I may ask you  
13 to put up Slide 18 from the PowerPoint.

14 Thank you.

15 Q. (By Mr. Bobrow) I believe that Mr. McLeroy  
16 showed you this -- I believe I took my notes down  
17 correctly. I believe it was this slide and asked you  
18 some questions about that.

19 Do you remember that line of questions and  
20 answers?

21 A. Yes, I do.

22 Q. And Mr. McLeroy was somehow suggesting that  
23 you were moving things around and changing up clients on  
24 us.

25 Do you remember that line of questioning?

1 A. Yes, I do.

2 Q. Now, if you take a look up on -- well, I won't  
3 ask you to strain your neck and look up there. You look  
4 at the monitor, but if the ladies of the jury look over  
5 here next to the words proxy chaining and above Server  
6 1, it says Server 1 appears as a user to Server 2.

7 Do you see that?

8 A. Yes.

9 Q. Can you please explain to us what that means  
10 and how that pertains to whether or not something can be  
11 a client at one time and a server at another?

12 A. Basically, what this says is that Server 1 is  
13 acting as a client to Server 2. It's acting as a user.

14 So, for example, this Aventail -- that didn't  
15 work; I wanted an arrow.

16 What's on the left is acting as a client to  
17 the outbound server, but the outbound server then acts  
18 as a client to this Server No. 2.

19 Q. And how can that be the case in computer  
20 science and in a client/server model? How is it  
21 something can be a client at one time with respect to  
22 one computer and a server at another time with respect  
23 to another computer? How does that work?

24 A. Well, client/server is a relationship. In  
25 fact, we can all see this in our lives.

1           Sometimes we're the clients, and sometimes  
2 we're the servers. And yet we're still just one person.  
3 It's a relationship between someone asking for  
4 information and someone providing it.

5           Q. All right. Thank you.

6           MR. BOBROW: Pass the witness.

7           THE COURT: Any recross?

8           MR. MCLEROY: No, Your Honor.

9           THE COURT: All right. Thank you. You  
10 may step down.

11           All right. Ladies of the Jury, that  
12 completes our week. I want to compliment y'all. You  
13 have been an extremely attentive jury. You've been  
14 taking notes and paying very close attention to some  
15 very tedious testimony. And I want to thank you for  
16 your efforts in that regard.

17           What we're going to do is we're going to  
18 recess here in a moment until Monday. I'll ask you to  
19 be back here at 9:00 o'clock on Monday morning.

20           We have about -- we have about three  
21 hours, three and a half more hours of the testimony --  
22 no, excuse me. We only have about a little less than  
23 three hours of testimony. So we should finish the  
24 testimony by 11:30, 12:00 o'clock on Monday.

25           We will then break for lunch, let you

1 have lunch, then come back after lunch. I will give you  
2 your final jury instructions. You will hear closing  
3 arguments. Then you can begin your deliberations Monday  
4 afternoon.

5                   So the end is in sight. That's good  
6 news. I want you to go home and have a relaxing  
7 weekend. Remember my instructions. Don't discuss the  
8 case among yourselves or with anyone else. Don't make  
9 any independent investigation. Just enjoy the weekend  
10 and don't think about this case.

11                   Come back with a clear head Monday  
12 morning, and we'll get this wrapped up on Monday for  
13 you.

14                   So with the Court's thanks, you're  
15 excused for the weekend.

16                   COURT SECURITY OFFICER: All rise for the  
17 jury.

18                   (Jury out.)

19                   THE COURT: Please be seated.

20                   Well, I am advised the jury would like to  
21 have a nice floral arrangement on the table. I'd like  
22 to know who would like to take care of that?

23                   All right. We'll allow both of you to  
24 get together and split the cost of the nice floral  
25 arrangement, but not anything too gaudy. Just something



1 nice for the spring, I think would be nice. They seem  
2 to be settling in and enjoying themselves.

3 All right. With regard to witnesses,  
4 what will we have on Monday?

5 MR. POWERS: On Monday, Your Honor, there  
6 will be some depositions and the final live witness will  
7 be Keith Ugone, our damages witness.

8 And subject to Your Honor -- I think it  
9 would be helpful for the parties to hear Your Honor's  
10 statement of how much time we have left, because I think  
11 we will probably need to be cutting down some of the  
12 deposition designations, and we will be doing that over  
13 the weekend and then that will close off Defendant's  
14 case.

15 THE COURT: All right. The Plaintiff has  
16 used 13 of their 14 hours, and the Defendant has used 12  
17 hours and 10 minutes of their 14 hours. So you have an  
18 hour and 50 minutes, and you have an hour.

19 MR. CAWLEY: Yes, Your Honor. We have  
20 one rebuttal witness. That will be Dr. Jones.

21 THE COURT: Okay. Very well. Anything  
22 further?

23 MR. POWERS: No, Your Honor.

24 THE COURT: All right. Y'all have a good  
25 weekend. We will see you on Monday.

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COURT SECURITY OFFICER: All rise.

(Court adjourned.)

\* \* \* \* \*

CERTIFICATION

I HEREBY CERTIFY that the foregoing is a true and correct transcript from the stenographic notes of the proceedings in the above-entitled matter to the best of my ability.

/s/ \_\_\_\_\_  
SUSAN SIMMONS, CSR  
Official Court Reporter  
State of Texas No.: 267  
Expiration Date: 12/31/10

\_\_\_\_\_  
Date

/s/ \_\_\_\_\_  
JUDITH WERLINGER, CSR  
Deputy Official Court Reporter  
State of Texas No.: 731  
Expiration Date: 12/31/10

\_\_\_\_\_  
Date

EXHIBIT F11

1 IN THE UNITED STATES DISTRICT COURT  
2 FOR THE EASTERN DISTRICT OF TEXAS  
3 TYLER DIVISION

4 VIRNETX \* Civil Docket No.  
5 \* 6:07-CV-80.  
6 VS. \* Tyler, Texas  
7 \*  
8 \* March 15, 2010.  
9 \* 9:00 A.M.  
10 MICROSOFT CORPORATION

11 TRANSCRIPT OF JURY TRIAL  
12 BEFORE THE HONORABLE JUDGE LEONARD DAVIS  
13 UNITED STATES DISTRICT JUDGE  
14

15 APPEARANCES:

16 FOR THE PLAINTIFFS: MR. DOUGLAS CAWLEY  
17 MR. BRADLEY CALDWELL  
18 MR. JASON D. CASSADY  
19 MR. LUKE MCLEROY  
20 McKool-Smith  
21 300 Crescent Court  
22 Suite 1500  
23 Dallas, TX 75201  
24  
25 MR. ROBERT M. PARKER  
Parker, Bunt & Ainsworth  
100 East Ferguson  
Suite 1114  
Tyler, TX 75702.

APPEARANCES CONTINUED ON NEXT PAGE:

COURT REPORTERS: MS. SUSAN SIMMONS, CSR  
Ms. Judith Werlinger, CSR  
Official Court Reporters  
100 East Houston, Suite 125  
Marshall, TX 75670  
903/935-3868.

(Proceedings recorded by mechanical stenography,  
transcript produced on CAT system.)

1 APPEARANCES CONTINUED:

2 FOR THE DEFENDANT:

MR. MATTHEW POWERS  
MR. JARED BOBROW  
MR. PAUL EHRlich  
MR. THOMAS KING  
MR. ROBERT GERRITY  
Weil Gotshal & Manges  
201 Redwood Shores Parkway  
5th Floor  
Redwood City, CA 94065

7 MS. ELIZABETH WEISWASSER  
MR. TIM DeMASI  
Weil Gotshal & Manges  
767 Fifth Avenue  
9 New York, NY 10153

10 MR. DANIEL BOOTH  
Weil Gotshal & Manges  
11 700 Louisiana  
Suite 1600  
12 Houston, TX 77002

13 MR. RICHARD SAYLES  
MR. MARK STRACHAN  
14 Sayles Werbner  
1201 Elm Street  
15 4400 Renaissance Tower  
Dallas, TX 75270

16 MR. ERIC FINDLAY  
17 Findlay Craft  
6760 Old Jacksonville Highway  
18 Suite 101  
Tyler, TX 75703

19 \* \* \* \* \*

21 P R O C E E D I N G S

08:04 22 (Jury out.)

08:04 23 COURT SECURITY OFFICER: All rise.

08:04 24 THE COURT: Please be seated.

08:04 25 All right. Do the parties have anything before we bring

08:04 1 the jury in?

08:04 2 MR. POWERS: A couple of matters, Your  
08:04 3 Honor.

08:04 4 One is an issue that came up at the  
08:04 5 pretrial conference, and it was VirnetX's motion in  
08:04 6 limine regarding our evidence that they had earlier  
08:04 7 accused of infringement, PPTP, which is now being  
08:04 8 asserted to be prior art.

08:04 9 And Your Honor granted that motion in  
08:04 10 limine. At Page 7, you said, I'll look at it closer  
08:04 11 between now and then. Bring it back up with me prior to  
08:04 12 trial. I think you're zeroing in on something that  
08:04 13 would probably be an admission. So if you want to use  
08:04 14 it to impeach their expert, to raise it now, and that's  
08:04 15 what we're doing now.

08:04 16 So the basic --

08:05 17 THE COURT: So you want to raise -- oh,  
08:05 18 yeah. Go ahead. Explain it to me a little further.

08:05 19 MR. POWERS: So the basic issue is this:  
08:05 20 As Your Honor knows, we're relying on PPTP to be a piece  
08:05 21 of prior art in the case. It's a Microsoft product that  
08:05 22 was done in 1996.

08:05 23 We believe that the fact that VirnetX's  
08:05 24 lawyers originally accused it of infringement and  
08:05 25 withdrew it only when they learned of the date is

08:05 1 evidence that should be allowed to be used in  
08:05 2 cross-examination of their validity expert on the  
08:05 3 question of whether PPTP does, in fact, come within the  
08:05 4 scope of the claims.

08:05 5 THE COURT: Response?

08:05 6 MR. McLEROY: Yes, Your Honor.

08:05 7 The short answer is, we never accused it  
08:05 8 of infringement. PPTP is not mentioned in our  
08:05 9 infringement contentions. I believe what Counsel is  
08:05 10 referring to is a letter that VirnetX's lawyers --  
08:05 11 former lawyers sent to Microsoft clarifying the  
08:05 12 definition of accused features in an interrogatory we  
08:06 13 propounded to Microsoft.

08:06 14 And as you can see from the context of the  
08:06 15 letter, as well as the interrogatories themselves, it's  
08:06 16 a broad definition of accused features that VirnetX used  
08:06 17 at the very beginning of the case, in November of 2007,  
08:06 18 to identify every possible infringing feature to do our  
08:06 19 analysis to see which infringed and which did not.

08:06 20 THE COURT: Okay. Is there a document or  
08:06 21 something that you would rely on, Mr. Powers?

08:06 22 MR. POWERS: There is, Your Honor. It's  
08:06 23 Exhibit 3252. I can hand up my copy, if you'd like.

08:06 24 THE COURT: All right. Bring up a copy of  
08:06 25 that.

08:06 1 And specifically --

08:06 2 MR. POWERS: The specific portion I  
08:06 3 believe is highlighted in that copy, Your Honor. And it  
08:06 4 is exactly as Counsel has characterized it. It's their  
08:06 5 lawyers saying, yes, the accused functionality includes  
08:07 6 PPTP and L2TP.

08:07 7 THE COURT: And let me see the  
08:07 8 interrogatory.

08:07 9 MR. McLEROY: May I approach?

08:07 10 THE COURT: Okay. When do you need to get  
08:07 11 into this with him?

08:07 12 MR. POWERS: It would be with their  
08:07 13 invalidity expert, who will be on this morning.

08:07 14 THE COURT: Next or --

08:07 15 MR. POWERS: No. It will be in their  
08:07 16 rebuttal case.

08:07 17 THE COURT: Right.

08:07 18 MR. POWERS: So we have -- it will be an  
08:07 19 hour and a half at least.

08:07 20 THE COURT: All right. Let me study on it  
08:07 21 a little bit.

08:07 22 What else?

08:07 23 MR. POWERS: Understood.

08:07 24 Your Honor, there were two offers of proof  
08:07 25 filed late last night on issues that have been



08:08 1 previously raised and subject of motions in limine, and  
08:08 2 we wanted to make those offers of proof and obtain  
08:08 3 indictment rulings from the Court on them.

08:08 4           The two issues are, I know, familiar to  
08:08 5 the Court from the motions in limine.

08:08 6           One is the question of the reexaminations.  
08:08 7 And that, of course, is relevant also to the witness  
08:08 8 coming up. It's relevant to various issues in the case  
08:08 9 and -- including, particularly, willfulness.

08:08 10           And so we wanted to obtain a definitive  
08:08 11 ruling from the Court on that issue.

08:08 12           THE COURT: It's overruled.

08:08 13           MR. POWERS: Understood.

08:08 14           THE COURT: Okay.

08:08 15           MR. POWERS: And the second one on which  
08:08 16 we wanted a definitive ruling is the question of  
08:08 17 Microsoft patents which are covering the accused  
08:08 18 functionality. On that one, Your Honor had earlier  
08:08 19 ruled as well. There is one change that has happened  
08:08 20 during the trial that does affect that issue.

08:08 21           The change is that their damages expert  
08:08 22 testified on direct examination that one of the reasons  
08:09 23 he believed some of the licenses he was relying upon  
08:09 24 were particularly relevant was that they included PNRP  
08:09 25 patents owned by Microsoft.

08:09 1                   So this is now a situation that is  
08:09 2 different from how it was presented to Your Honor in the  
08:09 3 motions in limine, because now VirnetX has made -- has  
08:09 4 affirmatively opened the door to the relevance and  
08:09 5 relied upon the relevance of Microsoft's patents on the  
08:09 6 accused functionality.

08:09 7                   And, therefore, we think that that opening  
08:09 8 of the door should allow Microsoft to introduce those  
08:09 9 patents into evidence.

08:09 10                   THE COURT: All right. Response?

08:09 11                   MR. CASSADY: Your Honor, I don't think  
08:09 12 it's actually a fair representation to say that we've  
08:09 13 done anything outside of what we've always intended for  
08:09 14 these licenses.

08:09 15                   When Mr. Sayles and I argued the  
08:10 16 admissibility of the MCPP and WSPP licenses, I  
08:10 17 specifically referred to the PNRP-related technologies  
08:10 18 that has to go into those licenses. That was Wednesday.  
08:10 19 Here we are Monday morning. That never got brought up  
08:10 20 for five days that somehow that opened the door to any  
08:10 21 issue related to these patents.

08:10 22                   Furthermore, Dr. Ugone --

08:10 23                   THE COURT: So what are you raising,  
08:10 24 untimeliness in their --

08:10 25                   MR. CASSADY: Well, that's one, Your

08:10 1 Honor, or this is just a hail Mary at the end, that they  
08:10 2 never thought it was relevant, and they're bringing it  
08:10 3 in now. That's one.

08:10 4 Number two, Your Honor, Dr. Ugone never  
08:10 5 talked about these patents in his report. He doesn't  
08:10 6 specifically refer to these patent numbers. He doesn't  
08:10 7 specifically refer to the Microsoft technology patents.

08:10 8 Three, Dr. Johnson, who he has to rely on  
08:10 9 for the technical knowledge of these patents, didn't  
08:10 10 refer to these patents either with regards to the  
08:10 11 technology in this case.

08:10 12 THE COURT: But Mr. Reed did.

08:10 13 MR. CASSADY: Mr. Reed said that these  
08:10 14 patents are related to technologies that Microsoft  
08:11 15 licenses out.

08:11 16 Now what the Defendant's trying to do is  
08:11 17 come in and say that these patents are for Microsoft  
08:11 18 Windows products. So if the Windows product is  
08:11 19 accused -- or is covered by one of our patents, then it  
08:11 20 can't possibly infringe this patent.

08:11 21 They're trying to bring in or backdoor in  
08:11 22 an inadmissible argument based on their own patents.

08:11 23 MR. POWERS: May I respond briefly, Your  
08:11 24 Honor?

08:11 25 THE COURT: Yes.

08:11 1 MR. POWERS: Mr. Reed went beyond merely  
08:11 2 saying these are patents that Microsoft licenses out.  
08:11 3 Mr. Reed attempted to increase the relevance of those  
08:11 4 licenses in the eyes of the jury by saying that these  
08:11 5 patents related to the accused functionality, and it was  
08:11 6 that link that clearly opened the door.

08:11 7 THE COURT: Okay. And for what purpose do  
08:11 8 you want to introduce these patents?

08:11 9 MR. POWERS: As evidence of Microsoft's  
08:11 10 patents on its own functionality.

08:11 11 If he's relying on them and introducing  
08:11 12 them and affirmatively relying on them, the patents  
08:11 13 themselves should be in evidence before the jury.

08:11 14 THE COURT: But are you -- are you wanting  
08:12 15 to use them to rebut his testimony regarding the damages  
08:12 16 issue?

08:12 17 MR. POWERS: In part, yes, but in part,  
08:12 18 they should be admissible now that he's opened the door.  
08:12 19 He's opened the door to the relevance of those patents.

08:12 20 THE COURT: But --

08:12 21 MR. POWERS: And one purpose would be to  
08:12 22 rebut his testimony. One purpose would be that  
08:12 23 Microsoft --

08:12 24 THE COURT: And what would you rebut about  
08:12 25 his testimony?

08:12 1 MR. POWERS: The relevance in relationship  
08:12 2 between those patents and the accused functionality, and  
08:12 3 to the extent they actually do cover the accused  
08:12 4 functionality, that's relevant to the jury as well.

08:12 5 MR. CASSADY: Your Honor, the only  
08:12 6 question that these go to is comparability of the  
08:12 7 licenses. Mr. Reed testified about the comparability of  
08:12 8 the MCPP and WSPP license programs.

08:12 9 And he said, one reason they're comparable  
08:12 10 is they include PNRP-related patents and other  
08:12 11 technologies. He specifically said that this is what  
08:12 12 Windows -- or this is what Microsoft uses to license  
08:12 13 that technology out.

08:12 14 He did not say they're related to Windows.  
08:12 15 He did not say they're related to server. He did not go  
08:12 16 into that detail.

08:12 17 Dr. Ugone can easily get on the stand and  
08:13 18 say that these licenses are not comparable without those  
08:13 19 patents in his hand, as evidenced by the fact that he  
08:13 20 never referred to those patents --

08:13 21 THE COURT: I'm not going to allow the  
08:13 22 patents to be introduced. I will allow Dr. Ugone to  
08:13 23 testify as to the damages aspect with regard to the  
08:13 24 patents.

08:13 25 MR. CASSADY: And, so, Your Honor, just so

08:13 1 we're clear, you mean he can get up and say that these  
08:13 2 cover the Windows products, and they cover the products  
08:13 3 in this case, those patents?

08:13 4 THE COURT: No. No.

08:13 5 MR. CASSADY: Okay. Thank you, Your  
08:13 6 Honor.

08:13 7 THE COURT: Okay.

08:13 8 MR. POWERS: One housekeeping matter, Your  
08:13 9 Honor. I think there's an agreement between the  
08:13 10 parties. In that large list of exhibits that we offered  
08:13 11 on the first day, Microsoft inadvertently included  
08:13 12 DX3455, which is a physical hard drive of the source  
08:13 13 code.

08:13 14 And so the parties have agreed that we'll  
08:13 15 have a placeholder for that where there will be a  
08:13 16 picture of the hard drive, and Microsoft will retain the  
08:13 17 physical hard drive in case it's needed for anything.

08:13 18 THE COURT: Yes. And that should be the  
08:13 19 practice with any physical objects. Substitute a  
08:13 20 photograph for it.

08:13 21 MR. POWERS: The last thing, Your Honor,  
08:13 22 on the housekeeping side, I thought Your Honor might  
08:14 23 want the times for the depositions that are going to be  
08:14 24 read today, so you'll have that in advance.

08:14 25 THE COURT: Okay.

08:14 1 MR. POWERS: I'll give you the sequence,  
08:14 2 if you like. There's going to be four depositions  
08:14 3 played before Mr. Ugone goes on. Those will be Becker,  
08:14 4 Hopen, Sterne, and then Kindred, and then Dr. Ugone will  
08:14 5 go on.

08:14 6 And then the final two witnesses will also  
08:14 7 be by deposition. That will be Victor Larson with an O  
08:14 8 and then Kindell Larsen with an E. And the times for  
08:14 9 all of those depositions are 50 minutes for Microsoft,  
08:14 10 5-0, and 17 and a half minutes for VirnetX.

08:14 11 THE COURT: Okay. Very good.

08:14 12 All right.

08:14 13 MR. POWERS: I understand that VirnetX's  
08:14 14 rebuttal case includes two depositions, which as I  
08:14 15 understand it, are about four and a half minutes.

08:14 16 So the total -- and I think almost none  
08:15 17 for Microsoft. So the totals for all the depositions  
08:15 18 will be 50 for Microsoft and about 22 for VirnetX.

08:15 19 THE COURT: Is that correct?

08:15 20 MR. CALDWELL: I think it actually is  
08:15 21 correct, with the exception of the part that VernetX  
08:15 22 will not play in its rebuttal case. I think we will  
08:15 23 play that by ear. So 50 and 17.

08:15 24 THE COURT: Okay. We'll go --

08:15 25 MR. CASSADY: 50 minutes and 17 and a

08:15 1 half.

08:15 2 THE COURT: Yeah. We'll do the 50 and the  
08:15 3 17 and a half, and you remind me if you put in those two  
08:15 4 later depositions.

08:15 5 MR. CALDWELL: Yes, Your Honor.

08:15 6 THE COURT: All right. Anything further?

08:15 7 MR. POWERS: Nothing further, Your Honor.

08:15 8 THE COURT: All right. Bring the jury in.  
08:16 9 (Jury in.)

08:16 10 THE COURT: Please be seated.

08:16 11 Good morning, Ladies of the Jury.

08:16 12 Did you like your flowers?

08:16 13 JUROR: Yes. Very good. Thank you.

08:16 14 THE COURT: Well, that's complement of  
08:16 15 both parties. I told them of your desire to have a --  
08:16 16 after such a pretty week, to be locked up in here with  
08:16 17 no windows all week, I think those flowers are very  
08:16 18 appropriate, and both Plaintiff and Defendant split the  
08:16 19 cost of those, and we hope that you like them.

08:16 20 JUROR: Thank you.

08:16 21 THE COURT: All right. Very good then.

08:16 22 Thank you for your jury service last week  
08:16 23 again. And today is, hopefully, our final day, if we --  
08:16 24 we're going to try to work very hard and move through  
08:16 25 the evidence.



08:16 1 We have about a little less than three  
08:16 2 hours of testimony to hear this morning, so we're going  
08:16 3 to get started.

08:16 4 With that, Mr. Powers, you may call your  
08:16 5 first witness.

08:16 6 MR. McLEROY: Your Honor, may we handle a  
08:17 7 couple of exhibits?

08:17 8 THE COURT: Certainly, uh-huh.

08:17 9 MR. McLEROY: There are two exhibits. We  
08:17 10 move to admit Plaintiff's Exhibits 985 and 1034. I do  
08:17 11 not believe there are any objections.

08:17 12 MR. POWERS: No objection, Your Honor.

08:17 13 THE COURT: Be admitted.

08:17 14 MR. McLEROY: And, Your Honor, may I also  
08:17 15 bring to the front a copy of our exhibits -- list of  
08:17 16 exhibits admitted Friday?

08:17 17 THE COURT: All right. You certainly may.  
08:17 18 That will be accepted without objection.

08:17 19 MR. POWERS: And similarly, Your Honor, we  
08:17 20 have a list of exhibits to be admitted today as to which  
08:17 21 there's no objection and a cumulative list of exhibits  
08:17 22 admitted through Friday, including the list to be  
08:17 23 admitted today.

08:17 24 THE COURT: Any objection to those to be  
08:17 25 admitted today?

08:17 1 MR. McLEROY: No, Your Honor.

08:17 2 THE COURT: All right. Be admitted, and  
08:17 3 the other list is accepted without objection.

08:17 4 All right. Who will be your first witness  
08:17 5 today?

08:17 6 MR. POWERS: Our first witness, Your  
08:17 7 Honor, will be Mr. Becker from SafeNet by video  
08:17 8 deposition.

08:17 9 THE COURT: Okay. Thank you.

08:18 10 I'll tell the ladies of the jury, we have  
08:18 11 four depositions, I'm advised, of four different  
08:18 12 witnesses coming up, and the runtime on them is going to  
08:18 13 be a little over an hour, about an hour and ten minutes.

08:18 14 So just sit back and enjoy.

08:18 15 (Video playing.)

08:18 16 QUESTION: Good morning, Mr. Becker. You  
08:18 17 are Mr. Bill Becker?

08:18 18 ANSWER: Yes.

08:18 19 QUESTION: Okay. Thank you very much.

08:18 20 Mr. Becker, where are you currently  
08:18 21 employed?

08:18 22 ANSWER: I work at SafeNet, Incorporated.

08:18 23 QUESTION: And what is SafeNet,  
08:18 24 Incorporated?

08:18 25 ANSWER: It's an information security

08:18 1 company located on -- headquartered in Belcamp,  
08:18 2 Maryland.

08:18 3 QUESTION: Okay. How long have you been  
08:18 4 an employee of SafeNet?

08:18 5 ANSWER: Since July 1996, 13 years.

08:18 6 QUESTION: Do you recall that at some  
08:18 7 period in time, you met with individuals from a company  
08:19 8 called SAIC?

08:19 9 ANSWER: Yes.

08:19 10 QUESTION: What -- what do you  
08:19 11 specifically recall about the technology that you were  
08:19 12 shown?

08:19 13 ANSWER: It was a -- it was a solution  
08:19 14 to -- they called it EasyVPN. It was a solution to have  
08:19 15 their software distribute policy to an IP SEC client and  
08:19 16 IP SEC gateway, and they were trying to make it easier  
08:19 17 and more intuitive for the end user.

08:19 18 QUESTION: Was SAIC trying to get you at  
08:19 19 SafeNet interested in their technology?

08:19 20 ANSWER: In some degree, yeah.

08:19 21 QUESTION: Do you recall -- I'm going to  
08:19 22 show you, in connection with that evaluation, a document  
08:19 23 bearing Bates No. SAFE-0006. I'm going to mark it as  
08:20 24 Exhibit 371.

08:20 25 And I'd like to know if this refreshes

08:20 1 your recollection of your conclusions about the EasyVPN  
08:20 2 technology.

08:20 3 ANSWER: It's an accurate summary.

08:20 4 QUESTION: Does this document, Mr. Becker,  
08:20 5 appear to be an accurate summary of SafeNet's evaluation  
08:20 6 of the EasyVPN technology that would have been created  
08:20 7 in the ordinary course of its business?

08:20 8 ANSWER: Yes.

08:20 9 QUESTION: And what was your conclusion as  
08:20 10 to whether the EasyVPN technology would actually  
08:20 11 accomplish the simplicity that it was trying to  
08:20 12 accomplish?

08:20 13 ANSWER: The concept of -- for the users,  
08:21 14 it might be simpler, but there was a lot of complexity  
08:21 15 in the software in actually implementing it, especially  
08:21 16 with trying to load stuff into a router.

08:21 17 QUESTION: So in your view, would the  
08:21 18 technology that SAIC had shown you actually accomplish,  
08:21 19 ultimately, any real simplicity?

08:21 20 ANSWER: No, not really.

08:21 21 QUESTION: Is it accurate, as this memo  
08:21 22 says, that it seemed that the -- that the complexity it  
08:21 23 was trying to eliminate had simply been moved from one  
08:21 24 place to another?

08:21 25 ANSWER: That's accurate, yes.

08:21 1 QUESTION: What exactly does it mean that  
08:21 2 the complexity that they were trying to eliminate had  
08:21 3 simply been moved from one place to another?

08:21 4 ANSWER: Their -- the complexity at the  
08:21 5 time of VPNs was configuring policy of who could talk to  
08:21 6 who, what different gateways and clients could talk to  
08:21 7 each other.

08:21 8 So they were trying to simplify it from  
08:21 9 the user's perspective in that they could just use .scom  
08:21 10 extensions, and if something was .scom, it would go  
08:21 11 secure there.

08:21 12 But the complexity would get moved from  
08:22 13 the user's interface now into their software, and from  
08:22 14 their software, it would be complex to get it -- to get  
08:22 15 the keys derived and load it into like a Cisco router or  
08:22 16 a VPN client.

08:22 17 So they were moving the complexity kind of  
08:22 18 from the user interface down further into the -- into  
08:22 19 the networking stack.

08:22 20 QUESTION: So would you call this solution  
08:22 21 that SAIC claimed to have, would you call it really just  
08:22 22 something that was, in reality, complex?

08:22 23 ANSWER: Yeah. The implementation was  
08:22 24 complex, yes.

08:22 25 QUESTION: And do you know whether

08:22 1 SafeNet, in fact, ultimately adopted this EasyVPN  
08:22 2 technology?

08:22 3 ANSWER: We did not.

08:22 4 QUESTION: Okay. Can you name some VPN  
08:22 5 companies that have failed?

08:22 6 ANSWER: There's a company called Open  
08:22 7 Reach that failed. I remember the -- there were -- I  
08:22 8 don't remember the names of them all. There are a  
08:22 9 number of them that have disappeared over the years.

08:23 10 QUESTION: Can you estimate how many VPN  
08:23 11 companies have failed in the market?

08:23 12 ANSWER: A guess is maybe ten.

08:23 13 QUESTION: Is setting up a VPN a hard  
08:23 14 problem?

08:23 15 ANSWER: It -- it can be.

08:23 16 QUESTION: How can setting up a VPN be a  
08:23 17 hard problem?

08:23 18 ANSWER: If -- if a user interface or the  
08:23 19 rules are -- are complex for a -- for a system, it could  
08:23 20 be hard to -- hard to set up and hard to get  
08:23 21 operational.

08:24 22 QUESTION: Did you think VirnetX's EasyVPN  
08:24 23 technology was a bad idea?

08:24 24 ANSWER: No. I didn't -- I didn't think  
08:24 25 it was a bad idea.

08:24 1 QUESTION: Just hard to implement?

08:24 2 ANSWER: It's hard to implement, yes.

08:24 3 QUESTION: And I think you said that  
08:24 4 moving the complexity from one place to another -- what  
08:24 5 did you mean by that?

08:24 6 ANSWER: I was referring to moving the --  
08:24 7 the complexity from -- from the user to the -- to the  
08:24 8 software that interfaces to load keys into the gateway  
08:24 9 and into the client.

08:25 10 QUESTION: So would you agree that EasyVPN  
08:25 11 technology, once implemented, would make it easier for a  
08:25 12 user to set up or create a VPN?

08:25 13 ANSWER: It might compared to certain  
08:25 14 products, and it might not compared to other products.

08:25 15 (End of video clip.)

08:25 16 MR. POWERS: Your Honor, the next witness  
08:25 17 will be Mr. Hopen from Aventail, and the total time will  
08:25 18 be 14 minutes.

08:25 19 THE COURT: All right. You've already  
08:25 20 given me the times, haven't you?

08:25 21 MR. POWERS: I've given you the cumulative  
08:25 22 times, yes.

08:25 23 THE COURT: All right.

08:25 24 (Video playing.)

08:25 25 QUESTION: Can you please introduce

08:25 1 yourself?

08:25 2 ANSWER: I'm Chris Hopen. I was a  
08:25 3 cofounder of Aventail Corporation back in 1996.

08:25 4 QUESTION: Okay. What were your job  
08:25 5 titles while at Aventail?

08:26 6 ANSWER: I ran engineering, so I was Vice  
08:26 7 President of engineering and Chief Technology Officer.

08:26 8 QUESTION: What was Aventail Connect  
08:26 9 Version 3.1?

08:26 10 ANSWER: Aventail connect 3.1 was a piece  
08:26 11 of software that would run on an end user's PC that  
08:26 12 would provide additional secure communications services  
08:26 13 to applications running on that PC. It would -- it was  
08:26 14 a client in a pair of a client/server solutions that we  
08:26 15 sold.

08:26 16 So it was one component of what we  
08:26 17 referred to as Aventail ExtraNet Center. And so  
08:26 18 Aventail Connect was the component that was the  
08:26 19 client-side software that would be distributed and run  
08:26 20 on individual users' systems.

08:26 21 QUESTION: What was the name of the other  
08:26 22 component of the -- of the Aventail ExtraNet Center?

08:26 23 ANSWER: Yeah. So, typically, ExtraNet  
08:26 24 Center was sort of the umbrella name, if you will, for  
08:27 25 the entire product. The -- I believe at that point in



08:27 1 time -- we had a number of different marketing names  
08:27 2 over the years, and I believe at that time, we would  
08:27 3 just call that the VPN server component, which was a  
08:27 4 SOCKS 5-based proxy server.

08:27 5 QUESTION: Can you tell me approximately  
08:27 6 when the development of Aventail Connect Version 3.1  
08:27 7 started?

08:27 8 ANSWER: Well, Aventail Connect 3.0 or  
08:27 9 3.X, the 3.X series began -- if you want to go all the  
08:27 10 way back, the purpose -- one of the main purposes for  
08:27 11 3.X was what was called a layered service provider  
08:27 12 architecture from Microsoft and part of the WinSock 2.0  
08:27 13 standard.

08:27 14 That development started, I would say, in  
08:28 15 late '97, probably -- probably that kind of timeframe,  
08:28 16 because at that time, Intel and the WinSock community of  
08:28 17 vendors were working together on a standard.

08:28 18 And so if you -- if you trace it back, you  
08:28 19 know, that was probably when we began the discussions  
08:28 20 and design discussions around what would become 3.X or  
08:28 21 3.1.

08:28 22 QUESTION: I'd like to mark our first  
08:28 23 exhibit. I guess we'll mark it Hopen Exhibit 1. It's  
08:28 24 labeled AVEN 1 through AVEN 124.

08:28 25 And I'd like to ask you, Mr. Hopen, to

08:28 1 take a look at Hopen Exhibit 1 and let me know if you  
08:29 2 recognize what that document is.

08:29 3 ANSWER: Yes. This is -- this is the  
08:29 4 Administrator's Guide that we shipped with the Aventail  
08:29 5 Connect and Aventail ExtraNet Center product.

08:29 6 QUESTION: How was the -- well, was the  
08:29 7 Aventail Connect Administrator's Guide distributed to  
08:29 8 anyone?

08:29 9 ANSWER: It was part of the product  
08:29 10 distribution that we would distribute to any prospect  
08:29 11 or -- or end customer.

08:29 12 QUESTION: Was the proxy chaining  
08:29 13 deployment ever actually done for a real corporation?

08:30 14 ANSWER: Yes.

08:30 15 QUESTION: And what -- what -- what  
08:30 16 customers did the proxy chaining deployment?

08:30 17 ANSWER: The two -- one -- you want me to  
08:30 18 name them or --

08:30 19 QUESTION: Please.

08:30 20 ANSWER: Okay. So one of the customers  
08:30 21 that -- that liked proxy chaining exclusively was a  
08:30 22 company called DuPont. They had -- as most people know,  
08:30 23 if you know DuPont, they have many, many subsidiaries in  
08:30 24 really sort of this -- it's a conglomerate of other  
08:30 25 companies and brands.

08:30 1           So they had an incredibly complex internal  
08:30 2 network, and so proxy chaining was one of the only  
08:30 3 solutions that they could find to solve some of their  
08:30 4 unique secure-access challenges.

08:30 5           QUESTION: Were there other clients of  
08:30 6 yours that deployed the proxy chaining?

08:30 7           ANSWER: There were. I mean, certainly, a  
08:31 8 lot of times, I would only know about it if they had  
08:31 9 specific questions or issues or challenges around it. A  
08:31 10 lot of times there -- you know, there was more  
08:31 11 involvement sort of at the field engineering team level.

08:31 12           I believe Kodak may have been another one  
08:31 13 that used it extensively. Exxon Mo -- or what were they  
08:31 14 called at the time? I guess it was just Exxon -- was  
08:31 15 another company that used it, so...

08:31 16           QUESTION: Okay. Did Aventail ever give  
08:31 17 betas of Aventail Connect 3.1 to the press for  
08:31 18 evaluation?

08:31 19           ANSWER: Yes. Yes.

08:31 20           QUESTION: Can you take a look, please, at  
08:31 21 Hopen Exhibit 2, and let me know what it is?

08:31 22           ANSWER: This looks like a Network  
08:31 23 Computing article that was written to outline  
08:31 24 features -- new features and benefits of the Aventail  
08:32 25 ExtraNet Center solution.

08:32 1 QUESTION: Can you go down to the fourth  
08:32 2 paragraph? Do you see the one that starts Network  
08:32 3 Computing?

08:32 4 ANSWER: Yes.

08:32 5 QUESTION: So going through that sentence,  
08:32 6 it says: Network computing conducted an exclusive test  
08:32 7 of AEC 3.1 --

08:32 8 ANSWER: Yes.

08:32 9 QUESTION: -- and Connect 3.1 betas --

08:32 10 ANSWER: Yes.

08:32 11 QUESTION: -- in our real-world labs (R)  
08:32 12 at Syracuse University.

08:32 13 ANSWER: Yes.

08:32 14 QUESTION: Do you see that?

08:32 15 ANSWER: Yes.

08:32 16 QUESTION: Was there ever a point in time  
08:32 17 that Aventail Connect 3.1 was demonstrated at either  
08:32 18 trade shows or conferences?

08:32 19 ANSWER: Yes. Yeah, that was commonplace.

08:32 20 QUESTION: Let me mark another document as  
08:32 21 Hopen Exhibit 3.

08:32 22 Mr. Hopen, if you will, please, take a  
08:32 23 look at Hopen Exhibit 3 and let me know if you recognize  
08:33 24 what it is.

08:33 25 ANSWER: This looks like a press release,

08:33 1 basically, that we would put out there saying ahead of  
08:33 2 time, prior to -- looks like this show was the  
08:33 3 Networld+Interop show. We would put that out prior so  
08:33 4 that people would see it, and if they were going to the  
08:33 5 show, that they would know that we were going to be  
08:33 6 there and stop by and see whatever the latest and  
08:33 7 greatest was.

08:33 8 QUESTION: Did you go to these Interop  
08:33 9 shows?

08:33 10 ANSWER: Yes. Yes.

08:33 11 QUESTION: Do you see underneath there it  
08:33 12 says: Live demonstrations at Aventail ExtraNet Center  
08:33 13 will be featured at NetWorld+Interop at the Las Vegas  
08:33 14 Convention Center from May 11 through 13th at the  
08:33 15 Aventail Booth No. 953 and at the Extranet hot spot  
08:33 16 Booth No. 8469?

08:33 17 ANSWER: Yes.

08:33 18 QUESTION: Do you -- do you recall  
08:33 19 whether, in fact, there was a live demonstration of  
08:33 20 Aventail ExtraNet Center?

08:33 21 ANSWER: Yeah. I believe I was at this  
08:33 22 actual event. We had this running both -- there was an  
08:34 23 Aventail booth, which is, you know, a traditional kind  
08:34 24 of corporate booth that you would see at any trade show.  
08:34 25 We would have workstations out front with

08:34 1 salespeople standing by those workstations. Typically,  
08:34 2 they would show the Connect client itself in operation,  
08:34 3 and then they would also show like the Aventail ExtraNet  
08:34 4 Center Management console and -- and, you know, the user  
08:34 5 interface and those kinds of things and talk with  
08:34 6 customers about how they would use it, how they would  
08:34 7 deploy it, pricing, I mean, you know, any question under  
08:34 8 the sun.

08:34 9                   The hot spot booth was more of a  
08:34 10 multi-vendor area where people who had different VPN,  
08:34 11 Extranet kind of solutions could come and customers  
08:34 12 could see them side by side and kind of compare and  
08:34 13 contrast them.

08:35 14                   QUESTION: And if you look at the second  
08:35 15 sentence there, you see where it says: Aventail  
08:35 16 ExtraNet Center 3.1 will be available in June, price  
08:35 17 starting the \$7,995?

08:35 18                   ANSWER: Yes.

08:35 19                   QUESTION: And to the best of your  
08:35 20 knowledge, that's when Aventail started to offer to sell  
08:35 21 Aventail ExtraNet Center 3.1?

08:35 22                   ANSWER: Yes.

08:35 23                   QUESTION: Okay. Was Aventail Connect  
08:35 24 Version 3.1 a successful product?

08:35 25                   ANSWER: Yes. Yeah, it was well received.

08:35 1 QUESTION: Can you give me examples of  
08:35 2 some of the customers that purchased Aventail Connect  
08:35 3 Version 3.1?

08:35 4 ANSWER: The Principal Financial Group,  
08:35 5 Mass Mutual, Morgan Stanley, Bear Stearns, DuPont,  
08:35 6 Kodak. I could -- if you give me enough time, I can go  
08:35 7 on and on and on.

08:35 8 QUESTION: That's --

08:35 9 ANSWER: So I don't know how many you  
08:35 10 want, but...

08:36 11 QUESTION: Mr. Hopen, are you being  
08:36 12 compensated today for your time?

08:36 13 ANSWER: Yes.

08:36 14 QUESTION: And you're being compensated by  
08:36 15 Microsoft for your time?

08:36 16 ANSWER: Yes.

08:36 17 QUESTION: Are you being compensated at  
08:36 18 your normal consulting rate?

08:36 19 ANSWER: Yes.

08:36 20 QUESTION: With all that in mind, is it  
08:36 21 your opinion that Aventail was a success as a company?

08:36 22 ANSWER: So I wore a number of different  
08:36 23 hats at Aventail, right? I was a founder. I was an  
08:36 24 employee, right? I was on the board, right? And so it  
08:36 25 depends on which hat you want me to put on to answer

08:36 1 that question.

08:36 2 QUESTION: Let's talk about it from a  
08:36 3 commercial shareholder perspective. In that sense, do  
08:36 4 you see Aventail as a commercial success?

08:36 5 ANSWER: I would say probably not. You  
08:36 6 know, given the same statement, you know, that  
08:36 7 Aventail -- or that Evan had detailed down here, you  
08:36 8 know, it was the best transaction for the investors.  
08:37 9 Would I call that a success? No.

08:37 10 QUESTION: Did Aventail apply for any  
08:37 11 patents on its 3.1 product?

08:37 12 ANSWER: I don't believe so.

08:37 13 QUESTION: Version 3.1 of Aventail Connect  
08:37 14 could set up secure encrypted connections, right?

08:37 15 ANSWER: Yes.

08:37 16 QUESTION: It could also be used to set up  
08:37 17 non-encrypted --

08:37 18 ANSWER: Correct.

08:37 19 QUESTION: -- connections?

08:37 20 And when the host name request is received  
08:37 21 by the Aventail Connect software, it makes a  
08:37 22 determination of whether or not redirection rules apply?

08:37 23 ANSWER: Correct.

08:37 24 QUESTION: But just because a redirection  
08:37 25 rule applies does not necessarily mean that it's going



08:37 1 to be ultimately an encrypted connection, right?

08:37 2 ANSWER: Correct.

08:37 3 QUESTION: All right. The redirection  
08:37 4 rule is applied, and at that point, Aventail Connect  
08:37 5 software returns an IP address to the application?

08:38 6 ANSWER: Yes.

08:38 7 QUESTION: At that point, it hasn't tried  
08:38 8 to contact the Aventail server?

08:38 9 ANSWER: For -- for that particular  
08:38 10 application, correct.

08:38 11 QUESTION: And then the application, after  
08:38 12 it receives the IP address, it may or may not send a  
08:38 13 connection request back to the Aventail Connect  
08:38 14 software, right?

08:38 15 ANSWER: Yes.

08:38 16 QUESTION: And --

08:38 17 ANSWER: It's part of the standard sockets  
08:38 18 API.

08:38 19 QUESTION: If it never sends a connection  
08:38 20 request, no connection, secure or otherwise, will be  
08:38 21 established, right?

08:38 22 ANSWER: Correct.

08:38 23 QUESTION: Would you agree that it's  
08:38 24 possible there are people out in the industry who don't  
08:38 25 think SOCKS is a VPN protocol?

08:38 1 ANSWER: Yeah.

08:38 2 QUESTION: And in 2000, do you think it's  
08:38 3 pretty likely that there are people out there who  
08:38 4 thought that SOCKS was not a VPN protocol?

08:39 5 ANSWER: Sure, yes.

08:39 6 QUESTION: In the Aventail 3.1 product,  
08:39 7 did you ever consider using -- let me back up.

08:39 8 Have you ever heard of IP SEC?

08:39 9 ANSWER: Sure.

08:39 10 QUESTION: You've heard of L2TP?

08:39 11 ANSWER: Yes.

08:39 12 QUESTION: Those are VPN protocols, right?

08:39 13 ANSWER: Yes.

08:39 14 QUESTION: Did Aventail ever consider  
08:39 15 using any of those protocols in place of SOCKS?

08:39 16 ANSWER: Not until -- in the early, I  
08:39 17 would say probably not until 2002 maybe, somewhere in  
08:39 18 that timeframe. But, yeah, not until later.

08:39 19 QUESTION: Not in conjunction with the 3.1  
08:39 20 release?

08:39 21 ANSWER: No.

08:39 22 QUESTION: Domain names that were used in  
08:39 23 Aventail 3.1 were all standard domain names, right?

08:39 24 ANSWER: Yes.

08:39 25 QUESTION: They could all be resolved by

08:39 1 standard DNS?

08:39 2 ANSWER: Yeah. We didn't manipulate  
08:39 3 domain names, I don't think, in any of the products. We  
08:39 4 would just passively inspect them.

08:40 5 (End of video clip.)

08:40 6 MR. POWERS: The next witness, Your Honor,  
08:40 7 is Mr. Sterne from Trust Information Systems and  
08:40 8 relating to the DMLP project.

08:40 9 THE COURT: Okay.

08:40 10 (Video playing.)

08:40 11 QUESTION: Good morning, Mr. Sterne.

08:40 12 Can you please introduce yourself?

08:40 13 ANSWER: My name is Dan Sterne. I'm an  
08:40 14 employee of Sparta, Incorporated.

08:40 15 QUESTION: Mr. Sterne, can you give me a  
08:40 16 brief description of your education starting with  
08:40 17 college?

08:40 18 ANSWER: Yes. I earned a bachelor's  
08:40 19 degree in mathematics at the University of Washington in  
08:40 20 1972 and a master's degree in computer science at the  
08:40 21 University of North Carolina at Chapel Hill in 1978.

08:40 22 QUESTION: I want to shift gears a little  
08:40 23 bit and focus on what I believe is a specific example of  
08:40 24 some work that you did for DARPA.

08:40 25 Have you ever heard of a project called

08:40 1 Dynamic Virtual Private Network or DVPN?

08:40 2 ANSWER: Yes.

08:40 3 QUESTION: Can -- was DVPN -- was the DVPN  
08:41 4 project a DARPA project?

08:41 5 ANSWER: It was funded by DARPA, yes.

08:41 6 QUESTION: Were you involved in the  
08:41 7 Dynamic VPN project?

08:41 8 ANSWER: Yes, I was.

08:41 9 QUESTION: Okay. And what was your role?

08:41 10 ANSWER: I was the team leader for the  
08:41 11 effort. I conceived, working with a couple of other  
08:41 12 people, of the idea and oversaw its prototype and  
08:41 13 development through its lifetime.

08:41 14 QUESTION: What was Dynamic VPN?

08:41 15 ANSWER: DVPN was an attempt to find a  
08:41 16 more flexible and scalable way of allowing separate  
08:41 17 networks to be unified in a way that the boundaries  
08:41 18 between them, even if they were separated geographically  
08:41 19 and so forth, would become very transparent so they  
08:41 20 would be -- have the effect of being part of one  
08:42 21 network.

08:42 22 QUESTION: The --

08:42 23 ANSWER: Can I add to that?

08:42 24 QUESTION: Sure. Of course.

08:42 25 ANSWER: And -- and what we sought to do

08:42 1 was make it much easier, much more automated, find a  
08:42 2 more automated -- sorry -- more automated way of doing  
08:42 3 that in a way that was very flexible and dynamic.

08:42 4 So the goals were basically to allow this  
08:42 5 kind of marrying of separate networks into a unified  
08:42 6 network to be done rapidly without a lot of advance  
08:42 7 planning and with minimal human intervention.

08:42 8 QUESTION: When did you start the DVPN  
08:42 9 project?

08:42 10 ANSWER: I would probably double-check my  
08:42 11 notes, but I think it was early in 1997.

08:42 12 QUESTION: Okay. I'd like to mark as  
08:43 13 Sterne Exhibit 2 a document labeled Sparta 1808 through  
08:43 14 1811.

08:43 15 Mr. Sterne, I'd like you to take a look at  
08:43 16 Sterne Exhibit 2 and let me know if you've ever seen it  
08:43 17 before.

08:43 18 ANSWER: I have.

08:43 19 QUESTION: Can you tell me what it is,  
08:43 20 please?

08:43 21 ANSWER: This is an e-mail exchange  
08:43 22 between Domenic Turchi and myself with other people  
08:43 23 being cc'd. This is an attempt to describe the  
08:43 24 highlight of the design of VPN and to talk about some of  
08:43 25 the technical details of how it would work.

08:43 1 QUESTION: And when was this document  
08:43 2 created?

08:43 3 ANSWER: October 28th, 1997.

08:43 4 QUESTION: And was it created by  
08:44 5 Mr. Turchi?

08:44 6 ANSWER: It -- it was in the sense that  
08:44 7 this particular document was created by him; however,  
08:44 8 this was probably the result of several iterations  
08:44 9 between myself and Domenic Turchi.

08:44 10 QUESTION: So does the firewall then make  
08:44 11 the decision as to whether to create a VPN?

08:44 12 ANSWER: Yes, it does.

08:44 13 QUESTION: And what actually creates the  
08:44 14 VPN? Is it -- I'm sorry. Is it the firewall that  
08:44 15 actually then creates the VPN after it makes a decision?

08:44 16 ANSWER: Yes.

08:44 17 QUESTION: Did TIS ever demonstrate  
08:44 18 Dynamic VPN at any IFDs or IFEs?

08:44 19 ANSWER: Yes. It was demonstrated at  
08:44 20 IFD -- I think it was 1.1. It was the first IFD. It  
08:44 21 was then -- that particular technology was then kind of  
08:45 22 put on hold for a while, and then I believe it was shown  
08:45 23 at one of the later IFEs. I believe it was 3.1, but I  
08:45 24 would need to double-check my records to be sure.

08:45 25 QUESTION: I want to mark some more

08:45 1 documents, if I may. Let me mark as Sterne Exhibit 7 a  
08:45 2 document -- a document labeled Sparta 1844 through 1854.

08:45 3 Mr. Sterne, if you could please take a  
08:45 4 look at Sterne Exhibit 7. I don't know if you've seen  
08:45 5 it before.

08:45 6 ANSWER: I have.

08:45 7 QUESTION: Can you tell me what Sterne  
08:45 8 Exhibit 7 is, please?

08:45 9 ANSWER: Yes. It is a description of the  
08:46 10 configuration of all the computer networking gear used  
08:46 11 in the IFD, IFD 1.1 with certain areas highlighted to  
08:46 12 show the components that were being used for some  
08:46 13 portion of the demonstrations.

08:46 14 QUESTION: To the best of your knowledge,  
08:46 15 does the first page of Sterne Exhibit 7 describe the  
08:46 16 Dynamic VPN demonstration that the TIS did at IFD 1.1?

08:46 17 ANSWER: I believe so.

08:46 18 QUESTION: Who was the individual, to the  
08:46 19 best of your recollection, who actually demonstrated  
08:46 20 Dynamic VPN at IFD 1.1?

08:46 21 ANSWER: It was probably Domenic Turchi.  
08:46 22 Again, Darrell Kindred would be the only other person,  
08:46 23 and I don't believe Darrell was involved at this point.

08:47 24 QUESTION: Now, the Dynamic VPN prototype  
08:47 25 appears to have evolved over time. Would you agree with

08:47 1 that?

08:47 2 ANSWER: Yes.

08:47 3 QUESTION: So when it comes to actually  
08:47 4 how it was implemented, that's something that is not  
08:47 5 within the scope of -- of your definitive authority?

08:47 6 ANSWER: Well, I would say, after 10 or 12  
08:47 7 years, I'm not sure I remember those details very well.  
08:47 8 Darrell Kindred, who did the programming, can tell you  
08:47 9 with greater accuracy. I can give you conceptually how  
08:47 10 I believe it works, but I may not be a hundred percent  
08:47 11 correct.

08:47 12 QUESTION: So the implementation details  
08:47 13 would have changed over time?

08:47 14 ANSWER: They -- implementation details  
08:47 15 would have changed over time, though not necessarily  
08:47 16 because the concept or the underlying ideas changed.  
08:47 17 It's just that the prototype is a partial implementation  
08:47 18 of the idea.

08:47 19 You kind of develop the things that you  
08:47 20 think are most interesting to a particular audience, and  
08:48 21 then it -- as time and money permits, you then backfill  
08:48 22 and, you know, create the other missing pieces. But  
08:48 23 that's the nature of prototyping, is you generally pick  
08:48 24 some things that you implement and some things that you  
08:48 25 don't, at least initially.



08:48 1 QUESTION: Do you think you're the best  
08:48 2 person to answer those questions, those implementation  
08:48 3 questions?

08:48 4 ANSWER: No.

08:48 5 QUESTION: And again, in order to know  
08:48 6 exactly what was demonstrated in the spring of '98,  
08:48 7 you'd need to look at the source code?

08:48 8 ANSWER: To know exactly what was  
08:48 9 demonstrated, yes.

08:48 10 QUESTION: Now --

08:48 11 ANSWER: Let me -- let me clarify that.

08:48 12 That would wouldn't be authoritative  
08:48 13 either because the demonstration didn't show everything  
08:48 14 that was in the implementation.

08:48 15 QUESTION: And turn again to this figure,  
08:49 16 Sparta 1513. It's Dynamic Security Perimeter -  
08:49 17 Establishing VPN.

08:49 18 ANSWER: Okay.

08:49 19 QUESTION: You see the domain names that  
08:49 20 are in that box in the bottom left?

08:49 21 ANSWER: Yes.

08:49 22 QUESTION: Are those standard top-level  
08:49 23 domain names?

08:49 24 ANSWER: I'm not sure I understand the  
08:49 25 question.

08:49 1 QUESTION: Do you know what a top-level  
08:49 2 domain name is?

08:49 3 ANSWER: Sure, like .com and .mil.

08:49 4 QUESTION: Right.

08:49 5 ANSWER: Sure. .mil is a top-level domain  
08:49 6 name.

08:49 7 QUESTION: Is it a standard top-level  
08:49 8 domain name that would be handled by an IETF-compliant  
08:49 9 domain name service?

08:49 10 ANSWER: I believe so.

08:49 11 QUESTION: And you understand what I mean  
08:49 12 by an IETF domain name service?

08:49 13 ANSWER: You're talking about conformance  
08:49 14 to a standard protocol.

08:49 15 QUESTION: Correct. So the domain names  
08:50 16 that are being referred to on this page of Exhibit 5 all  
08:50 17 possess standard top-level domain names, correct?

08:50 18 ANSWER: In this example, yes.

08:50 19 QUESTION: Was DVPN, Dynamic Virtual  
08:50 20 Private Network, as described in your paper, Exhibit 14,  
08:50 21 was that ever sold as a commercial product?

08:50 22 ANSWER: Not to my knowledge. Not -- not  
08:50 23 by my organization.

08:50 24 QUESTION: To your knowledge, was it ever  
08:50 25 sold by anyone?

08:50 1 ANSWER: Not to my knowledge.

08:50 2 QUESTION: Did -- did you ever seek or  
08:50 3 apply for any patent protection in connection with any  
08:50 4 of the ideas that were expressed in Exhibit 14 relating  
08:50 5 to Dynamic Virtual Private Networks?

08:51 6 ANSWER: No.

08:51 7 (End of video clip.)

08:51 8 MR. POWERS: The next witness, Your Honor,  
08:51 9 is Mr. Kindred, who worked with Mr. Sterne on the DVPN  
08:51 10 project.

08:51 11 (Video playing.)

08:51 12 QUESTION: Good afternoon, Mr. Kindred.

08:51 13 Can you please introduce yourself?

08:51 14 ANSWER: I am Darrell Kindred. I'm an  
08:51 15 employee currently here at Sparta, and I was in the --  
08:51 16 previous to my employment at Sparta, I was employed at  
08:51 17 McAfee, which was at times known as Network Associates,  
08:51 18 as a senior research scientist there.

08:51 19 QUESTION: What is your current job title  
08:51 20 at Sparta?

08:51 21 ANSWER: Senior research scientist.

08:51 22 QUESTION: Okay. When you joined Network  
08:51 23 Associates, was there a particular project that you were  
08:51 24 assigned to?

08:51 25 ANSWER: The first project that I was

08:51 1 assigned to after joining was the Dynamic VPN project.

08:52 2 QUESTION: Who -- when you joined, who was  
08:52 3 the -- the leader of the DVPN team?

08:52 4 ANSWER: Dan Sterne was the leader of  
08:52 5 the -- I mean, DVPN was one project under a general  
08:52 6 contract that Dan was -- was the project manager for, so  
08:52 7 he was directing the work.

08:52 8 QUESTION: And what was your role on the  
08:52 9 Dynamic VPN project?

08:52 10 ANSWER: I was the -- you know, at that  
08:52 11 point, I guess I was basically the lead developer, I  
08:52 12 would say, or the only -- the only developer, really, on  
08:52 13 the project at that time.

08:52 14 So Dan asked me to, you know, look into  
08:52 15 this code and -- and, you know, get it working on a --  
08:52 16 in a -- and -- you know, and prepare it for being  
08:52 17 demonstrated at other facilities.

08:52 18 QUESTION: And let me mark as Kindred  
08:53 19 Exhibit 1 a disk -- CD of -- a CD labeled Sparta 2236-1.

08:53 20 Is that code dated in Kindred Exhibit 1?

08:53 21 ANSWER: So there are a few ways that I  
08:53 22 can -- that I can say it's dated. The files in this  
08:53 23 directory have modification times that would be updated  
08:53 24 anytime that that file is modified.

08:53 25 And in most instances, these modification

08:53 1 times that I'm looking at in the DVPN D folder, for  
08:53 2 example, are February 1998, March 1998. There are a  
08:53 3 couple back in November of 1997.

08:53 4           You know, I could look at other files in  
08:53 5 here, but...

08:54 6           QUESTION: Now, can you describe for me  
08:54 7 the process of setting up a VPN, for example, from the  
08:54 8 Red Cross LAN to the FEMA LAN starting with a host on  
08:54 9 the Red Cross LAN who wants to communicate with a host  
08:54 10 who's located on the FEMA LAN?

08:54 11           ANSWER: Okay. And again, I'll be  
08:54 12 referring to the original implementation from '98 or  
08:54 13 thereabouts.

08:54 14           QUESTION: Please.

08:54 15           ANSWER: So a host in the Red Cross LAN  
08:54 16 wants to communicate with a host in the FEMA LAN. So  
08:54 17 I'll use it as an example that there might be a web  
08:54 18 server in the FEMA LAN that someone with a web browser  
08:54 19 in the Red Cross LAN may want to access.

08:54 20           They would type into their browser a URL  
08:54 21 that includes a host name for this host in the FEMA LAN.  
08:55 22 They would enter that into their browser. The browser  
08:55 23 or the operating system would then initiate a DNS  
08:55 24 request to find the IP address that corresponds to that  
08:55 25 host name.

08:55 1           That DNS request would go to the local Red  
08:55 2 Cross firewall first where the DVPN agent would  
08:55 3 intercept that DNS request. The DVPN agent would then  
08:55 4 forward the request to the domain name server.

08:55 5           I believe that was -- there was typically  
08:55 6 a standard domain name server on the firewall itself, so  
08:55 7 the DVPN agent would -- would basically proxy that DNS  
08:55 8 request and relay it to the local server, which would  
08:56 9 then send the request wherever it needed to be to -- to  
08:56 10 resolve the name so that that local DVP -- that local  
08:56 11 DNS server on the firewall might already have the  
08:56 12 information cached, it might already know what IP  
08:56 13 address corresponded to that name, or it might have to  
08:56 14 go to a server, say, at the FEMA LAN or elsewhere to  
08:56 15 resolve that name.

08:56 16           When the response to that request comes  
08:56 17 back, it, again, comes back from the local DNS server on  
08:56 18 the firewall to the DVPN agent. The DVPN agent inspects  
08:56 19 the response and looks -- because the response is going  
08:56 20 to have a -- the IP address of that remote server in it.

08:56 21           Okay. So that would be an IP address  
08:56 22 within the FEMA LAN. The DVPN agent will look at that  
08:56 23 IP address and -- and attempt to determine whether that  
08:57 24 address is inside a community member, coalition member  
08:57 25 enclave in this case.

08:57 1 In order to do that, the information on  
08:57 2 who the enclave members are is stored in DNS as well,  
08:57 3 but this is a different DNS zone that is maintained or  
08:57 4 for which the master for that DNS zone is the Community  
08:57 5 Manager.

08:57 6 It's going to retrieve information from --  
08:57 7 from -- either directly from the Community Manager or  
08:57 8 may already have it cached as to who are the members of  
08:57 9 the enclave. If any of those enclave members -- you  
08:57 10 know, each of -- each of those records for the enclave  
08:58 11 members will include a specification of what's the  
08:58 12 subnet, what's the IP address range that sits behind the  
08:58 13 firewall, so whatever is the range of firewall addresses  
08:58 14 within the FEMA LAN, for instance.

08:58 15 So the DVPN agent will notice that the  
08:58 16 response to the DNS request is an IP address from that  
08:58 17 LAN. It will notice that it has not already configured  
08:58 18 a VPN tunnel to that FEMA firewall. It will then  
08:58 19 rewrite configuration of the configuration file that  
08:58 20 is -- that is read by the VPN software that's part of  
08:58 21 the firewall.

08:58 22 It will write the new information in there  
08:58 23 that the firewall needs in order to establish the VPN  
08:58 24 tunnel with the FEMA firewall, and the -- and it will  
08:58 25 then signal the local firewall, the local fire -- the

08:59 1 local VPN process on the -- on the Red Cross firewall to  
08:59 2 reread its configuration, and upon rereading its  
08:59 3 configuration, it will initiate negotiation of a VPN  
08:59 4 tunnel with the FEMA firewall.

08:59 5 So that is the VPN agent in the -- I'm  
08:59 6 sorry -- the -- yeah -- the VPN component in the Red  
08:59 7 Cross firewall will initiate negotiation of a tunnel  
08:59 8 with the corresponding software on the FEMA.

08:59 9 Meanwhile, the VPN agent, which has  
08:59 10 received this -- this DNS response back, will relay that  
08:59 11 response back to the host that requested it inside the  
08:59 12 fire -- inside the Red Cross LAN.

08:59 13 The Red Cross LAN host will now have the  
08:59 14 IP address that it needs to send the actual request to  
09:00 15 the web server to ask for whatever web page it wanted.

09:00 16 That request will go out to the firewall  
09:00 17 and through the tunnel that has been established to the  
09:00 18 FEMA firewall where it will be -- come out of the tunnel  
09:00 19 at that end and be relayed on to the server in the FEMA  
09:00 20 network.

09:00 21 And at that point, the client in the Red  
09:00 22 Cross LAN and the server in the FEMA LAN are able to  
09:00 23 communicate securely through this VPN tunnel that's been  
09:00 24 established between their firewalls.

09:00 25 QUESTION: So the name itself for the --



09:00 1 the domain name that's associated with what you had  
09:00 2 referred to as the FEMA server, that domain name didn't  
09:00 3 trigger the VPN being initiated; it was a response to  
09:01 4 that domain name request; is that right?

09:01 5           ANSWER: The request -- the request and  
09:01 6 the response are both intercepted. The response is what  
09:01 7 contains the information necessary to determine whether,  
09:01 8 you know -- the DMLP agent uses information out of the  
09:01 9 response to determine whether -- as part of the  
09:01 10 information that needs to determine whether a new tunnel  
09:01 11 needs to be set up.

09:01 12           (End of video clip.)

09:01 13           MR. SAYLES: May it please the Court.

09:01 14           At this time, Microsoft calls Dr. Keith  
09:01 15 Ugone --

09:01 16           THE COURT: Okay.

09:01 17           MR. SAYLES: -- its damages expert, and he  
09:01 18 has not been sworn.

09:01 19           THE COURT: Dr. Ugone?

09:02 20           MR. SAYLES: May I approach and hand up  
09:02 21 the exhibits?

09:02 22           THE COURT: Yes, you may.

09:02 23           COURTROOM DEPUTY: Please raise your hand.

09:02 24           (Witness sworn.)

09:02 25           MR. SAYLES: May it please the Court.

09:02 1 THE COURT: Proceed.

09:02 2 KEITH UGONE, Ph.D., DEFENDANT'S WITNESS, SWORN

09:02 3 DIRECT EXAMINATION

09:02 4 BY MR. SAYLES:

09:02 5 Q. Dr. Ugone, everyone in the courtroom knows that  
09:02 6 we're under time constraints, so let's go to work right  
09:02 7 away, without diminishing the importance of your work,  
09:02 8 all right?

09:02 9 A. Okay.

09:02 10 Q. And let's work rapidly.

09:02 11 Tell us your name, please.

09:02 12 A. My name is Keith Raymond Ugone. Last name is  
09:02 13 spelled U-G-O-N-E.

09:02 14 Q. Where do you live?

09:02 15 A. I actually live in Grand Saline, Texas. If  
09:02 16 you've ever been to Trade Days on I-20 there in Canton,  
09:02 17 I live the next exit over.

09:02 18 Q. How long have you lived in Texas?

09:02 19 A. Lived in Texas since 1994, sir, about 16 years.

09:02 20 Q. Have children?

09:02 21 A. I've got two sons. Son No. 1, Kyle, is a  
09:03 22 captain in the United States Marine Corps, and Son No.  
09:03 23 2, Casey, lives with me and goes to Tyler Junior  
09:03 24 College.

09:03 25 Q. What do you do for a living, sir?

09:03 1           A.     I'm actually an economist.  Sometimes I'm  
09:03 2 referred to as a forensic economist, and I'm also a  
09:03 3 damage quantifier.

09:03 4           Q.     Would you tell the ladies of the jury what a  
09:03 5 forensic economist or a damage quantifier is.

09:03 6           A.     The easiest way to think about it is, is that  
09:03 7 companies like VirnetX and Microsoft sometimes get into  
09:03 8 commercial disputes, and one of them is claiming  
09:03 9 wrongful conduct and claiming they've been monetarily  
09:03 10 damaged.

09:03 11                         So someone has to evaluate the amount of  
09:03 12 the alleged monetary damage, and that's what I do as a  
09:03 13 damage quantifier.

09:03 14           Q.     And what was your assignment in this case?

09:03 15           A.     I really had two assignments.  One was to  
09:03 16 independently evaluate VirnetX's claim damages should  
09:03 17 the '135 patent and the '180 patent be found to have  
09:03 18 been infringed by Microsoft and also that those patents  
09:04 19 are found to be valid.

09:04 20                         So if those conditions hold, I have an  
09:04 21 opinion as to the monetary damages suffered by VirnetX,  
09:04 22 but I was also asked to evaluate the opinions that  
09:04 23 Mr. Reed presented in court as to what he felt VirnetX's  
09:04 24 damages were.

09:04 25           Q.     And before we get into the work you did on this

09:04 1 matter, tell us about your educational background.

09:04 2 A. I have the slide here. I've got my  
09:04 3 undergraduate degree in economics from the University of  
09:04 4 Notre Dame in 1977, and I have a master's degree from  
09:04 5 the University of Southern California, which I received  
09:04 6 in 1979. And I got my Ph.D. in economics from Arizona  
09:04 7 State University in 1983. So I went to college for 10  
09:04 8 straight years.

09:04 9 Q. Would you tell us a bit about your work  
09:04 10 experience after you got your Ph.D.?

09:04 11 A. Well, after I got my Ph.D. in 1983, I worked at  
09:04 12 one of the California State University systems schools,  
09:04 13 California State Northridge, for a couple of years.

09:04 14 But then in 1985, I joined  
09:05 15 PriceWaterhouse, which I'm sure you've just heard of  
09:05 16 them, the company that counts the Academy Awards  
09:05 17 ballots. But I worked for them for 18 years, from 1985  
09:05 18 all the way up to 2003.

09:05 19 At the very end of 2003, I joined Analysis  
09:05 20 Group, and I've been there ever since. So about six or  
09:05 21 seven years.

09:05 22 Q. Have you done this type of work in patent cases  
09:05 23 before?

09:05 24 A. Yes, I have.

09:05 25 Q. And have you testified in patent cases before?

09:05 1 A. Yes, I've testified in patent cases.

09:05 2 Q. Have you done this type of work for some  
09:05 3 companies that the jury might have heard of or be  
09:05 4 familiar with by name?

09:05 5 A. Yes. I've done this work in the past for  
09:05 6 Microsoft. I have done this work for Samsung. I have  
09:05 7 done this work for AOL, for Electronic Data Systems. I  
09:05 8 have done this work for TiVo. So a large number of  
09:05 9 companies that people have heard of.

09:05 10 Q. Let's get to your assignment. What did you do  
09:05 11 to prepare yourself to give the opinions that you hold  
09:05 12 in this case?

09:05 13 A. Well, we can see a slide here that shows a  
09:06 14 listing of the documentation I reviewed. Actually,  
09:06 15 there are many, many more documents than this. This is  
09:06 16 just an overview.

09:06 17 But you can see I looked at Microsoft  
09:06 18 documents, VirnetX -- VirnetX documents. I considered  
09:06 19 the trial testimony; I was reading deposition  
09:06 20 transcripts; I had interviews with Microsoft employees;  
09:06 21 I had interviews with Dr. Johnson. You can see  
09:06 22 everything that I reviewed. This is probably a good  
09:06 23 summary of that.

09:06 24 Q. Now, you heard Mr. Reed testify about the  
09:06 25 materials that he reviewed.

09:06 1                   Essentially, did you and Mr. Reed have  
09:06 2 access to the same materials?

09:06 3           A.     Yes. We would have had access to the same  
09:06 4 materials.

09:06 5           Q.     Now, as an initial matter, let me ask you this  
09:06 6 before we get started.

09:06 7                   From an economic perspective what happens  
09:06 8 if the jury finds that Microsoft does not infringe these  
09:06 9 patents?

09:06 10           A.     Well, if Microsoft is found not to infringe the  
09:06 11 patents in dispute here, then from an economic  
09:06 12 perspective, there's been no monetary harm to VirnetX,  
09:07 13 so there would be no damages.

09:07 14           Q.     And if the jury finds these patents invalid,  
09:07 15 from an economic standpoint, what does that mean?

09:07 16           A.     And so that would, again, lead to the situation  
09:07 17 where there's no monetary damages in that situation.

09:07 18           Q.     All right. Now let's go to your opinions.  
09:07 19 Before we get into the details, give the jury an  
09:07 20 overview of what your opinions are?

09:07 21           A.     Sure. I have a couple of opinions. First one  
09:07 22 is is that Mr. Reed, in his presentation, has  
09:07 23 significantly overstated VirnetX's claim damages.

09:07 24                   The opinions I hold is that the parties,  
09:07 25 if they had negotiated a license to the patents in

09:07 1 dispute here, would have negotiated a lump-sum payment  
09:07 2 structure and the payment would have ranged between \$9  
09:07 3 million and \$15 million for a license to the two patents  
09:07 4 in dispute here.

09:07 5 Q. Mr. Reed did a Georgia-Pacific analysis to  
09:07 6 determine the royalty payment that he testified about in  
09:08 7 his testimony, and you were here for that?

09:08 8 A. Yes.

09:08 9 Q. Essentially, did Mr. Reed describe the  
09:08 10 framework of a Georgia-Pacific analysis properly?

09:08 11 A. Yes, he did. There's 15 Georgia-Pacific  
09:08 12 factors, and I'm not going to dispute his presentation.  
09:08 13 I think those are generally accepted factors.

09:08 14 Q. All right. So we won't go into details about  
09:08 15 explaining those factors except as they relate in other  
09:08 16 ways to your opinions. But did you do a Georgia-Pacific  
09:08 17 analysis?

09:08 18 A. Yes.

09:08 19 Q. Now, Mr. Reed conducted what is known as a  
09:08 20 hypothetical negotiation analysis; is that right?

09:08 21 A. Yes.

09:08 22 Q. Did you also perform a hypothetical negotiation  
09:08 23 analysis?

09:08 24 A. Yes, I did.

09:08 25 Q. In doing that in the legal framework you are to

09:08 1 follow, are you required to make any assumptions?

09:08 2 A. I have and I have a slide on that, and you can  
09:08 3 see a negotiating table here. And it's a hypothetical  
09:08 4 negotiation because the parties did, in fact, not  
09:08 5 negotiate a license in the past, but I am required to  
09:09 6 make certain assumptions, which I have listed on the --  
09:09 7 the right side of the chart there.

09:09 8 Some of the assumptions I am required to  
09:09 9 make are that the patents are valid, enforceable and  
09:09 10 infringed. And that the parties, both VirnetX and  
09:09 11 Microsoft, would have a willingness to negotiate, that  
09:09 12 VirnetX would be willing to give a license to the  
09:09 13 patents we've been talking about and that Microsoft  
09:09 14 would be willing to acquire a license.

09:09 15 But what's important is in this  
09:09 16 hypothetical negotiation is that the parties go into the  
09:09 17 negotiation as prudent business people. They go in  
09:09 18 smart. They have knowledge as to the relevant economic  
09:09 19 factors to help them determine the appropriate royalty  
09:09 20 payment for the use of the patents, and they have  
09:09 21 reasonable expectations as to future events.

09:09 22 And then finally, I think as the jury has  
09:09 23 understood, nobody can kind of leave this room without  
09:09 24 having reached an agreement, so they must reach an  
09:10 25 agreement.



09:10 1                   But this is the general framework of the  
09:10 2 hypothetical negotiation.

09:10 3           Q.     In a hypothetical negotiation, can one side  
09:10 4 dictate to the other the outcome?

09:10 5           A.     Well, the best way to think about it is we're  
09:10 6 trying to determine a reasonable royalty payment, and so  
09:10 7 what that means is one side can't dictate the outcome.  
09:10 8 There has to be the inner play between the negotiations  
09:10 9 to determine this reasonable payment.

09:10 10          Q.     Now, in the context of a case like we have  
09:10 11 here, you are required to do this hypothetical  
09:10 12 negotiation framework because that's the legal method in  
09:10 13 which you do it; is that right?

09:10 14          A.     Yes.

09:10 15          Q.     But do the real world facts count?

09:10 16          A.     Yes, the real world facts count. As I said,  
09:10 17 these are business people going into the negotiations,  
09:10 18 and so there would have been relevant financial  
09:10 19 information and economic considerations at the time of  
09:10 20 the hypothetical negotiation. So even though it's a  
09:10 21 hypothetical negotiation, you're still using real world  
09:10 22 information and real world economic considerations.

09:11 23          Q.     And let's talk about the hypothetical  
09:11 24 negotiation. Remind the ladies of the jury when it  
09:11 25 would have taken place.

09:11 1 A. Well, it would have been in early 2003 or March  
09:11 2 2003. That's the time of the alleged first  
09:11 3 infringement, so that's the point when Microsoft would  
09:11 4 have required a license to the patents-in-suit, so  
09:11 5 that's when the negotiations would have taken place.

09:11 6 Q. Between which parties?

09:11 7 A. And at that time, SAIC owned the patents that  
09:11 8 have been discussed here, so it'd be between SAIC and  
09:11 9 Microsoft. So, hopefully, I'm not hitting this too  
09:11 10 much. I don't know if that's disturbing to people.

09:11 11 Q. Could you tell us what would have been  
09:11 12 discussed at the negotiation, what topics?

09:11 13 A. Well, what I'm really here to present is the  
09:11 14 economic questions that would be answered at the  
09:11 15 hypothetical negotiation, and I've kind of hinted at  
09:11 16 these.

09:11 17 But there's really two primary ones. The  
09:11 18 first one is what's the payment structure for a license  
09:11 19 to the patents-in-suit, and the second one is what's the  
09:11 20 payment amount. So how much is going to be paid and  
09:12 21 what are the -- what's the structure of those payments.  
09:12 22 Those are two important economic questions to be  
09:12 23 addressed.

09:12 24 Q. And what types of payment structure are there?

09:12 25 A. Well, I've got a slide that shows two of them.

09:12 1 There's actually various combinations, but it's easiest  
09:12 2 to think about these two. The first is called a  
09:12 3 lump-sum payment structure, and a lump-sum payment  
09:12 4 structure, as the slide says, is just sort of an upfront  
09:12 5 paid-in-full royalty payment.

09:12 6 So the parties negotiate. They determine  
09:12 7 the amount of the payment as paid upfront and then you  
09:12 8 have a license and a freedom to operate using the  
09:12 9 patents that have been licensed, so it's one-time  
09:12 10 payment.

09:12 11 The second type is called a running  
09:12 12 royalty, and the easiest way to think about that is that  
09:12 13 that's one that's -- could be based on volume. So if  
09:12 14 the volumes go up, there's higher payments; if the  
09:12 15 volumes go down, there's lower payments. So there can  
09:12 16 either be a lump-sum upfront payment or there can be a  
09:13 17 running royalty payment.

09:13 18 Q. Now in this case --

09:13 19 THE COURT: Excuse me, Dr. Ugone. You may  
09:13 20 want to lean back a little bit or move that. You can  
09:13 21 move that microphone out a little bit. It's sort of  
09:13 22 bent around there. You're popping a little bit.

09:13 23 THE WITNESS: Okay.

09:13 24 Q. (By Mr. Sayles) Now, in this case you know Mr.  
09:13 25 Reed is contending for a running royalty, right?

09:13 1 A. Yes.

09:13 2 Q. And your opinion is that there would have been  
09:13 3 an upfront paid-in-full royalty?

09:13 4 A. That's correct.

09:13 5 Q. And are there advantages and disadvantages to  
09:13 6 either structure?

09:13 7 A. Sure. Yes, there's -- depending on sort of the  
09:13 8 facts and circumstances and -- and the economic  
09:13 9 circumstances surrounding the businesses and the  
09:13 10 license, that dictates which of these makes sense. So  
09:13 11 yes, there are advantages and disadvantages to both.

09:13 12 Q. All right. Now let's talk about the  
09:13 13 hypothetical negotiation. And could you tell the jury  
09:13 14 what economic factors would have been important in a  
09:13 15 hypothetical negotiation between SAIC on the one hand  
09:14 16 and Microsoft on the other?

09:14 17 A. Well, I'm going to go through six topics of  
09:14 18 discussion. I'm going to briefly touch on the thousands  
09:14 19 of features and functionalities contained in the accused  
09:14 20 software products; I'm going to talk about the usage of  
09:14 21 the accused functionalities; I'm going to talk about  
09:14 22 Microsoft's patent licensing practices; I'm going to  
09:14 23 talk about SAIC's failure to commercialize the SAIC  
09:14 24 technology.

09:14 25 And I think we've -- the jury has heard of

09:14 1 this. We're only going to talk about the SAIC licenses  
09:14 2 with SafeNet and VirnetX, and I'm also going to talk  
09:14 3 about certain value indicators that existed over time.

09:14 4 Now, some of these things you've already  
09:14 5 heard of, but what I'm going to try to do is take these  
09:14 6 and put them in the context of the hypothetical  
09:14 7 negotiation so you can see how these would be used in  
09:14 8 the negotiating process to determine a reasonable  
09:14 9 royalty payment.

09:14 10 Q. All right. Let's start with the first one.

09:14 11 Can you explain the economic significance  
09:14 12 of the fact that there were thousands of features and  
09:15 13 functionalities in the products that are accused here?

09:15 14 A. Well, this -- from just listening to trial  
09:15 15 throughout the past week seems to be undisputed,  
09:15 16 especially when you talk about Windows XP and Windows  
09:15 17 Vista, that there's many, many basic, but important  
09:15 18 features and functionalities in those operating systems.

09:15 19 And I think you've seen some of the  
09:15 20 witnesses use a computer. Well, the operating system  
09:15 21 helps the computer recognize the keyboard or the  
09:15 22 operating system, allows the text and the graphics to be  
09:15 23 displayed on a monitor. The operating system helps the  
09:15 24 computer recognize a printer so you can print documents.  
09:15 25 Those are all important features and some of the

09:15 1 thousands of features that are included in the operating  
09:15 2 systems in XP and Vista that we've been talking about  
09:15 3 up. And I think as we've also heard that there's many,  
09:15 4 many hundreds, if not thousands, of APIs as well.

09:16 5 Q. And from an economic standpoint, what is the  
09:16 6 significance of that?

09:16 7 A. Well, the significance of that is if you look  
09:16 8 at the complexity of the product, that with XP and  
09:16 9 Vista, for example, there's these thousands of  
09:16 10 functionalities, and what the parties are negotiating  
09:16 11 over are just some limited features or functionalities  
09:16 12 within this much larger software product in a sense.

09:16 13 Q. The next economic consideration you mentioned  
09:16 14 that you would discuss is the usage of these accused  
09:16 15 functionalities. Would you explain that, please?

09:16 16 A. Yes. And this would be important to the  
09:16 17 negotiators at the -- at the hypothetical negotiation.  
09:16 18 And I have a slide on this one as well.

09:16 19 But when I'm talking about usage, what I'm  
09:16 20 really looking at, first of all, is sort of the usage of  
09:16 21 the accused functionalities relative to the usage of  
09:16 22 just the XP and Vista operating systems in general. And  
09:16 23 relatively speaking, obviously, these accused  
09:16 24 functionalities are used in a much more limited sense  
09:17 25 than the entire operating systems.

09:17 1 But in this example here, I just tried to  
09:17 2 give a little bit of an idea of that, that over -- if  
09:17 3 you look from 2003 to 2008, there were roughly 280  
09:17 4 million copies of XP and Vista in the United States.  
09:17 5 But at the same time people that had client access  
09:17 6 licenses that allowed LCS and OCS to be used with XP and  
09:17 7 Vista, so those were licenses that would allow, in a  
09:17 8 sense, a combination of these software products, were  
09:17 9 only about 15 million dollars -- 15 million copies. If  
09:17 10 we roundly look at those numbers, 14.8 million.

09:17 11 The point is that's much less than the 280  
09:17 12 million, and that would be important to the negotiators  
09:17 13 at that negotiating table.

09:17 14 Q. Dr. Ugone, I'm going to point out above your  
09:17 15 head here the right-hand corner where there's a DX  
09:17 16 number there.

09:18 17 Are there exhibit references on the  
09:18 18 graphics that you've prepared to explain your testimony?

09:18 19 A. Yes.

09:18 20 Q. And so this data comes from information that  
09:18 21 was available to you and Mr. Reed?

09:18 22 A. That's correct.

09:18 23 Q. Now Mr. Reed concluded that had Microsoft would  
09:18 24 agree to pay royalties relating to the '135 patent for  
09:18 25 each and every copy of Windows XP and Vista?

09:18 1           A.     That's correct.  So he's -- he is calculating  
09:18 2 royalties on the big blue bar, even though it's -- it  
09:18 3 would be the -- my understanding -- for the alleged  
09:18 4 infringement, that there would have to be this  
09:18 5 combination of -- for the '135 patent XP and Vista with  
09:18 6 LCS and OCS.

09:18 7           Q.     Do you agree with Mr. Reed's conclusion?

09:18 8           A.     No, I do not.

09:18 9           Q.     Why not?

09:18 10          A.     Well, if you think about it, if you are a  
09:18 11 business person at the negotiating table, while you're  
09:18 12 negotiating a license to the '135 and the '180 patent,  
09:18 13 you know that there's an awful lot of copies of XP and  
09:18 14 Vista that are not going to be used in an alleged  
09:18 15 infringing way, and so that's going to be an important  
09:19 16 economic consideration at the hypothetical negotiation.

09:19 17          Q.     For the '135 patent, if one must use LCS or OCS  
09:19 18 with XP or Vista in order to use the functionality  
09:19 19 that's accused, have you done the math to see what that  
09:19 20 usage is?

09:19 21          A.     Well, you would -- if you do a division here,  
09:19 22 you get about 5.3 percent.

09:19 23          Q.     And what is it that Mr. Reed did in this  
09:19 24 regard?

09:19 25          A.     Well, he was applying a royalty rate to all the



09:19 1 copies of XP and Vista, the revenues associated with  
09:19 2 them.

09:19 3 Now, I have to be a little careful. He  
09:19 4 did some adjustments. If you recall, I think he had  
09:19 5 40 -- 44 to 48 billion dollars of sales. He adjusted  
09:19 6 that down ultimately to 30 billion, but it's still a  
09:19 7 substantial number of the XP and Vista copies.

09:19 8 Q. So let me see if I understand this correctly.  
09:19 9 Is it your opinion that Mr. Reed thinks Microsoft would  
09:19 10 have, at the table, agreed to pay a royalty on over 250  
09:20 11 million copies of XP and Vista even though both parties  
09:20 12 would know those copies wouldn't infringe the '135  
09:20 13 patent?

09:20 14 A. Well, he -- yes, he essentially is -- is giving  
09:20 15 that opinion.

09:20 16 Q. And do you agree with that analysis?

09:20 17 A. No, I do not.

09:20 18 Q. And from the standpoint of the hypothetical  
09:20 19 negotiation, tell us briefly why not.

09:20 20 A. Well, again, think about what a -- what prudent  
09:20 21 business people would do. And this is from an economic  
09:20 22 perspective. And from an economic perspective, you'd be  
09:20 23 looking at the limited usage of the features that the  
09:20 24 license would be required to have Microsoft provide to  
09:20 25 its customers, and those are much more limited than all

09:20 1 the copies of XP and Vista.

09:20 2           So a prudent business person would not  
09:20 3 agree to paying royalties on all the copies of XP and  
09:20 4 Vista even with some adjustments; and frankly, SAIC on  
09:20 5 the other side of the negotiating table, if you think  
09:20 6 about it, would have reasonable expectations as to the  
09:21 7 royalty base as well. So they would be taking that into  
09:21 8 account as well.

09:21 9           Q. I want to shift your attention now to the  
09:21 10 claims of the '180 patent and the feature of PNRP Plus  
09:21 11 Grouping. Regarding this usage idea, do you have a  
09:21 12 similar opinion?

09:21 13           A. Yes. And -- and we've heard some of this  
09:21 14 testimony, that there are no applications using the  
09:21 15 PeerNet APIs for Windows XP. We've heard testimony that  
09:21 16 there was only one application, Windows Meeting Space,  
09:21 17 that used the PeerNet APIs and -- in Windows Vista. And  
09:21 18 if we get a little bit more technical about it, there  
09:21 19 was some discussion about a PNRP Plus Grouping  
09:21 20 functionality in a sense, but that was rarely, if ever,  
09:21 21 used in conjunction with Windows Meeting Space.

09:21 22           So, again, the point is, like I was saying  
09:21 23 before, but now we're looking at the PeerNet APIs that,  
09:21 24 again, there's limited usage and the parties  
09:22 25 realistically would not expect to have a huge royalty

09:22 1 base or payments on a huge royalty base when there's  
09:22 2 much more limited usage of those functionalities.

09:22 3 Q. And the parties would know that at the  
09:22 4 negotiating table?

09:22 5 A. Yes.

09:22 6 Q. Now let me shift your attention to the other  
09:22 7 area, the third area that you said you would address and  
09:22 8 that's patent licensing practices.

09:22 9 Could you describe what you did in this  
09:22 10 regard, please?

09:22 11 A. Yes. So I looked at 20 Microsoft what's called  
09:22 12 inbound patent license agreements. And I have to  
09:22 13 explain that a little bit. But we're -- we're trying to  
09:22 14 understand what are the licensing practices of the  
09:22 15 parties at the hypothetical negotiation. So, in a  
09:22 16 sense, you know, what are their positions going in and  
09:22 17 how do they like to run their business with respect to  
09:22 18 licenses to intellectual property.

09:22 19 And we can show a slide here. Perhaps.  
09:22 20 There we go.

09:22 21 Q. First of all, before you go into that, tell us  
09:22 22 what inbound means in this context.

09:23 23 A. Right. So we have Microsoft inbound patent  
09:23 24 license agreements. And think about it as inbound  
09:23 25 versus outbound. On the inbound ones, it's Microsoft

09:23 1 paying the money out to get a license coming in to use  
09:23 2 those -- whatever patents are involved in the license  
09:23 3 agreement.

09:23 4           So the inbound patent license agreements  
09:23 5 I'm going to talk about is where Microsoft was the one  
09:23 6 acquiring the patent. In other words, they were -- not  
09:23 7 acquiring the patent, acquiring a license to use the  
09:23 8 teachings of the patent. That's what we're talking  
09:23 9 about.

09:23 10         Q. All right. I interrupted you. I'd like you  
09:23 11 to, using the slide as an aid, describe for the jury the  
09:23 12 significance of the inbound licenses.

09:23 13         A. Well, what I'm going to do is just give you an  
09:23 14 overview. There were 20 inbound patent license  
09:23 15 agreements that Microsoft had entered into. And if you  
09:23 16 look at those, virtually all of them were non-exclusive.  
09:23 17 They were software patent license agreements.  
09:23 18 Generally, they had 10 or fewer patents associated with  
09:24 19 them. They took place over the 1997 to 2007 time  
09:24 20 period.

09:24 21           So what we're trying to do here is look at  
09:24 22 patent license agreements inbound that Microsoft had  
09:24 23 entered into, really, kind of from an economic  
09:24 24 perspective to see in those patent license agreements  
09:24 25 what did they do. And all 20 of those were lump-sum

09:24 1 payments that Microsoft made for the use of the  
09:24 2 teachings of the patent.

09:24 3 Q. And so what is the economic significance of  
09:24 4 that at a hypothetical negotiation?

09:24 5 A. Well, Microsoft, from an economic perspective,  
09:24 6 would go into the negotiations and that would be the  
09:24 7 type of payment structure that they would want for a  
09:24 8 license to the '135 patent and the '180 patent.

09:24 9 Q. Now let's shift to the failure to commercialize  
09:24 10 the technology in the '135 patent.

09:24 11 Would you explain what you mean when you  
09:24 12 say there was a failure to commercialize the technology?

09:24 13 A. Right. And what we're doing here is looking in  
09:25 14 some of the economic forces or pressures that would have  
09:25 15 been present at the hypothetical negotiation. And as  
09:25 16 we've entitled this chart, there was sort of what we  
09:25 17 call a market rejection of the technology. And we saw  
09:25 18 that -- and I think the jury has heard this over the  
09:25 19 past week -- that In-Q-Tel did not want to do any  
09:25 20 additional funding into this technology; that various  
09:25 21 government agencies did not want to pay any money to use  
09:25 22 the technology; that investors and venture capitalists  
09:25 23 from a market perspective and from an economic  
09:25 24 perspective were not willing to invest in the  
09:25 25 technology; that businesses did not want to use the

09:25 1 technology. And we've even heard about SafeNet entering  
09:25 2 into a license agreement with SAIC, but after evaluating  
09:25 3 the technology for six months, terminated that license  
09:25 4 agreement.

09:25 5                   So what we have here are a series of  
09:25 6 indicators of the unwillingness of the market to invest  
09:26 7 in the technology, and that would have been very  
09:26 8 important.

09:26 9           Q.     And what are the economic implications of these  
09:26 10 failed attempts by SAIC to commercialize?

09:26 11           A.     Well, so what you would have is SAIC going into  
09:26 12 the hypothetical negotiation, in a sense, on the heels  
09:26 13 of others out in the marketplace unwilling to invest in  
09:26 14 the technology to provide funding. So that would have  
09:26 15 been top of the mind to them, and that would have  
09:26 16 tempered or lowered some of their expectations of the  
09:26 17 type of payment that they could get for a license to  
09:26 18 the -- to the use of the technologies we've been talking  
09:26 19 about here.

09:26 20                   And, in fact, the SafeNet rejection of the  
09:26 21 license agreements I believe occurred in December of  
09:26 22 2002, which would have been only months before the  
09:26 23 hypothetical negotiation in early 2003.

09:26 24                   So, from SAIC's mindset, there's sort of a  
09:27 25 difficult economic situation where no one is willing

09:27 1 to -- to invest. And they're going to know from an  
09:27 2 economic perspective that riskiness associated with this  
09:27 3 technology. And not only would that temper what their  
09:27 4 expectations would be, but it would -- also could lead  
09:27 5 them to the willingness to accept a lump-sum amount.

09:27 6 Now from the other perspective, you have  
09:27 7 Microsoft that would know these same things, and that  
09:27 8 would place downward pressure on the amount that they  
09:27 9 were willing to pay. Because there's been market  
09:27 10 indicators no one's willing to invest in the technology.

09:27 11 Q. All right. Let's -- let's talk about the  
09:27 12 license to the patents-in-suit. You heard Mr. Reed  
09:27 13 identify two licenses to the patents, specifically the  
09:27 14 SAIC SafeNet license and the SAIC VirnetX license.

09:27 15 What is your opinion regarding those  
09:27 16 licenses?

09:27 17 A. Well, we have to be very careful with these  
09:27 18 licenses. There's the SAIC/SafeNet license that  
09:27 19 Mr. Reed used as a -- as a key benchmark and he talked  
09:28 20 about the 20 percent. Well, the first thing we have to  
09:28 21 realize is that was sort of a beginning point that  
09:28 22 Mr. Reed made adjustments to.

09:28 23 But the point is with the SafeNet license  
09:28 24 agreement of 20 percent, the safe -- or I'm sorry -- the  
09:28 25 SAIC/SafeNet license agreement of 20 percent, the

09:28 1 SAIC/VirnetX agreement 15 percent, I think the important  
09:28 2 takeaway is while those were stated rates in the  
09:28 3 agreements, there's been no payments. SAIC has not --  
09:28 4 did not receive any payments from SafeNet. And, in  
09:28 5 fact, what SafeNet did was terminate the agreement and  
09:28 6 did not make any payments.

09:28 7           And I want to be a little careful on the  
09:28 8 VirnetX license agreement. There were some \$50,000  
09:28 9 fixed payments that had to be made each year, so I think  
09:28 10 they might have paid close to \$200,000 up to this point,  
09:28 11 but they have not made any royalty payments related to  
09:28 12 products. So that's what I mean when I say there's no  
09:28 13 payments.

09:28 14           But the key is that these were key  
09:28 15 benchmarks being used by Mr. Reed. But in the sense of  
09:29 16 a product where royalties have to be made from sales of  
09:29 17 the product, that has not occurred.

09:29 18           Q. All right. Next, let's talk about the various  
09:29 19 value indicators that you said you would discuss.

09:29 20           A. Right.

09:29 21           Q. Can you tell us what you mean by this, please?

09:29 22           A. And what I'm looking at here is that if you  
09:29 23 look at the documentation and if you look at what was  
09:29 24 happening, and I'm going to say contemporaneously, what  
09:29 25 were the businesses looking at, how were they valuing



09:29 1 things, you can see this sort of timeline across the  
09:29 2 bottom. And I will just go through it quickly. That  
09:29 3 SAIC internally around February of 2001, in that time  
09:29 4 period, was looking at valuating a company that had the  
09:29 5 SAIC -- SAIC technology at about \$15 million.

09:29 6 In-Q-Tel, in their discussions with SAIC,  
09:29 7 said no that the value's really this point currently.  
09:29 8 That's what we're talking about, at that moment in time,  
09:30 9 the value is \$10 million.

09:30 10 The venture capitalists were saying back  
09:30 11 to SAIC at this moment in time, it's worth \$12 million.  
09:30 12 And there's even a document that shows that SAIC was  
09:30 13 valuing the technology, not a company including the  
09:30 14 technology, but the technology itself, at that moment in  
09:30 15 time at \$2.7 million.

09:30 16 Q. Let me stop you right there for a moment.

09:30 17 A. Okay.

09:30 18 Q. Now we have on the graph that the ladies are  
09:30 19 seeing a DX number under each one of these. Are these  
09:30 20 the documents that support what you're saying here and  
09:30 21 where these numbers can be found?

09:30 22 A. Yes.

09:30 23 Q. I notice that there are two green bars on the  
09:30 24 graph. Could you explain what those mean, please?

09:30 25 A. Yes, sir. Two green lines, now a box is above

09:30 1 them. But the first of the two tells us in the timeline  
09:30 2 when the '135 patent issued and that was December of  
09:30 3 2002, and then the second green bar to the right of the  
09:30 4 first one tells us or shows us diagrammatically where  
09:31 5 the hypothetical negotiation would have been on this  
09:31 6 timeline. So that's March of 2003.

09:31 7 Q. All right. Now, before we move on, this \$2.7  
09:31 8 million amount that was put on the value of the  
09:31 9 technology just before the hypothetical negotiation, is  
09:31 10 that an SAIC internal document?

09:31 11 A. Yes, it is.

09:31 12 Q. I see a \$15.4 million number on the bar in the  
09:31 13 chart that has Larsen 4/3 below it. What is that?

09:31 14 A. So that was in April 2003. They were  
09:31 15 discussing a potential spinoff of the technology in the  
09:31 16 company. And currently at that point in time they were  
09:31 17 trying to raise some funding, but they put a value at  
09:31 18 15.4 million on -- on the company with the technology at  
09:31 19 this point.

09:31 20 Q. All right. Now, I want to get a little deeper  
09:31 21 into this one. But first of all, Mr. Larsen is  
09:32 22 Mr. Kendall Larsen who is currently the Chief Executive  
09:32 23 Officer and Chairman of the Board of VirnetX, the  
09:32 24 Plaintiff in this case?

09:32 25 A. That's correct.

09:32 1 Q. But at the time of this document, what that  
09:32 2 before the formation of the company VirnetX?

09:32 3 A. Yes.

09:32 4 Q. And so is what we have Mr. Larsen negotiating  
09:32 5 with SAIC?

09:32 6 A. Yes.

09:32 7 Q. Let's take a look at Exhibit 3193 that is shown  
09:32 8 there. And first, tell us the date of this.

09:32 9 A. That's April 25th, 2003.

09:32 10 Q. And on the second page there is a reference to  
09:32 11 Kendall Larsen. Do you see that?

09:32 12 A. Yes. It's highlighted in yellow and there's an  
09:32 13 attachment there, yes.

09:32 14 Q. It says Larsen's cap table indicates our  
09:32 15 proposed ownership position post funding.

09:32 16 And then is there an attachment that has  
09:32 17 Mr. Larsen's table?

09:32 18 A. Yes.

09:32 19 Q. Let's look at that.

09:32 20 But on this table in the document there's  
09:32 21 a figure of 15,384,614. Tell us what that is, please.

09:33 22 A. Well, at the current time that they were  
09:33 23 negotiating this spinoff company, that was the value  
09:33 24 they were placing on the company and the technology at  
09:33 25 that moment in time.

09:33 1 Q. All right. Now, let's go back to your value  
09:33 2 indicators. I see there is an \$18 million value at the  
09:33 3 end there. Can you tell us what that is?

09:33 4 A. That's in October 2006 and that was  
09:33 5 negotiations between SAIC and VirnetX, and the concept  
09:33 6 there was that VirnetX was trying to get SAIC to provide  
09:33 7 some additional funding for VirnetX, and so they were  
09:33 8 discussing then what a perceived current value of the --  
09:33 9 what the company was at that moment in time.

09:33 10 Q. So, here again, private discussions between  
09:33 11 SAIC on the one hand and VirnetX on the other?

09:33 12 A. Yes.

09:33 13 Q. Let's take a look at Exhibit 3165 that's  
09:33 14 referenced there. And can you tell us first what this  
09:34 15 is?

09:34 16 A. Yes. Again, here's an e-mail October 9th,  
09:34 17 2006, and you can see it was from Mr. Larsen.

09:34 18 Q. Kendall Larsen, CEO and co-founder of VirnetX?

09:34 19 A. Yes.

09:34 20 Q. And at this time, does this document show what  
09:34 21 the perceived value of the company was?

09:34 22 A. Yes, I think if we --

09:34 23 Q. Let's go to the next page.

09:34 24 A. Right. So --

09:34 25 Q. From the document, tell the jury what we're

09:34 1 seeing here.

09:34 2 A. Well, you can see a little bit of a difference  
09:34 3 of opinion, but it ranged from \$12 million to VirnetX's  
09:34 4 proposal of \$18 million. But that was the range they  
09:34 5 were discussing.

09:34 6 Q. And is this at a time when they even knew they  
09:34 7 might have legal claims against Microsoft?

09:34 8 A. Yeah. There appears to be a reference to that.  
09:34 9 VirnetX leads legal claims for M-Co, which my  
09:34 10 understanding is Microsoft.

09:34 11 Q. Have you seen the depositions that explain  
09:34 12 that?

09:34 13 A. Yes.

09:34 14 Q. And even though they knew they may have legal  
09:34 15 claims against Microsoft at the time, the numbers being  
09:34 16 mentioned were between 12 million and 18 million between  
09:35 17 the two parties?

09:35 18 A. That's correct.

09:35 19 Q. You have heard Mr. Reed's damages conclusion  
09:35 20 earlier this week, and let's go back to your value  
09:35 21 indicators.

09:35 22 And I -- I see on the right-hand side the  
09:35 23 number that Mr. Reed presented to the jury. Do you  
09:35 24 recall that?

09:35 25 A. Yes, I do.

09:35 1 Q. Is Mr. Reed's damage conclusion consistent with  
09:35 2 these facts that we've just discussed?

09:35 3 A. No. What's going on here is, again, we've  
09:35 4 looked at all the economic indicators and economic  
09:35 5 considerations that would have been discussed at the  
09:35 6 hypothetical negotiation. And here we have the value  
09:35 7 indicators and we see them over time that they're stable  
09:35 8 in this range of, when you look at a company that is  
09:35 9 incorporating the technology, of around \$15 million.

09:35 10 Now we have to be a little bit careful in  
09:35 11 our comparisons, but what Mr. Reed is saying is around  
09:35 12 the time of the hypothetical negotiation in 2003, March  
09:36 13 2003, he's saying the outcome of the hypothetical  
09:36 14 negotiation would be that SAIC and Microsoft would have  
09:36 15 agreed to a running royalty payment structure that would  
09:36 16 ultimately lead to \$242 million in royalty payments from  
09:36 17 that point to basically the end of 2009 I think it is.

09:36 18 But that is in stark contrast to what the  
09:36 19 contemporaneous documents are telling us or the  
09:36 20 documents at the moment in time from 2001 to even 2006.  
09:36 21 So that's a stark contrast.

09:36 22 Q. You told us earlier that you did your own  
09:36 23 Georgia-Pacific analysis, and let's take -- here are the  
09:36 24 15 factors on the board that I told -- told the jury  
09:36 25 earlier we wouldn't go into detail into all of those,

09:36 1 but these are the same factors that Mr. Reed put up?

09:36 2 A. That's correct.

09:36 3 Q. And did you incorporate all of these factors  
09:37 4 and more into your testimony today?

09:37 5 A. Yes. I did a substantial analysis, and I  
09:37 6 looked at all of these factors and then I summarized my  
09:37 7 opinions today.

09:37 8 Q. And everything that you've discuss today, would  
09:37 9 both SAIC and Microsoft have known all of these  
09:37 10 considerations at the time of the hypothetical  
09:37 11 negotiation?

09:37 12 A. Yes. In fact, remember what I said at the  
09:37 13 beginning. You have a hypothetical negotiation, you  
09:37 14 have the willingness to negotiate, and you have the  
09:37 15 reasonable knowledge and expectation such that the  
09:37 16 parties can go in smart. They're prudent business  
09:37 17 people. They're prudent negotiators. They would know  
09:37 18 all of these things in the hypothetical negotiation.

09:37 19 Q. Dr. Ugone, what did you conclude based on your  
09:37 20 analysis of the Georgia-Pacific factors and everything  
09:37 21 you've discussed today and everything you studied in  
09:37 22 preparation for your testimony?

09:37 23 A. Well, I have reached the conclusion that  
09:37 24 Mr. Reed has substantially overstated claim damages, and  
09:37 25 for the reasons that I've provided today, the parties

09:37 1 would have entered into a license agreement at the  
09:38 2 hypothetical negotiation but it would have had a  
09:38 3 lump-sum payment structure, and the amount of the  
09:38 4 payment would have been between \$9 million and \$15  
09:38 5 million.

09:38 6 Q. One final thing. Now, if the '135 patent is  
09:38 7 found not to be infringed or is found to be invalid but  
09:38 8 the '180 patent is found to be infringed and valid, what  
09:38 9 would happen?

09:38 10 A. Well, I've just -- a couple of things would  
09:38 11 change. So this is if the '135 is not valid or is not  
09:38 12 infringed but the '180 is found to be valid and  
09:38 13 infringed, what changes is the date of the hypothetical  
09:38 14 negotiation moves to March 2007. The parties change.  
09:38 15 It's now going to be VirnetX and Microsoft. But many of  
09:38 16 the underlying economic considerations would still be  
09:38 17 the same.

09:38 18 So even though the date moves forward a  
09:38 19 little bit and even though it's now VirnetX and  
09:38 20 Microsoft instead of SAIC and Microsoft, I have reached  
09:39 21 the conclusion, because of the underlying economic  
09:39 22 considerations, that the answer would still be between  
09:39 23 \$9 million and \$15 million in a lump-sum payment  
09:39 24 structure.

09:39 25 MR. SAYLES: Pass the witness.



09:39 1 THE COURT: All right. Thank you.  
09:39 2 All right, ladies of the jury, I think we'll take our  
09:39 3 morning break at this time. So we're going to be in  
09:39 4 recess until 5 minutes until 11:00, and I note that our  
09:39 5 clock has not been moved forward so we -- we are on  
09:39 6 daylight savings time, and it will be about a 15-minute  
09:39 7 break. Be in recess.

09:39 8 COURT SECURITY OFFICER: All rise.

09:39 9 (Jury out.)

09:40 10 THE COURT: Please be seated.

09:40 11 All right. Mr. Powers, the Court has  
09:40 12 taken a look at your reurging of wanting to  
09:40 13 cross-examine their rebuttal -- Plaintiff's rebuttal  
09:40 14 witness with the December 17th, 2007 letter from  
09:40 15 VirnetX's counsel to Microsoft's counsel regarding the  
09:40 16 point-to-point tunneling protocol and the layer 2  
09:40 17 tunneling protocol, and I'm not going -- I am going to  
09:40 18 stand by my ruling and exclude the letter for  
09:40 19 cross-examination purposes for the reason that the  
09:40 20 paragraph that you're referring to is a response to  
09:40 21 VirnetX's interrogatories.  
09:40 22 And in paragraph 19 of their first set of  
09:40 23 interrogatories, VirnetX identified the accused features  
09:41 24 and then lists A through S of the accused features. And  
09:41 25 apparently in response to a meet and confer with

09:41 1 Microsoft's counsel, VirnetX responded back as follows:  
09:41 2 Without prejudice in an effort to assist you in  
09:41 3 responding to these interrogatories, the features found  
09:41 4 in the accused products are as follows. And it lists  
09:41 5 some more specific features than the accused features in  
09:41 6 the interrogatory.

09:41 7 But I don't think that that -- if it had  
09:41 8 have been in their infringement contentions or in a  
09:41 9 pleading, I would allow you to cross-examine, but I  
09:41 10 don't think where attorneys are trying to give guidance  
09:41 11 on discovery would be such an admission and are contrary  
09:41 12 to our patent rules desire to have meet and confers.  
09:41 13 And so that will be my ruling on that.

09:41 14 With regard to the Court's charge, we have  
09:42 15 a draft ready that Ms. Li will be passing out to you,  
09:42 16 and after we conclude the evidence, I'll hear any  
09:42 17 objections to the Court's charge.

09:42 18 Be in recess.

09:42 19 MR. CAWLEY: Your Honor, could I raise a  
09:42 20 quick matter of procedure --

09:42 21 THE COURT: Yes. Uh-huh.

09:42 22 MR. CAWLEY: -- to maybe save some time?

09:42 23 I understand that the Defendant has two  
09:42 24 depositions to play and that they then intend to rest.  
09:42 25 We'll have a motion for JMOL that we'd like to make at

09:42 1 that time unless the Court would prefer that we all  
09:42 2 agree to defer that until, I guess, sometime over the  
09:42 3 lunch hour or -- in order to avoid breaking up the  
09:42 4 testimony and we're trying to get finished.

09:42 5 THE COURT: If that's agreeable to the  
09:42 6 parties, we will do that immediately after the  
09:42 7 conclusion of all the evidence as well.

09:42 8 MR. BOBROW: Yes, Your Honor that will be  
09:42 9 fine.

09:42 10 MR. CAWLEY: Thank you, Your Honor.

09:42 11 THE COURT: All right.

09:42 12 COURT SECURITY OFFICER: All rise.

09:59 13 COURT SECURITY OFFICER: All rise.

09:59 14 (Jury in.)

09:59 15 THE COURT: Please be seated.

09:59 16 All right, Counsel. You may proceed.

09:59 17 MR. CASSADY: May it please the Court.

09:59 18 CROSS-EXAMINATION

09:59 19 BY MR. CASSADY:

09:59 20 Q. Dr. Ugone -- good morning, Dr. Ugone. My name  
10:00 21 is Jason Cassady. I think we have met more than a  
10:00 22 couple of times before, correct?

10:00 23 A. We have, yes. Good to see you.

10:00 24 Q. And as Mr. Sayles said earlier, we're all under  
10:00 25 time constraints here, and I'm going to ask you to

10:00 1 please answer just the question that I ask and to give  
10:00 2 Mr. Sayles a chance on redirect to come back and clarify  
10:00 3 anything that he thinks was unfair. Is that fair?

10:00 4 A. I will agree with that, yes.

10:00 5 Q. Okay. Okay. Now, Dr. Ugone, you filed an  
10:00 6 expert report in this case, correct?

10:00 7 A. Yes.

10:00 8 Q. And I take it we can rely on your expert report  
10:00 9 to accurately -- accurately portray your opinions in the  
10:00 10 case?

10:00 11 A. Yes.

10:00 12 Q. And I think you've already actually mentioned  
10:00 13 it, but your report included an opinion as to damages  
10:00 14 just for the '180 patent, correct?

10:00 15 A. Yes.

10:00 16 Q. Okay. And then you also said it included an  
10:00 17 opinion for the '135 and the '180, correct?

10:00 18 A. Yes.

10:00 19 Q. But it was -- it said 9 to \$15 million for both  
10:00 20 of those opinions, correct?

10:00 21 A. Yes.

10:01 22 Q. Okay. So, no matter how many patents are in  
10:01 23 this case, the answer -- your answer is 9 to \$15  
10:01 24 million, correct?

10:01 25 A. Yes.

10:01 1 Q. Okay. Now, Dr. Ugone, this isn't your first  
10:01 2 case that you've worked for Microsoft, is it?

10:01 3 A. That's correct.

10:01 4 Q. Okay. And in this case you're testifying to a  
10:01 5 lump-sum agreement, correct?

10:01 6 A. Yes.

10:01 7 Q. Well, with that in mind --

10:01 8 MR. CASSADY: Let's go ahead and pull up  
10:01 9 slide number 2, please.

10:01 10 Q. (By Mr. Cassady) I would like to ask you this  
10:01 11 question: How many times, including this case, have you  
10:01 12 testified to a lump-sum on behalf of Microsoft? Would  
10:01 13 it be once, twice, or three or more times?

10:01 14 A. Actually, I'll take off the four or more times  
10:01 15 and then it would be accurate to say three times.

10:01 16 Q. Okay. So at least three times then; that's  
10:01 17 fair?

10:01 18 A. Let me -- if I could ask a clarification. In  
10:01 19 fact, here, I will help you with the answer: I can  
10:01 20 remember being retained four times for Microsoft, three  
10:01 21 times I testified at trial, and in those three times, I  
10:01 22 gave a lump-sum opinion.

10:02 23 So, it's not at least three times  
10:02 24 testified, it's three times.

10:02 25 Q. Okay. Fair enough.

10:02 1 Now, sir, you've also testified in cases  
10:02 2 for the Plaintiff or the patent owner, correct?

10:02 3 A. Yes.

10:02 4 Q. Okay. The patent owner like VirnetX in this  
10:02 5 case, correct?

10:02 6 A. You took it a little bit farther, but I'm  
10:02 7 willing to say yes, I've -- I've been retained by a  
10:02 8 patent holder to evaluate their damages, yes.

10:02 9 Q. Okay. And so -- so isn't it true, Dr. Ugone,  
10:02 10 that when you've been hired by people that own the  
10:02 11 patent, which is -- which is seeking a royalty in those  
10:02 12 cases, a reasonable royalty in those cases, you have  
10:02 13 never testified that a lump sum was appropriate?

10:02 14 A. Again, I just need a clarification. At trial  
10:02 15 I've testified as to running royalty rates. I have  
10:02 16 given opinions in the report where it's a lump-sum  
10:02 17 amount on the Plaintiff's side as well.

10:02 18 Q. Well, at trial you've never stood under oath  
10:02 19 and testified for a Plaintiff, a patent owner, that a  
10:02 20 lump sum was appropriate, correct?

10:03 21 A. That's correct. The facts and circumstances  
10:03 22 weren't the same.

10:03 23 Q. Okay. Now, sir --

10:03 24 MR. CASSADY: Could we put up slide --  
10:03 25 well, actually, I apologize.

10:03 1 Can we put up slide 22, Mr. Moreno?

10:03 2 Q. (By Mr. Cassady) Dr. Ugone, you put this slide  
10:03 3 up just a few minutes ago and said that this included  
10:03 4 all the indicators of the valuations of VirnetX or the  
10:03 5 SAIC technology, correct?

10:03 6 A. I think you've misquoted me. I said they were  
10:03 7 value indicators. There's obviously additional ones in  
10:03 8 my report. I was trying to give a representative sample  
10:03 9 across time, but if that was what you were meaning to  
10:03 10 say, then I'll agree with that. If you're trying to say  
10:03 11 that this was all of them, I would say no.

10:03 12 Q. Right. Well, fair enough.

10:03 13 The point is these are the ones you chose  
10:03 14 to show the jury, correct?

10:03 15 A. Yes.

10:03 16 Q. Okay. And this is not all of the valuations  
10:03 17 that were done on the VirnetX and SAIC technology,  
10:03 18 correct?

10:03 19 A. There are some additional ones, yes.

10:03 20 Q. Okay. Well, let's talk about some of those  
10:03 21 additional ones.

10:04 22 MR. CASSADY: Can you bring up slide 19,  
10:04 23 Mr. Moreno?

10:04 24 Q. (By Mr. Cassady) Now, Dr. Ugone, can you see  
10:04 25 here this is a Cambridge Strategic Management Group?

10:04 1 Now, you read the reports by the Cambridge Strategic  
10:04 2 Management Group, correct?

10:04 3 A. Yes, I did.

10:04 4 Q. Okay. And do you see this bullet point  
10:04 5 highlighted, it says: Business case analysis indicates  
10:04 6 a total net eraser, net present value of \$190 million.

10:04 7 Do you see that, sir?

10:04 8 A. It says 190 million. I'm aware of this  
10:04 9 document, and I think there's a lot more going on than  
10:04 10 what we're showing the jury, but I don't disagree that  
10:04 11 that's what it says. But also this was not believed by  
10:04 12 anyone.

10:04 13 Q. Okay. Well, let me just ask you this: You  
10:04 14 agree that NetEraser is a reference to the technology in  
10:04 15 this case, correct?

10:04 16 A. Yes.

10:04 17 Q. Okay.

10:04 18 A. Yes.

10:04 19 Q. So, that might as well say business case  
10:04 20 analysis indicates a total VirnetX net present value of  
10:04 21 \$190 million, correct?

10:04 22 A. I'm sorry. Could you say that again?

10:04 23 Q. You would agree with me that we can replace the  
10:04 24 word NetEraser in this quote with VirnetX, the VirnetX  
10:05 25 technology, and that would be accurate still? It's just



10:05 1 a synonym, correct?

10:05 2 A. Yes. If you wanted to do that, you could do  
10:05 3 that. But, obviously, there's a lengthier document that  
10:05 4 has some underlying assumptions that were not accurate  
10:05 5 and that's why this number was not accurate.

10:05 6 Q. Well, I understand that you feel that way,  
10:05 7 Dr. Ugone, but you didn't show this \$190 million  
10:05 8 valuation to the jury in your analysis and tell them why  
10:05 9 it's inaccurate, did you?

10:05 10 A. No, but I'd be willing to do that now if you  
10:05 11 would like.

10:05 12 Q. Well, maybe Mr. Sayles will ask you that.

10:05 13 MR. CASSADY: The next one, Mr. Moreno, is  
10:05 14 slide 20, please.

10:05 15 Q. (Mr. Cassady) Here's another one by CSMG. And  
10:05 16 let's just get some backup information on this,  
10:05 17 Dr. Ugone. CSMG is not SAIC, correct?

10:05 18 A. That's correct.

10:05 19 Q. It's a third-party company that went out and  
10:05 20 did this valuation, correct?

10:05 21 A. They were doing valuations, yes.

10:05 22 Q. Okay. So CSMG in this one here, they said the  
10:05 23 net present value was \$264 million, correct?

10:05 24 A. I don't disagree with what it says. There I  
10:05 25 have my same comments about the invalidity of this

10:05 1 number.

10:05 2 Q. Okay. And then --

10:06 3 MR. CASSADY: So let's just -- let's just  
10:06 4 go ahead and go back to slide 22, Mr. Moreno. 22. I  
10:06 5 apologize.

10:06 6 Q. (By Mr. Cassidy) Now, you were showing this to  
10:06 7 the jury at least for one reason, to show that it wasn't  
10:06 8 fair to Microsoft that these valuations were this low,  
10:06 9 and at the end, \$242 million was being requested, right?

10:06 10 A. I don't think I ever said fair. I'm saying  
10:06 11 what are the economic value indicators, and I'm showing  
10:06 12 those value indicators contemporaneously across time  
10:06 13 before the patent was issued, after the patent was  
10:06 14 issued, before the hypothetical negotiation, after the  
10:06 15 hypothetical negotiation. And so I'm trying to talk  
10:06 16 about the forces of pressures that would have been  
10:06 17 present at the hypothetical negotiation, then I compared  
10:06 18 that to Mr. Reed's opinion. That's what this chart is  
10:06 19 showing.

10:06 20 Q. Well, I mean, your opinion, Dr. Ugone, is that  
10:06 21 \$242 million is an unreasonable royalty, correct?

10:06 22 A. I will agree with that statement.

10:06 23 Q. So here you're using this to show at least one  
10:06 24 reason that the \$242 million is unreasonable, correct?

10:07 25 A. That's correct.

10:07 1 Q. Okay. Now, you'll agree with me that the time  
10:07 2 span in this chart is about nine years, correct?

10:07 3 A. Absolutely. We show that at the bottom, from  
10:07 4 2001 all the way up to 2006, if that's what you're  
10:07 5 asking.

10:07 6 Q. Yes. And then the current time period, \$242  
10:07 7 million is today and that's 2010, correct? That would  
10:07 8 be nine years, 2001 to 2010?

10:07 9 A. I may not understand your question, but I'll  
10:07 10 agree with that statement, yes.

10:07 11 Q. Now, let's talk about -- well, let me just ask  
10:07 12 you this: Is -- is it out of the ordinary for a company  
10:07 13 to go up in value that kind of multiplier, I guess it's  
10:07 14 about maybe 20 times or 10 times? Is it -- is it out of  
10:07 15 the ordinary for a company to go up in value in nine  
10:07 16 years that much?

10:07 17 A. Well, it's not nine years because you have  
10:07 18 October 2006 and this data goes through the end of 2009.  
10:07 19 So what you're asking is is it out of the ordinary to go  
10:07 20 up this value in three years, and I would say yes,  
10:08 21 that's extraordinary to do that. That's not a common  
10:08 22 appearance that you see in the marketplace.

10:08 23 Q. Okay. Well, let's talk about -- let's talk  
10:08 24 about a couple of years in the life of another company.  
10:08 25 Let's talk about Microsoft.

10:08 1 A. Sure.

10:08 2 Q. Do you remember when Mr. -- Mr. Pall joined  
10:08 3 Microsoft, do you remember what he testified to?

10:08 4 A. On the date? I'm not sure I remember. It was  
10:08 5 about 20 years ago.

10:08 6 Q. He joined in 1990 I believe is what his  
10:08 7 testimony said. And so Mr. Pall joined in 1990.

10:08 8 Do you know what the stock price was of  
10:08 9 Microsoft stock in 1990?

10:08 10 A. I don't know that I could give you an estimate  
10:08 11 of that.

10:08 12 Q. Okay. Well, I looked it up last night. I  
10:08 13 actually -- I went to Google and I looked it up and got  
10:08 14 a little chart. It's really kind of nifty what you can  
10:08 15 get on the Internet.

10:08 16 A. Sure.

10:08 17 Q. And I got this chart and in 1990, the stock  
10:08 18 price was \$1.09. Do you have any reason to disagree  
10:08 19 with that?

10:08 20 A. No. I will accept your representation.

10:08 21 Q. Okay. And generally it appears that in 1995  
10:08 22 and 1996, it was maybe 4 or \$5. Do you have any reason  
10:09 23 to disagree with that?

10:09 24 A. No.

10:09 25 Q. Okay. Now, would you be surprised to hear what

10:09 1 it is in 1990, sir? 1999. I apologize.

10:09 2 A. 1999. No. And I -- and I know it's going to  
10:09 3 be substantially higher.

10:09 4 Q. Yeah, it's \$50 or \$49.27.

10:09 5 MR. CASSADY: Could you go ahead and put  
10:09 6 the next slide up, Mr. Moreno?

10:09 7 Q. (By Mr. Cassady) So in 1990, Microsoft stock  
10:09 8 was valued at \$1.09, but in 1999 it was valued at \$50.

10:09 9 A. Yeah. They have to have a functioning product,  
10:09 10 and they're selling operating systems and they're  
10:09 11 innovative. And the market is accepting their products,  
10:09 12 so that's why we see that.

10:09 13 Q. Okay. So -- so you're saying that it was fair  
10:09 14 for Microsoft's valuation to go up that much but it's  
10:09 15 not fair for VirnetX; is that true?

10:09 16 A. Again, you keep using this term fair, and I  
10:09 17 like to look at things from an economic perspective.  
10:09 18 And yes, you have economic indicators where they come  
10:09 19 out with innovative products. The market's accepted XP,  
10:09 20 the market's accepted later products. They've come out  
10:09 21 with Word; they've come out with Excel; they've come out  
10:09 22 with PowerPoint. Those are all hugely successive  
10:10 23 products, and the market rewards a company that puts out  
10:10 24 hugely successive products and that's why you see this.

10:10 25 Q. And that's not really the question I asked,

10:10 1 Dr. Ugone. What I'm asking you is -- I guess I'll use  
10:10 2 your term -- is it unreasonable for a company's  
10:10 3 valuation to go from \$1 to \$50 in less than nine years?

10:10 4 A. I didn't say it was unreasonable. I said it  
10:10 5 was extraordinary. It's not a common occurrence.  
10:10 6 That's what my testimony was.

10:10 7 Q. Okay.

10:10 8 MR. CASSADY: That's all I have.

10:10 9 Thank you, Your Honor.

10:10 10 THE COURT: Thank you. Redirect?

10:10 11 MR. SAYLES: May it please the Court.

10:10 12 REDIRECT EXAMINATION

10:10 13 BY MR. SAYLES:

10:10 14 Q. A few moments ago you said that you thought the  
10:10 15 valuations that you were shown, including CSMG, were not  
10:10 16 applicable in this case. Would you explain to the  
10:10 17 ladies why that is so?

10:10 18 A. There's different ways of doing valuations.  
10:11 19 There's all the ones that I showed you and those all  
10:11 20 have a consistent methodology and were roughly in the  
10:11 21 \$15 million range.

10:11 22 Another way to do it is say, well, let me  
10:11 23 make a projection as to what my sales are going to be.

10:11 24 Now remember, SAIC with its technology and  
10:11 25 VirnetX have never had a product that they've been able

10:11 1 to sell out in the marketplace. But if you say let me  
10:11 2 forget about that and just project sales and look at  
10:11 3 those profits and then look at the value of that, that's  
10:11 4 another way to do the methodology. But that's also a  
10:11 5 very risky -- a risky analysis because there is no  
10:11 6 product yet.

10:11 7           But underlying those numbers that I was  
10:11 8 being shown on cross-examination where huge projections  
10:11 9 of sales that when you do -- this is fancy term -- net  
10:11 10 present value, that's looking at the value today versus  
10:11 11 over time. But they have these huge sales projections  
10:11 12 of hundreds of millions of dollars in just a matter of  
10:11 13 two or three or four years.

10:11 14           And SAIC quickly realized that that wasn't  
10:12 15 going to take place, and they've retracted from those  
10:12 16 values and they started agreeing with what all these  
10:12 17 other third parties were telling them, the venture  
10:12 18 capitalists and everybody else.

10:12 19           Q. And you were asked some questions about the  
10:12 20 rise in the Microsoft stock price and asked in some way  
10:12 21 to compare that to VirnetX. Is that a reasonable and  
10:12 22 fair comparison from an economic standpoint?

10:12 23           A. And I was attempting to say no there. I was  
10:12 24 trying to give the jury some indication of Microsoft's  
10:12 25 success in terms of the market acceptance of their

10:12 1 products. And as we know in the stock market, the stock  
10:12 2 market rewards successful companies. Microsoft has had  
10:12 3 very good products over time: Excel, Word, the  
10:12 4 operating systems.

10:12 5 VirnetX, there hasn't been any market  
10:12 6 reward because they haven't even developed a product.  
10:12 7 They finally had a beta version after the nine years.  
10:12 8 My understanding is they've achieved no revenues from  
10:12 9 any sales or licensing of that product.

10:13 10 MR. SAYLES: Pass the witness.

10:13 11 THE COURT: Recross.

10:13 12 MR. CASSADY: No further questions, Your  
10:13 13 Honor.

10:13 14 THE COURT: All right. Thank you. You  
10:13 15 may step down.

10:13 16 All right. Who will be your next witness?

10:13 17 MR. POWERS: We will have two final video  
10:13 18 depositions, Your Honor. The next one is Dr. Victor  
10:13 19 Larson who's from VirnetX.

10:13 20 THE COURT: Okay. And do I have the times  
10:13 21 on that one?

10:13 22 MR. POWERS: They are included in the  
10:13 23 cumulative times that I gave you before. If you want  
10:13 24 the exact time for these, I can give you that as well.

10:13 25 THE COURT: They were included in the



10:13 1 other four?

10:13 2 MR. POWERS: Yes.

10:13 3 THE COURT: All right. Very good.

10:13 4 (Video playing.)

10:13 5 QUESTION: Good morning, Dr. Larson.

10:13 6 ANSWER: Good morning.

10:13 7 QUESTION: What is your full name?

10:13 8 ANSWER: Victor J. Larson.

10:13 9 QUESTION: And what is your current job  
10:13 10 title?

10:13 11 ANSWER: I believe it's the Director of  
10:13 12 Research and Development.

10:13 13 QUESTION: And you're employed by VirnetX?

10:13 14 ANSWER: Yes, I am.

10:13 15 QUESTION: And you believed at the time  
10:14 16 that a NetEraser client solution would provide many  
10:14 17 functional advantages over browsers communicating  
10:14 18 through https?

10:14 19 ANSWER: I believe that the NetEraser  
10:14 20 product would provide additional benefits to the end  
10:14 21 user, yes.

10:14 22 QUESTION: Dr. Larson, do you have Exhibit  
10:14 23 231 in front of you?

10:14 24 ANSWER: Yes, I do.

10:14 25 QUESTION: And you see this is an e-mail

10:14 1 from you to Bob Short on November 8th, 2005?

10:14 2 ANSWER: Yes, I see that that's what it  
10:14 3 is.

10:14 4 QUESTION: And you see in the e-mail you  
10:14 5 write to Dr. Short and say, I did not come away from the  
10:14 6 Thursday/Friday meetings with a strong feeling that our  
10:14 7 patent provided any amount of protection against  
10:14 8 reasonably secure approaches for SIP (i.e. TLS)?

10:14 9 Do you see that?

10:14 10 ANSWER: Yes, I see that.

10:15 11 QUESTION: You see in the second paragraph  
10:15 12 you say, It seems like if LCS is doing secure SIP  
10:15 13 between servers, we have nothing to add.

10:15 14 Do you see that line?

10:15 15 ANSWER: Yes, I do.

10:15 16 QUESTION: LCS refers to Live  
10:15 17 Communication Server; is that right?

10:15 18 ANSWER: I believe that's what it refers  
10:15 19 to, yes.

10:15 20 QUESTION: And Exhibit 231 reflects your  
10:15 21 thoughts after the meeting, that if LCS was doing Secure  
10:15 22 SIP, that VirnetX had nothing to add in terms of  
10:15 23 security technology; is that right?

10:15 24 ANSWER: Again, this was a -- this was a  
10:15 25 reaction without looking at Secure SIP in detail or

10:15 1 looking at LCS in detail or looking at our patents in  
10:15 2 detail.

10:15 3 QUESTION: So then Exhibit 231 reflects  
10:15 4 your reaction without having looked at your patents yet?

10:16 5 ANSWER: Yes.

10:16 6 QUESTION: Exhibit 231 reflects your  
10:16 7 reaction to the long meetings with Kendall Larsen, Gif  
10:16 8 Munger, and other persons, that your patents, as you  
10:16 9 remembered them, didn't provide any protection against  
10:16 10 SIP using TLS?

10:16 11 ANSWER: Well, again, I was -- I was  
10:16 12 representing a feeling without going in and reviewing  
10:16 13 the -- the -- the patents and -- and secure SIP.

10:16 14 QUESTION: I just asked, based on what  
10:16 15 you've reviewed on Secure SIP on your patents, have you  
10:16 16 changed your mind about the strong feeling you had that  
10:16 17 your patent provided no amount of protection against  
10:16 18 Secure SIP using TLS as reflected in Exhibit 231?

10:17 19 ANSWER: I -- no. No, I haven't changed  
10:17 20 my mind.

10:17 21 QUESTION: Have you done any investigation  
10:17 22 as to whether the VirnetX prototype would infringe any  
10:17 23 other company's intellectual property?

10:17 24 ANSWER: No, I haven't done that  
10:17 25 investigation.

10:17 1 QUESTION: Why haven't you done an  
10:17 2 analysis of whether the Gabriel prototype infringes  
10:17 3 every patent cited against yours?

10:17 4 ANSWER: I haven't been directed to do  
10:17 5 that.

10:17 6 QUESTION: It didn't make sense for you to  
10:17 7 do that on your own without direction?

10:17 8 ANSWER: No. I -- it didn't make sense to  
10:17 9 me.

10:17 10 QUESTION: You've been handed what is  
10:17 11 marked as Exhibit 240. It's an e-mail from you to  
10:17 12 Gordon Warren and others with Bates Number VNET00247657.

10:18 13 Do you recognize this e-mail?

10:18 14 ANSWER: This would have been consistent  
10:18 15 with something I sent at the time.

10:18 16 QUESTION: Who is Gordon Warren?

10:18 17 ANSWER: He's a developer on the R&D team.

10:18 18 QUESTION: In this e-mail, Exhibit 240,  
10:18 19 the Subject is Fileshare Registry Change.

10:18 20 Do you see that?

10:18 21 ANSWER: Yes.

10:18 22 QUESTION: What is Fileshare?

10:19 23 ANSWER: Gordon was developing an  
10:19 24 application to enable sharing files as part of the  
10:19 25 Gabriel prototype.

10:19 1 QUESTION: In the e-mail Gordon is telling  
10:19 2 you, group shmoop. It's all vapor ware.

10:19 3 Do you see that?

10:19 4 ANSWER: Yes.

10:19 5 QUESTION: Why is Gordon Warren telling  
10:19 6 you that it's all vapor ware?

10:19 7 ANSWER: I'm sure Gordon was attempting at  
10:19 8 some humor here. My guess is he was also expressing  
10:20 9 that he didn't want to wait to solve this problem until  
10:20 10 Bob had the group concept flushed out and implemented.

10:20 11 QUESTION: And with humor is Gordon  
10:20 12 telling you that he believed that Bob Short's group idea  
10:20 13 was vapor ware?

10:20 14 ANSWER: I think he was just saying that  
10:20 15 he didn't want to wait for Bob to implement.

10:20 16 QUESTION: What is vapor ware, in your  
10:20 17 understanding?

10:20 18 ANSWER: It's software that doesn't exist  
10:20 19 yet.

10:20 20 QUESTION: It's also software that's not  
10:20 21 likely to exist?

10:20 22 ANSWER: No, I don't -- I don't -- I don't  
10:20 23 use the term that way. You'd have to ask Gordon if he  
10:20 24 was using the term that way.

10:20 25 QUESTION: So the log-in box that's on the

10:20 1 page ending in Bates No. 509 was the special log-in for  
10:21 2 VirnetX users who you were authorizing to access the  
10:21 3 registry; is that right?

10:21 4 ANSWER: Who were -- this is the log-in to  
10:21 5 get to the website that contained the registry code, and  
10:21 6 we -- we put that log-in just so that only users that we  
10:21 7 had provided the user name and password to would --  
10:21 8 would be able to do that.

10:21 9 QUESTION: What users did you provide the  
10:21 10 user name and password to? Who? Who was provided the  
10:21 11 user name and password?

10:21 12 ANSWER: Well, all the members of the R&D  
10:21 13 team and Gif Munger, and I believe it was provided to --  
10:21 14 to Kendall Larsen and -- and Sameer.

10:22 15 QUESTION: Do you know whether any of  
10:22 16 those users ever logged in through this log-in screen?

10:22 17 ANSWER: The -- the members of the R&D  
10:22 18 team would have logged in multiple times as part of  
10:22 19 testing and developing the software, and Gif Munger  
10:22 20 would have logged in multiple times. I -- I don't have  
10:22 21 knowledge of whether or how often Sameer and Kendall  
10:22 22 would have logged in.

10:22 23 QUESTION: You can see that the user  
10:22 24 name -- who chose the user name for this log-in screen,  
10:22 25 VirnetX?

10:22 1 ANSWER: It was likely me, but I am not  
10:22 2 for sure.

10:22 3 QUESTION: Did you also choose the  
10:22 4 password, MS4\$2009, question mark?

10:23 5 ANSWER: I may have chosen that, yes.

10:23 6 QUESTION: Is it your recollection that  
10:23 7 you chose that password?

10:23 8 ANSWER: It -- it is my recollection that  
10:23 9 I chose that password, yes.

10:23 10 QUESTION: Does your password stand for  
10:23 11 Microsoft four money 2009?

10:23 12 ANSWER: Yes, that's my recollection.

10:23 13 QUESTION: Why do you have a password  
10:23 14 that's a question, Microsoft four money 2009?

10:23 15 ANSWER: At that time that was my  
10:23 16 perception of when the -- based on what people had -- at  
10:23 17 that time that was my perception of when a -- a trial  
10:23 18 might occur?

10:23 19 QUESTION: Why did you make that the  
10:23 20 log-in and password for the VirnetX prototype?

10:24 21 ANSWER: I -- I think I thought it was a  
10:24 22 interesting password, and I probably copied the password  
10:24 23 from one place to another place. And so I don't think  
10:24 24 the -- using it in this context was a -- was a  
10:24 25 purposeful decision.

10:24 1 QUESTION: Where else have you used the  
10:24 2 password Microsoft four money 2009?

10:24 3 ANSWER: I have several passwords that I  
10:24 4 use. I believe I used this password when setting up  
10:24 5 some log-in accounts for a couple of other developers  
10:24 6 and then communicated it with them, and then in most  
10:25 7 cases, they likely changed it to their own password.

10:25 8 (End of video clip.)

10:25 9 MR. POWERS: Our final witness, Your  
10:25 10 Honor, will be Mr. Kendall Larsen, the President and CEO  
10:25 11 and Chairman of VirnetX.

10:25 12 THE COURT: All right. Mr. Kendall  
10:25 13 Larsen.

10:25 14 (Video playing.)

10:25 15 QUESTION: All right. If I understand  
10:25 16 this, you are the Chief Executive Officer of VirnetX; is  
10:25 17 that right?

10:25 18 ANSWER: That is right.

10:25 19 QUESTION: Do you hold any other titles  
10:25 20 with VirnetX?

10:25 21 ANSWER: Yes, I do.

10:25 22 QUESTION: What are they?

10:25 23 ANSWER: Chairman of the Board and  
10:25 24 President.

10:25 25 QUESTION: When was VirnetX founded?



10:25 1 ANSWER: VirnetX was founded in September  
10:25 2 of 2004.

10:25 3 QUESTION: How many shares do you hold in  
10:26 4 VirnetX?

10:26 5 ANSWER: Approximately 8.2 million shares.

10:26 6 QUESTION: Are you the single largest  
10:26 7 shareholder of VirnetX stock?

10:26 8 ANSWER: Yes, I am.

10:26 9 QUESTION: What's your percentage  
10:26 10 holdings?

10:26 11 ANSWER: My individual holdings represent  
10:26 12 about 20 percent of the company's outstanding common  
10:26 13 stock.

10:26 14 QUESTION: Let's take a look at Exhibit  
10:26 15 147. Do you recognize Exhibit 147 as Work Order Number  
10:26 16 1 as executed between VirnetX on the one hand and  
10:26 17 Magenic Technologies on the other?

10:27 18 ANSWER: Yes, I do.

10:27 19 QUESTION: And did you execute this on or  
10:27 20 around February 27, 2006?

10:27 21 ANSWER: Yes, I did.

10:27 22 QUESTION: Now, following the entry by  
10:27 23 Magenic and Kendall Larsen, yourself, on behalf of  
10:27 24 VirnetX in this agreement, did Magenic begin work to  
10:28 25 implement the project goal and the deliverables that are

10:28 1 outlined on page 2 of this work order?

10:28 2 ANSWER: Yes.

10:28 3 QUESTION: So as of February 23rd, 2006,  
10:28 4 your understanding was that the Live Communications  
10:28 5 Server, Office Communicator, did not include RFC 3263 as  
10:28 6 a means for securing communications?

10:28 7 ANSWER: That's correct. We wouldn't have  
10:28 8 put it in the work order to build products functionally  
10:28 9 similar to that had we believed it already to be there.

10:28 10 QUESTION: And in connection with the  
10:28 11 Magenic work on the project, I take it that Magenic  
10:28 12 reviewed the '135 patent; is that right?

10:28 13 ANSWER: They were given direction by Gif  
10:28 14 Munger and Sameer Mathur as to implementing those  
10:29 15 functions that are described in the '135 patent. This  
10:29 16 is product development.

10:29 17 QUESTION: And was one of the objectives  
10:29 18 of the work that was being done here was to take the  
10:29 19 Live Communications Server 2005 and embed in it or  
10:29 20 develop into it the technologies that are -- among  
10:29 21 others, that are found in the '135 patents?

10:29 22 ANSWER: In part, yes.

10:29 23 QUESTION: Now, in connection with the  
10:29 24 work that Magenic was doing on this project to embed the  
10:29 25 '135 patented technology into the Live Communication

10:29 1 Server, Microsoft product, how long did Magenic work on  
10:29 2 that?

10:29 3 ANSWER: I would say roughly six months.

10:30 4 QUESTION: Let me show you Exhibit 111.  
10:30 5 This appears to be a letter from Microsoft to SAIC on  
10:30 6 the subject of the '135 patent. Have you seen this  
10:30 7 letter before?

10:31 8 ANSWER: Yes, I have.

10:31 9 QUESTION: And did you see this letter in  
10:31 10 or around the September 2006 time frame?

10:31 11 ANSWER: Yes, I did.

10:31 12 QUESTION: You'll note in the second to  
10:31 13 last paragraph Microsoft says that they agree that a  
10:31 14 meeting might be appropriate. Do you see that?

10:31 15 ANSWER: Yes, I do.

10:31 16 QUESTION: I'm asking, between September  
10:31 17 of 2006 and February of 2007, did you make any effort to  
10:31 18 set up a meeting with Microsoft to discuss the subject  
10:31 19 matter of this letter?

10:31 20 ANSWER: No.

10:31 21 QUESTION: Do you know one way or the  
10:31 22 other whether Ms. Bumann undertook some efforts?

10:31 23 ANSWER: I can't speak for Ms. Bumann.

10:31 24 QUESTION: Now, in Exhibit 111, Microsoft  
10:32 25 asked Ms. Bumann for a claim chart to support the

10:32 1 allegations that the implementations of RFC 3263  
10:32 2 infringe the '135 patent. Do you see that?

10:32 3 ANSWER: I see that, yes.

10:32 4 QUESTION: To your knowledge, did  
10:33 5 Ms. Bumann send such a claim chart to Microsoft?

10:33 6 ANSWER: Sorry. I'm not aware.

10:33 7 QUESTION: Did VirnetX send such claim  
10:33 8 charts to Microsoft?

10:33 9 ANSWER: No, we did not.

10:33 10 QUESTION: And in light of that, was one  
10:33 11 of the goals of the Gabriel technology to embody the  
10:33 12 patent methods to support litigation?

10:33 13 ANSWER: Yes, it was.

10:33 14 QUESTION: Did you perform an analysis of  
10:33 15 whether most implementations under RFC 3263 would  
10:33 16 practice the VirnetX patents?

10:33 17 ANSWER: No.

10:33 18 QUESTION: Is it your belief that any  
10:33 19 product that has the general functions and benefits of  
10:33 20 what's described in RFC 3263 necessarily comes under the  
10:33 21 VirnetX patents?

10:33 22 ANSWER: No.

10:33 23 QUESTION: How long after December of 2005  
10:33 24 did VirnetX continue to work with Microsoft software to  
10:34 25 attempt to introduce instant secure connect, or Gabriel

10:34 1 technology?

10:34 2 ANSWER: We continued all the way through  
10:34 3 2006. So we continued working. We let SAIC know that  
10:34 4 they needed to contact Microsoft per the contract.

10:34 5 And, you know, I'm talking a month or two  
10:34 6 here. It could have been November where we had that  
10:34 7 conversation and the notice came in December, but it was  
10:34 8 in the fourth quarter of the architectural design  
10:34 9 document when that took place.

10:34 10 We were not stopped by that process, and  
10:34 11 we said we're going to continue because we think that  
10:34 12 there's a way to work this out, work together. And we  
10:34 13 said the best way to work that out would be hire  
10:34 14 Magenic, which was their top developer. And if there  
10:34 15 was anyone who could help us integrate our invention  
10:34 16 with Microsoft platforms, it would be Magenic. So it  
10:34 17 was really a well-intended effort.

10:35 18 QUESTION: One of Magenic's -- Magenic's  
10:35 19 objectives in attempting to modify Microsoft's products  
10:35 20 was the goal of utilizing VirnetX's patented technology  
10:35 21 in Microsoft's products, right?

10:35 22 ANSWER: That's correct.

10:35 23 QUESTION: And so VirnetX spent the lion's  
10:35 24 share of its Series A financing in this effort in 2006  
10:35 25 to modify Microsoft's products to practice the claims of

10:35 1 the patents, right?

10:35 2 ANSWER: To build a product that we felt  
10:35 3 completely would practice a full implementation of  
10:35 4 our -- of our patents, yes. And we believed that  
10:35 5 Microsoft implemented a portion of that along the way,  
10:35 6 and it was an increasing portion throughout the  
10:35 7 development process.

10:35 8 QUESTION: Isn't it true that you figured  
10:35 9 out what Microsoft was doing in terms of implementing  
10:35 10 SIP in the summer of 2006?

10:36 11 ANSWER: Yes.

10:36 12 QUESTION: It's your belief, and was in  
10:36 13 the summer of 2006, that Microsoft was not actually  
10:36 14 practicing RFC 3263, right?

10:36 15 ANSWER: Yes.

10:36 16 QUESTION: And when SAIC gave notice to  
10:36 17 Microsoft that Microsoft was potentially infringing the  
10:36 18 VirnetX's intellectual property, Microsoft was told that  
10:36 19 if it were practicing RFC 3263, it was potentially  
10:36 20 infringing, right?

10:36 21 ANSWER: It was a misstatement. Yes, I do  
10:36 22 remember that. And it was a notice from Pam Bumann. It  
10:36 23 was a general indicator that they were practicing 3263  
10:36 24 and if they were -- and Microsoft said: We're not.

10:36 25 QUESTION: To your knowledge, SAIC never

10:36 1 sent Microsoft a claim chart, charting any  
10:36 2 implementation of RFC 3263 against the '135 patent,  
10:36 3 right?

10:36 4 ANSWER: My answer is no.

10:37 5 QUESTION: Who, if anyone, at SAIC or  
10:37 6 VirnetX contacted Microsoft to set up a meeting after  
10:37 7 SAIC received this letter?

10:37 8 ANSWER: Pam Bumann.

10:37 9 QUESTION: When did Pam Bumann contact  
10:37 10 Microsoft to set up a meeting?

10:37 11 ANSWER: After September 12, 2006.

10:37 12 QUESTION: When?

10:37 13 ANSWER: You'd have to ask her  
10:37 14 specifically. But it was a -- a -- an action that we  
10:37 15 were trying to wait for a response, wait for a meeting  
10:37 16 date. I was ready to go, and there was never a response  
10:37 17 from Microsoft to set the meeting up.

10:37 18 QUESTION: A response to an inquiry made  
10:37 19 by Pam Bumann?

10:37 20 ANSWER: Yes. In other words, this  
10:37 21 meeting request was in theory. In practice, they never  
10:37 22 returned the calls.

10:38 23 QUESTION: But in your discussions with  
10:38 24 Pam Bumann, she never told you that she'd actually sent  
10:38 25 Microsoft a claim chart or any other evidence to

10:38 1 substantiate SAIC's claim that an implementation of RFC  
10:38 2 3263 could infringe the '135 patent?

10:38 3 ANSWER: That's correct. The answer is  
10:38 4 yes.

10:38 5 QUESTION: To your knowledge, did SAIC  
10:38 6 ever provide Microsoft with claim charts or other  
10:38 7 evidence that any Microsoft product infringed claims of  
10:38 8 the VirnetX patents?

10:38 9 ANSWER: To my knowledge, no.

10:38 10 QUESTION: Does VirnetX have a view, one  
10:38 11 way or the other, on which would be more valuable to a  
10:38 12 potential licensee? Licensing the specific technology  
10:38 13 in an SDK versus licensing patent rights to practice it  
10:38 14 a different way?

10:39 15 ANSWER: We believe them equally balanced  
10:39 16 as far as their value to the end user, whether they  
10:39 17 wanted to implement it in our object code or whether  
10:39 18 they wanted to write their own object code.

10:39 19 QUESTION: You believe the two types of  
10:39 20 licenses would carry similar values to the potential  
10:39 21 licensee?

10:39 22 ANSWER: Yes.

10:39 23 QUESTION: Would you agree that as a  
10:39 24 general matter, a company with significant resources,  
10:39 25 like a Google or a Microsoft, would be able to develop



10:39 1 the technology contained in the software development  
10:39 2 kits on its own and apart from VirnetX for around \$5  
10:39 3 million?

10:39 4 ANSWER: I would say that our development  
10:40 5 of Gabriel was in that range, and so I think that a  
10:40 6 company of Microsoft or Google's stature could develop  
10:40 7 the technology for that, yes.

10:40 8 (End of video clip.)

10:40 9 MR. POWERS: Your Honor, that completes  
10:40 10 the witnesses in Microsoft's case.

10:40 11 And we'd like to hand up a list of the  
10:40 12 illustrative exhibits that have been admitted throughout  
10:40 13 the course of the trial similar to the substantive  
10:40 14 exhibits.

10:40 15 THE COURT: All right. Very well.  
10:40 16 Any objection to the illustrative  
10:40 17 exhibits?

10:40 18 MR. McLEROY: No, Your Honor.

10:40 19 THE COURT: Okay. Be admitted.

10:40 20 Does Microsoft rest?

10:40 21 MR. POWERS: Yes, Your Honor.

10:40 22 THE COURT: All right. Rebuttal.

10:40 23 MR. McLEROY: Yes, Your Honor. VirnetX  
10:40 24 calls Professor Mark Jones back to the witness stand.

10:40 25 THE COURT: Professor Jones.

10:40 1 MR. McLEROY: Your Honor, may I approach?

10:40 2 THE COURT: Yes.

10:40 3 MARK JONES, PLAINTIFF'S WITNESS, PREVIOUSLY SWORN

10:40 4 DIRECT EXAMINATION

10:40 5 BY MR. McLEROY:

10:41 6 Q. Good morning, Professor Jones.

10:41 7 A. Good morning, sir.

10:41 8 Q. Now, last week Mr. Caldwell asked you questions  
10:41 9 about the infringement of the VirnetX patents. You  
10:41 10 understand that I am now going to cover the validity of  
10:41 11 the VirnetX patents with you?

10:41 12 A. Yes, sir.

10:41 13 Q. All right. Now the '135 patent was granted in  
10:41 14 I think in 2003 and the '180 patent was granted in 2007.  
10:41 15 What is the effect of granting a U.S. patent?

10:41 16 A. Well, as Judge Davis has told us, when the  
10:41 17 United States Patent and Trade Office grants a patent,  
10:41 18 that we are to presume that it is valid.

10:41 19 Q. And let me ask you right off the bat. Do you  
10:41 20 agree or disagree with Dr. Wicker's opinions that the  
10:41 21 '135 patent and '180 patents are invalid?

10:42 22 A. I disagree with that. None of the references  
10:42 23 Aventail DVPN or Windows NT anticipate or render obvious  
10:42 24 the VirnetX patents.

10:42 25 Q. Now, last time -- last week when you were on

10:42 1 the witness stand, I think your testimony lasted for  
10:42 2 more than three hours. Are you going to be here that  
10:42 3 long again today?

10:42 4 A. No, sir. Today I'm going to be testifying --  
10:42 5 testifying about the validity of the patents, and to  
10:42 6 show a patent is valid, I need to show that at least one  
10:42 7 element is missing from the prior art that is in the  
10:42 8 patents.

10:42 9 Q. Can you give me example of what you mean?

10:42 10 A. Well, let's say that patents had elements A, B,  
10:42 11 and C in a claim and the prior art had just elements A  
10:42 12 and B but not C, then the patent would be valid.

10:42 13 Q. So let's see if we can get an example from this  
10:42 14 case. Is what you're saying, Professor Jones, that if  
10:42 15 the jury finds that -- that just one thing is missing  
10:42 16 from, say, Windows NT 4, that then Windows NT 4 would  
10:43 17 not anticipate the VirnetX patents?

10:43 18 A. That's correct. I mean, it makes sense if --  
10:43 19 if you have an invention, all right, and if the prior  
10:43 20 art is missing part of that invention, then they don't  
10:43 21 have an invention.

10:43 22 Q. Well, Professor Jones, I know you'd probably  
10:43 23 like to discuss your entire validity case today, but  
10:43 24 because all that's required is to show that one element  
10:43 25 is missing, I'm going to ask you just to focus on one

10:43 1 element with respect to the prior art. Is that okay?

10:43 2 A. Yes, sir.

10:43 3 Q. Start with Windows NT 4. Is Windows NT 4 the  
10:43 4 same as the VirnetX patents?

10:43 5 A. No, sir, it's not.

10:43 6 Q. Well, what is the biggest difference between  
10:43 7 Windows NT 4 and the VirnetX patents?

10:43 8 A. Well, I think to -- to illustrate that I would  
10:43 9 like to put up Claim 1 of the '135 patent.

10:43 10 MR. McLEROY: Your Honor, may I approach  
10:43 11 the easel?

10:43 12 THE COURT: Yes, you may.

10:44 13 Q. (By Mr. McLeroy) Can you see that, Dr. Jones?

10:44 14 A. Yes, sir.

10:44 15 Q. Which part of this claim should we focus on?

10:44 16 A. I'd like to focus on for this important  
10:44 17 difference on the second step of that, and it's my  
10:44 18 opinion that Microsoft Windows NT does not determine  
10:44 19 whether the DNS request transmitted in step 1 is  
10:44 20 requesting access to a secure website.

10:44 21 Q. And, Professor Jones, what evidence confirms  
10:44 22 for you that Windows NT 4 does not meet that second step  
10:44 23 of this claim?

10:44 24 A. The evidence I reviewed in the case included  
10:44 25 source code, but I think it would be helpful to show

10:44 1 Mr. Pall's testimony from -- from last week on that  
10:44 2 topic.

10:44 3 MR. McLEROY: Can we set up the first  
10:44 4 slide?

10:44 5 Q. (By Mr. McLeroy) Is this the testimony you're  
10:44 6 referring to?

10:44 7 A. Yes, sir, it is. So -- so Mr. Pall was asked:  
10:44 8 So isn't it true, don't you agree, Mr. Pall, that the  
10:44 9 system you're demonstrating is not determining whether  
10:45 10 the VPN DNS request transmitted is requesting access to  
10:45 11 a secure website?

10:45 12 Q. And his answer was: The system is not  
10:45 13 determining that specifically, sir.

10:45 14 Is that right?

10:45 15 A. Yes, sir.

10:45 16 Q. Now, was Mr. Pall's testimony correct on this  
10:45 17 question?

10:45 18 A. Yes, sir. And I think we all saw the  
10:45 19 demonstration of Windows NT with the three computers up  
10:45 20 here on a table and -- and one computer beneath the  
10:45 21 desk.

10:45 22 In that demonstration, we saw that the VPN  
10:45 23 was connected and set up regardless of whether it was  
10:45 24 typed in `www.securewebsite.com` or whether it was  
10:45 25 `www.eBay.com`. There wasn't a determining, there was

10:45 1 just a setting up.

10:45 2 Q. One other topic related to Windows NT 4 --

10:45 3 MR. McLEROY: And, Your Honor, may I  
10:45 4 approach the easel again?

10:45 5 THE COURT: Yes, you may.

10:45 6 Q. (By Mr. McLeroy) This is the illustration that  
10:46 7 Dr. Wicker gave of the Windows NT 4 system, is that  
10:46 8 right, Professor Jones?

10:46 9 A. Yes, sir.

10:46 10 Q. Did Windows NT 4 operate in the manner that  
10:46 11 Dr. Wicker described here?

10:46 12 A. No, sir, it did not.

10:46 13 Q. Let me ask you a more basic question. Does  
10:46 14 this diagram appear anywhere in any of the evidence that  
10:46 15 you have seen in this case describing Windows NT 4?

10:46 16 A. No, sir, it does not.

10:46 17 Q. Okay. Did you find anything even close to this  
10:46 18 diagram in the evidence?

10:46 19 A. No, I didn't find anything close, but I did  
10:46 20 find a diagram in his report that -- or -- sorry -- in  
10:46 21 Microsoft evidence that was similar to part of this  
10:47 22 diagram.

10:47 23 MR. McLEROY: Could you put up Defendant's  
10:47 24 Exhibit 3064?

10:47 25 Q. (By Mr. McLeroy) All right. Professor Jones,

10:47 1 you have it there on your screen, don't you?

10:47 2 A. Yes, sir.

10:47 3 Q. What is Defendant's Exhibit 3064?

10:47 4 A. This is a document that Microsoft wrote to  
10:47 5 describe the VPN technology in Windows NT.

10:47 6 MR. McLEROY: Could we turn to page 22?

10:47 7 And please blow up the diagram and the text underneath  
10:47 8 the diagram at the top of the page.

10:47 9 Q. (By Mr. McLeroy) Professor Jones, is this the  
10:47 10 diagram that you're referring to?

10:47 11 A. Yes, it is.

10:47 12 Q. Are their differences between the actual  
10:47 13 Microsoft diagram and then the illustration that  
10:47 14 Dr. Wicker gave here in court?

10:47 15 A. Yes, there are. For example, when we're  
10:47 16 looking at the diagram up here on the board, it shows a  
10:47 17 secure DNS request going from the client to the tunnel  
10:48 18 client.

10:48 19 Q. Let me stop you there. This is where  
10:48 20 Dr. Wicker wrote secure DNS request and then he shows an  
10:48 21 arrow from the first computer to the second computer.  
10:48 22 Is that what you're referring to?

10:48 23 A. Yes, sir.

10:48 24 Q. Now, what did the actual Microsoft document  
10:48 25 show happens between those two computers?

10:48 1 A. The Microsoft document shows that there's a  
10:48 2 phone call going from the dial-up client to the tunnel  
10:48 3 client in this case.

10:48 4 Q. So the first computer makes a phone call to the  
10:48 5 second computer; is that right?

10:48 6 A. Yes, sir. It uses what's called -- a piece of  
10:48 7 hardware called a modem to make that call.

10:48 8 Q. How do you know it's a phone call that goes  
10:48 9 from the first computer to the second computer?

10:48 10 A. Well, a couple of things in this diagram as  
10:48 11 well as the rest of the document. First, I see that the  
10:48 12 client in the far left is called the dial-up client.

10:48 13 Q. Okay. So in the actual Microsoft document,  
10:48 14 it's called the dial-up client, right?

10:48 15 A. Yes, sir.

10:48 16 Q. Now, is that referring to what Dr. Wicker just  
10:48 17 called a client?

10:48 18 A. I believe it is.

10:48 19 Q. So he left off the words dial-up?

10:49 20 A. Yes, sir.

10:49 21 Q. Okay. You said a couple of things. Was there  
10:49 22 something else you wanted to point to?

10:49 23 A. Well, when we look at the highlighted text  
10:49 24 below the figure, note that it says, The client computer  
10:49 25 places a dial-up call.



10:49 1                   That's an indication that a phone call  
10:49 2 using a modem is being made.

10:49 3           Q.     Professor Jones, is it possible that there's  
10:49 4 some confusion here, that a telephone call is the same  
10:49 5 thing as a secure DNS request?

10:49 6           A.     No, sir. There's -- a secure DNS request is  
10:49 7 not a phone call.

10:49 8           Q.     And, Professor Jones, is there any evidence  
10:49 9 that the Windows NT 4 system is able to make a  
10:49 10 determination based on a secure DNS request, as we see  
10:49 11 in Dr. Wicker's illustration?

10:49 12          A.     No, sir.

10:49 13          Q.     Let's talk about DVPN now. Is DVPN the same as  
10:49 14 the VirnetX patents?

10:49 15          A.     No, sir, it's not. I found several  
10:49 16 differences. And further, this DVPN was developed, as  
10:49 17 we've heard in testimony, to solve a different problem.

10:49 18          Q.     Well, what was the single most important  
10:50 19 difference between DVPN and the VirnetX patents?

10:50 20          A.     Well, I think the most important difference was  
10:50 21 like Windows NT, DVPN was not doing a determination  
10:50 22 based on a DNS request to go on and then initiate a VPN.

10:50 23          Q.     Didn't Dr. Wicker testify that DVPN did make a  
10:50 24 determination based on a DNS request?

10:50 25          A.     Yes, sir, he did.

10:50 1 Q. Well, when the jury has to figure out if  
10:50 2 DVPN -- DVPN did or did not make that determination,  
10:50 3 what evidence should they rely on? What evidence should  
10:50 4 they look at?

10:50 5 A. I think, for example, we've heard testimony  
10:50 6 last week from Mr. Saydjari indicating that he's the  
10:50 7 person who funded DVPN, that he doubted that DVPN had --  
10:50 8 was DNS-triggered. But I think the best place to look  
10:50 9 is in the source code for DVPN.

10:50 10 MR. McLEROY: Could you pull up  
10:50 11 Plaintiff's Exhibit 985, and turn to the eighth page  
10:50 12 when you have it? And actually there's a section at the  
10:51 13 bottom I'd like you to highlight so we can all see it.

10:51 14 Q. (By Mr. McLeroy) Is this the source code that  
10:51 15 you're referring to, Professor Jones?

10:51 16 A. Yes, sir. This is the source code that  
10:51 17 Dr. Wicker cites to support his contention that there is  
10:51 18 a determination in DVPN based on DNS request.

10:51 19 Q. What does this source code indicate to you?

10:51 20 A. This source code is discussing and looking at  
10:51 21 IP addresses. So if we see in this example IP  
10:51 22 underscore ADDR, remember, IP addresses are like what we  
10:51 23 see on the far right of the screen. If I can -- like  
10:51 24 127.0.0.1 is an example of an IP address as opposed to a  
10:51 25 domain name which might be something like www.Yahoo.com.

10:51 1 Q. Now, to be real clear, does this source code  
10:51 2 that we're looking at on the screen, does it reference a  
10:51 3 DNS request at all?

10:51 4 A. No, sir, it's not.

10:51 5 Q. Finally let's turn to Aventail. Is Aventail  
10:52 6 the same as the VirnetX patents?

10:52 7 A. No, sir.

10:52 8 Q. Well, what is the biggest difference between  
10:52 9 Aventail and the VirnetX patents?

10:52 10 A. The biggest difference is that Aventail does  
10:52 11 not use or create a VPN.

10:52 12 Q. Well, Professor Jones, I know in the Aventail  
10:52 13 manual that Dr. Wicker showed us last week it used the  
10:52 14 term VPN. Is that enough? Does that -- does that  
10:52 15 satisfy a VPN element of the claim?

10:52 16 A. No, sir, it's not just enough to use the words  
10:52 17 VPN. That's why Judge Davis has given us a construction  
10:52 18 to use, and we are to compare that construction for VPN  
10:52 19 to what's actually going on in the products, not just  
10:52 20 look at words.

10:52 21 MR. McLEROY: Would you put the next slide  
10:52 22 up for presentation?

10:52 23 Q. (By Mr. McLeroy) Is this that definition that  
10:52 24 you're referring to?

10:52 25 A. Yes, sir. It states that a virtual private

10:52 1 network is a network of computers which privately  
10:52 2 communicate with each other by encrypting traffic on  
10:52 3 insecure communication paths between the computers.

10:53 4 Q. What about this definition indicates to you  
10:53 5 that Aventail does not form a VPN?

10:53 6 A. I would -- I would focus in this case on the  
10:53 7 second word, network. Aventail forms a point-to-point  
10:53 8 connection, a SOCKS connection. It doesn't create a  
10:53 9 network or a VPN.

10:53 10 Q. Well, what's the difference between a  
10:53 11 point-to-point connection and a network or virtual  
10:53 12 private network?

10:53 13 A. Well, sir, a point-to-point connection is -- is  
10:53 14 a connection that you put something -- it's like a  
10:53 15 garden hose, you put something in one side of that  
10:53 16 garden hose and it will come out the other. Unlike a  
10:53 17 network where I can typically address packets or  
10:53 18 messages and have them delivered to different computers.  
10:53 19 One mechanism for doing that is routing.

10:53 20 Q. All right. Let me ask you a first question  
10:53 21 about this. Do you know if Dr. Wicker agrees or  
10:53 22 disagrees with you that a -- that Aventail creates a  
10:53 23 point-to-point connection?

10:53 24 A. Dr. Wicker agrees that Aventail creates a  
10:54 25 point-to-point connection. I see this when I look at

10:54 1 Dr. Wicker's testimony. He discusses Aventail using a  
10:54 2 SOCKS -- SOCKS connections. Further in his deposition  
10:54 3 he indicates that he believes that SOCKS creates  
10:54 4 point-to-point connections.

10:54 5 MR. McLEROY: Can we go to the next slide?

10:54 6 Q. (By Mr. Cassidy) Is this that deposition  
10:54 7 testimony of Dr. Wicker that you're referring to?

10:54 8 A. Yes, sir. And he's being asked about whether  
10:54 9 SOCKS is a point-to-point connection, and going to the  
10:54 10 bottom indicates that he's pretty sure it has to be  
10:54 11 point-to-point.

10:54 12 Q. Now I guess that doesn't quite take us all the  
10:54 13 way there. Have we heard any testimony so far in this  
10:54 14 case about whether a point-to-point connection is or is  
10:54 15 not a VPN?

10:54 16 A. Yes, sir. For example, the testimony of  
10:54 17 Mr. Pall last week.

10:54 18 Q. All right.

10:54 19 MR. McLEROY: Could you go to the next  
10:54 20 slide?

10:54 21 Q. (By Mr. McLeroy) What was Mr. Pall's testimony?

10:54 22 A. Here he was asked: And you agree that,  
10:54 23 therefore, a VPN is more than just a point-to-point  
10:54 24 connection?

10:55 25 And he answers: Yes, sir.

10:55 1 Q. Do you agree with Mr. Pall on this issue?

10:55 2 A. Yes, sir, I do.

10:55 3 Q. Well, that covers the '135 patent. Let's talk  
10:55 4 about the '180 patent.

10:55 5 What is the biggest difference between the  
10:55 6 '180 patent and all of the prior art that Microsoft has  
10:55 7 discussed in this case?

10:55 8 A. It's the -- it's the -- the patents have the  
10:55 9 secure domain name elements and the secure domain name  
10:55 10 service elements that aren't there in the prior art.

10:55 11 Q. Well, if the prior art doesn't use secure  
10:55 12 domain names or secure domain name services, what do  
10:55 13 they use?

10:55 14 A. The use conventional domain names and  
10:55 15 conventional domain name services. And these things  
10:55 16 have been around for years.

10:55 17 MR. McLEROY: Would you go to the next  
10:55 18 slide, please?

10:55 19 Q. (By Mr. McLeroy) Here is Judge Davis's  
10:55 20 construction of secure domain name.

10:55 21 Do conventional domain names satisfy the  
10:55 22 judge's definition?

10:55 23 A. No, sir, they don't. Because they don't  
10:56 24 correspond to a secure computer network address as  
10:56 25 required in this claim construction.

10:56 1 Q. A few wrap-up questions, Professor Jones.

10:56 2 What is the role of hindsight in an  
10:56 3 obviousness analysis?

10:56 4 A. Hindsight should not play a part in obviousness  
10:56 5 analysis. Hindsight would be something like using the  
10:56 6 patent as a recipe of things to do and then go looking  
10:56 7 at prior art references for pieces and parts and words,  
10:56 8 assembling them altogether and then saying that that  
10:56 9 renders obvious or -- or the -- the patents. That would  
10:56 10 be the incorrect path to take.

10:56 11 Q. Well, if hindsight is the wrong way to do it,  
10:56 12 what is the right way to do an obviousness analysis?

10:56 13 A. The right way to do it is to put yourself in  
10:56 14 the shoes of one of ordinary skill in the art at the  
10:56 15 time of the invention, in this case late '99, early  
10:57 16 2000. Look at the information before you, including  
10:57 17 these prior art references, and ask whether or not it  
10:57 18 would have been obvious to create the invention using  
10:57 19 those references.

10:57 20 Q. Well, let me ask you that exact question. Were  
10:57 21 the '135 patent and '180 patents obvious in the year  
10:57 22 2000 when the patent applications were filed?

10:57 23 A. No, sir, they were not.

10:57 24 Q. Professor Jones, to wrap up once and for all,  
10:57 25 can you tell the jury what your opinion is on the

10:57 1 validity of the '135 and '180 patents?

10:57 2 A. Yes, sir. None of the three prior art  
10:57 3 references -- Aventail, DVPN or Windows NT 4 --  
10:57 4 anticipate or render obvious the VirnetX patents. The  
10:57 5 '135 and '180 patents are valid.

10:57 6 Q. Thank you.

10:57 7 MR. McCLEROY: I pass the witness, Your  
10:57 8 Honor.

10:57 9 THE COURT: Cross-examination.

10:58 10 MR. POWERS: May I approach, Your Honor?

10:58 11 THE COURT: Yes, you may.

10:58 12 MR. POWERS: May I proceed, Your Honor?

10:58 13 THE COURT: Yes, you may.

10:58 14 CROSS-EXAMINATION

10:58 15 BY MR. POWERS:

10:58 16 Q. Good morning still, Dr. Jones.

10:58 17 A. Good morning, sir.

10:59 18 Q. You began your discussion with the presumption  
10:59 19 of validity. Do you recall that on direct examination?

10:59 20 A. Yes, sir, I do.

10:59 21 Q. Now, the presumption of validity doesn't mean  
10:59 22 that the jury can't find the patents invalid, does it?

10:59 23 A. It does not mean that, that's correct, sir.

10:59 24 Q. In fact, juries do that all the time, don't  
10:59 25 they?



10:59 1 A. I believe they can, yes, sir.

10:59 2 Q. So in this case, the Patent Office did not  
10:59 3 actually consider any of the three pieces of prior art  
10:59 4 we discussed: Aventail, DVPN, or PPTP NT 4.

10:59 5 A. Yes, sir. They were not explicitly on that  
10:59 6 list.

10:59 7 Q. So there's no presumption that the Patent  
10:59 8 Office looked at those pieces of prior art and decided  
10:59 9 that VirnetX's patents were valid over those prior art,  
10:59 10 is there? They just -- they didn't even look at it at  
10:59 11 all.

10:59 12 A. That would be what -- the record indicates they  
10:59 13 did not, so we aren't to presume that they did.

10:59 14 Q. This jury would be the first opportunity to  
10:59 15 decide whether the VirnetX patents are valid over those  
10:59 16 pieces of prior art, true?

10:59 17 A. I believe that's correct, sir.

10:59 18 Q. Now, the Patent Office also didn't have the  
11:00 19 VirnetX source code or technical documentation, did it?

11:00 20 A. Not that I'm aware of, sir.

11:00 21 Q. And, in fact, the Patent Office doesn't make a  
11:00 22 technical evaluation of whether their source code or  
11:00 23 product is any good, does it? That's not the Patent  
11:00 24 Office's job.

11:00 25 A. That's correct, sir.

11:00 1 Q. Now, let's turn first to your discussion of the  
11:00 2 Windows prior art, which is PPTP and AutoDial.

11:00 3 Do you recall that?

11:00 4 A. Yes.

11:00 5 Q. You did not dispute in your testimony that PPTP  
11:00 6 is an easy and automatic way of setting up a VPN, did  
11:00 7 you?

11:00 8 A. I didn't say anything about that, sir.

11:00 9 Q. And the argument that you did make on direct is  
11:00 10 that you believe that the determining step in the '135  
11:00 11 patent was not satisfied by the PPTP/AutoDial prior art,  
11:00 12 right?

11:01 13 A. Yes, sir.

11:01 14 Q. Now, you cited, for example, the testimony of  
11:01 15 Mr. Pall when he was being cross-examined by VirnetX's  
11:01 16 lawyer, right?

11:01 17 A. Yes, sir.

11:01 18 Q. And that testimony came up in the context of  
11:01 19 Mr. Pall's carrying out the demonstration that VirnetX's  
11:01 20 lawyer asked him to carry out, right?

11:01 21 A. Yes, sir.

11:01 22 Q. And what VirnetX's lawyer asked him to do was  
11:01 23 to type in a fake, bogus name, right?

11:01 24 A. I believe in one case, it was eBay, and in  
11:01 25 another case, it was a made-up name, yes, sir.

11:01 1 Q. It was thisisnotasecurewebsite.com, right?

11:01 2 A. Something like that, yes, sir.

11:01 3 Q. That's not a real website, is it?

11:01 4 A. Not that I'm aware of.

11:01 5 Q. Okay. And in that context, that was the  
11:01 6 context in which Mr. Pall said there was no determining  
11:01 7 being done with the fake, bogus name, right?

11:01 8 A. I believe he was asked about the system, sir.  
11:01 9 I'm not sure what was in his head.

11:01 10 Q. But it was after the discussion of that fake,  
11:01 11 bogus demonstration, right?

11:01 12 A. Yes, sir.

11:01 13 Q. All right. Now, on the demonstration that  
11:01 14 Mr. Pall gave with a real domain name, it did determine  
11:02 15 a name, didn't it?

11:02 16 A. No, sir.

11:02 17 Q. In fact, what happened in that demonstration is  
11:02 18 Mr. Pall typed in a genuine address, and it went to the  
11:02 19 AutoDial address book, right? That's how it works.

11:02 20 A. I would not describe it that way, sir, no, sir.

11:02 21 Q. Well, it -- you did see the AutoDial address  
11:02 22 book pop up on the screen.

11:02 23 A. I don't recall if I saw it pop up on the  
11:02 24 screen, but I'm familiar with how it works.

11:02 25 Q. You were here during the testimony?

11:02 1 A. Yes, sir.

11:02 2 Q. Okay. And you don't dispute that the AutoDial  
11:02 3 address book came up on the screen.

11:02 4 A. I believe he had it up on the screen. I don't  
11:02 5 remember if it came up during that process or not.

11:02 6 Q. You had an opportunity to inspect that system  
11:02 7 for two full hours before it was shown to the jury,  
11:02 8 didn't you?

11:02 9 A. Yes, sir.

11:02 10 Q. So you know that the AutoDial address book  
11:02 11 contains addresses of websites that have been visited.

11:02 12 A. By addresses, you mean like IP address, sir,  
11:02 13 or --

11:02 14 Q. No. The path by which it was going to reach  
11:02 15 that -- or create that VPN.

11:02 16 A. I believe it contains the IP address and an  
11:03 17 indication of whether it's going to use PPTP, yes, sir.

11:03 18 Q. Exactly. The AutoDial address book says it's  
11:03 19 going to use PPTP for a particular secure connection,  
11:03 20 doesn't it?

11:03 21 A. That's the phone book, sir.

11:03 22 Q. Yes or no, does AutoDial do that? You just  
11:03 23 said it did.

11:03 24 A. No, sir, I didn't. Could you repeat the  
11:03 25 question, please.

11:03 1 Q. You just said that it contains an indication  
11:03 2 that it will use PPTP to make the connection.

11:03 3 A. The phone book --

11:03 4 Q. That's true, isn't it?

11:03 5 A. The phone book does, yes, sir.

11:03 6 Q. Okay. Now, let's turn then to -- well, let's  
11:03 7 stay with that demonstration for a moment.

11:03 8 You were here when VirnetX's lawyer  
11:03 9 cross-examined Mr. Pall and made him get down on his  
11:03 10 hands and knees and look at a Windows 2000 sticker that  
11:03 11 was on the bottom of the box?

11:03 12 A. Yes, sir.

11:03 13 Q. And he made the point that the Windows 2000  
11:03 14 software came out in 2000.

11:03 15 Do you recall that?

11:03 16 A. Yes, sir.

11:03 17 Q. Now, you know that the software running on that  
11:03 18 machine that was demonstrated was not Windows 2000  
11:04 19 software. You know that it was a 1996 NT software,  
11:04 20 don't you?

11:04 21 A. On that machine, sir? Yes, sir. That was  
11:04 22 Windows NT 4, I believe, yes, sir.

11:04 23 Q. Which is 1996.

11:04 24 A. That is my recollection, yes, sir.

11:04 25 Q. And that showed up actually on the screen when

11:04 1 you went to go inspect the demonstration, didn't it?

11:04 2 A. It may have, but I would agree that that was  
11:04 3 Windows NT 4 software from that timeframe, yes, sir.

11:04 4 Q. And that timeframe was 1996.

11:04 5 A. I believe so, yes, sir.

11:04 6 Q. So we didn't need to get down on our hands and  
11:04 7 knees and look at an old sticker to find out what  
11:04 8 software was running; it's right on the screen, and it  
11:04 9 says '96, didn't it?

11:04 10 A. On that computer, yes, sir.

11:04 11 Q. All right. Now, you haven't here offered an  
11:04 12 opinion as to whether any later versions of the BIOS  
11:04 13 would affect the operation of that 1996 software, did  
11:04 14 you?

11:04 15 A. I have not offered an opinion on that, sir.

11:04 16 Q. Let's turn to the DVPN software for a moment.

11:04 17 Do you recall testifying that in that one,  
11:05 18 there was no determining step as well?

11:05 19 A. No determination made an element as for the  
11:05 20 '135 patent, yes, sir.

11:05 21 Q. All right. And you based that conclusion on  
11:05 22 this source code analysis that Dr. Wicker is relieving  
11:05 23 on. Do you recall that?

11:05 24 A. No. I pointed out an example. My conclusion,  
11:05 25 though, is based on an analysis of all the source

11:05 1 code -- or the source code in its entirety, as well as  
11:05 2 the other documents.

11:05 3 Q. Now, let's go to the source code that you  
11:05 4 showed the jury, and that was in PX985. You asked the  
11:05 5 jury to look at the bottom of Page 8.

11:05 6 MR. POWERS: So let's bring that up,  
11:05 7 please, Chris.

11:05 8 Can we dim the lights, please?

11:05 9 Q. (By Mr. Powers) So this is the portion that you  
11:05 10 showed the jury, and you said what it's looking at is IP  
11:05 11 addresses, not DNS requests, right?

11:05 12 A. Well, this is the portion that Dr. Wicker  
11:05 13 showed, and this is what I'm referring to.

11:05 14 Q. All right. And this is what you showed the  
11:05 15 jury?

11:05 16 A. Yes, sir.

11:05 17 Q. Now, if you go forward two pages in the  
11:06 18 software --

11:06 19 MR. POWERS: Let's bring up the two pages  
11:06 20 of Page 10, Chris. And let's highlight DNS, lookup  
11:06 21 right there towards the top of the page. And then  
11:06 22 parse\_secure about -- oh, almost about five or six lines  
11:06 23 from the bottom.

11:06 24 Q. (By Mr. Powers) Do you see that?

11:06 25 A. Yes, sir, I do.

11:06 1 Q. Now, this is a section of the code that is  
11:06 2 talking about DNS lookups, not IP addresses, right?

11:06 3 A. That's correct, sir.

11:06 4 Q. And you didn't show the jury this portion.

11:06 5 A. No, sir, I didn't.

11:06 6 Q. And parse\_secure is where a determination step  
11:06 7 is occurring, isn't it?

11:06 8 A. I don't believe that parse\_secure is doing a  
11:06 9 determination whether to set up a VPN or not. No, sir,  
11:06 10 it does not do that.

11:06 11 Q. It's your testimony that a VPN is not set up  
11:06 12 after this parse\_secure step?

11:06 13 A. It will -- it's not set up as a result of the  
11:06 14 parse\_secure step, no, sir.

11:06 15 MR. POWERS: Let's go to the very next  
11:06 16 page, Page 11, of the source code. And, Chris, could  
11:06 17 you bring up, oh, the first half.

11:06 18 Q. (By Mr. Powers) You didn't show this portion to  
11:07 19 the jury either, did you?

11:07 20 A. No, sir, I didn't.

11:07 21 Q. And you see about, oh, halfway down where it  
11:07 22 says count = dns\_lookup, that's another DNS lookup in  
11:07 23 the DVPN code?

11:07 24 A. Yes, sir.

11:07 25 Q. And the parse\_secure is right below that as



11:07 1 well?

11:07 2 A. Yes, sir.

11:07 3 Q. And the very next step --

11:07 4 MR. POWERS: Chris, could you scroll down?

11:07 5 Q. (By Mr. Powers) -- is vpn\_cache. That's when  
11:07 6 the VPN is formed, isn't it?

11:07 7 A. I -- I see that. That is not when the VPN is  
11:07 8 formed, no, sir, it's not.

11:07 9 Q. That is discussing the formation of a VPN,  
11:07 10 though, isn't it, Dr. Jones?

11:07 11 A. No, sir, that's not what it's doing.

11:07 12 Q. That's your testimony?

11:07 13 A. Yes, sir.

11:07 14 Q. You didn't provide that testimony to the jury  
11:07 15 on direct, did you, sir?

11:07 16 A. No, sir.

11:07 17 Q. And in fact, this is the portion that  
11:07 18 Dr. Wicker relied on, isn't it?

11:07 19 A. No, sir. Dr. Wicker pointed to a different  
11:07 20 portion, the portion I showed.

11:07 21 MR. POWERS: Chris, could you put up  
11:07 22 PX875, just Page 27, and bring up the middle where it's  
11:08 23 about Pages 3 -- where it's Steps 3 through 5 -- look at  
11:08 24 even 3 through 8.

11:08 25 Q. (By Mr. Powers) This is a portion of

11:08 1 Dr. Wicker's report that you read it, right?

11:08 2 A. Yes, sir, I did.

11:08 3 Q. And it's specifically referring to the DVPN  
11:08 4 source code, right?

11:08 5 A. Yes, sir.

11:08 6 Q. And it's specifically referring to DVPN source  
11:08 7 code relating to DNS lookups, not IP address, right?

11:08 8 A. It does have DNS lookups, yes, sir.

11:08 9 Q. And you didn't show the jury that or even talk  
11:08 10 about it, did you?

11:08 11 A. His report? No, sir, I didn't.

11:08 12 Q. All right. Let's turn next to Aventail.

11:08 13 With regard to Aventail, as I heard your  
11:08 14 position, it's that Aventail is not a VPN because it's a  
11:08 15 point-to-point network. That was the argument you made?

11:08 16 A. Point-to-point connection, sir, yes, sir.

11:08 17 Q. Point-to-point connection.

11:08 18 Now, the -- let's go to the Court's  
11:09 19 construction. You put it up. And the Court's  
11:09 20 construction doesn't say it can't be a point-to-point  
11:09 21 connection, does it?

11:09 22 A. No. It says it has to be a network, so that  
11:09 23 precludes a point-to-point connection, sir.

11:09 24 Q. Yours is that a network precludes  
11:09 25 point-to-point because it has to -- why? Because there

11:09 1 have to be more than two computers?

11:09 2 A. No, sir.

11:09 3 Q. Nothing in Judge Davis' construction says  
11:09 4 anything about whether there's a point-to-point  
11:09 5 connection, does it? You'll agree with that?

11:09 6 A. It doesn't mention those words explicitly.  
11:09 7 That's what a network is, sir.

11:09 8 Q. But it's not in Judge Davis' construction,  
11:09 9 which is what the jury has to follow, right?

11:09 10 A. I would say it is because of the word network,  
11:09 11 sir.

11:09 12 Q. Now, in fact, Judge Davis' construction  
11:09 13 requires that for a VPN to exist, it has to be both data  
11:09 14 security encryption and anonymity. We talked about that  
11:09 15 a couple of days ago.

11:09 16 Do you recall that?

11:09 17 A. Yes, sir.

11:09 18 MR. POWERS: Chris, could we bring up the  
11:09 19 testimony that -- the slide that Dr. Jones used quoting  
11:10 20 Mr. Pall's trial testimony?

11:10 21 Nope. Mr. Pall's trial testimony, the one  
11:10 22 from his slide.

11:10 23 Q. (By Mr. Powers) Well, let me just ask you,  
11:10 24 because I wrote it down.

11:10 25 Mr. Pall testified that a VPN has to be

11:10 1 more than just a point-to-point. That was the testimony  
11:10 2 you quoted, right?

11:10 3 A. Yes, sir.

11:10 4 Q. And that's exactly what Judge Davis'  
11:10 5 construction says. It has to be more, because it has to  
11:10 6 be both anonymous and encrypted, right?

11:10 7 A. I would say that those are two things it has to  
11:10 8 be, but that is not sufficient.

11:10 9 Q. So Mr. Pall is right in his testimony in saying  
11:10 10 a point-to-point by itself isn't enough to be a VPN.  
11:10 11 There has to be more. That's all he said, and that's  
11:10 12 true, isn't it?

11:10 13 A. I would agree with that.

11:10 14 Q. And two things we know that it has to be under  
11:10 15 Judge Davis' construction is secure data and anonymous.

11:11 16 A. Data security and anonymity, yes, sir.

11:11 17 Q. All right. Now, you've testified that a  
11:11 18 point-to-point connection can be a VPN, haven't you?

11:11 19 A. That one could construct such a system, yes,  
11:11 20 sir.

11:11 21 Q. So a point-to-point connection can be a  
11:11 22 network.

11:11 23 A. Not when it's simply a point-to-point  
11:11 24 connection, no, sir. You could use a point-to-point  
11:11 25 connection to create a network. I would agree with

11:11 1 that.

11:11 2 Q. And --

11:11 3 MR. POWERS: Chris, could we bring up  
11:11 4 Dr. Jones' deposition from December 19, 2008, at Pages  
11:11 5 62, Line 15, through 63, 7?

11:12 6 Q. (By Mr. Powers) This was --

11:12 7 MR. POWERS: Let's go back up to --  
11:12 8 there's the question.

11:12 9 Q. (By Mr. Powers) This is your testimony in  
11:12 10 December of 2008, wasn't it, Dr. Jones?

11:12 11 A. Yes, sir.

11:12 12 Q. Question: If you met all the other  
11:12 13 requirements, we're taking about with an ability to  
11:12 14 communicate between them and some aspect of addressing  
11:12 15 or identifying to whom it is destined, then a point --

11:12 16 Answer: I guess by point-to-point, what  
11:12 17 are you -- I'm not sure what you're saying there.

11:12 18 MR. POWERS: Then let's go to the next  
11:12 19 question, please, Chris.

11:12 20 Q. (By Mr. Powers) By point-to-point, I am  
11:12 21 referring to, for example, this network that's on  
11:12 22 Page 24 of Exhibit 3, where you have a point being the  
11:12 23 PC on the left and another point being the PC on the  
11:12 24 right.

11:12 25 And your answer was: You could form a

11:12 1 network using that wire, yes.

11:13 2 Do you see that?

11:13 3 A. Yes, sir.

11:13 4 MR. POWERS: And, Chris, could you bring  
11:13 5 up the figure that Dr. Jones was discussing in that  
11:13 6 exact testimony.

11:13 7 Q. (By Mr. Powers) That was a page from the  
11:13 8 technology tutorial that had been discussed by the  
11:13 9 parties at that time, right?

11:13 10 A. I don't recall at this point, sir. That's  
11:13 11 certainly possible.

11:13 12 Q. You recall it being a point-to-point wire  
11:13 13 connection?

11:13 14 A. I -- I know that we're referring to a wire  
11:13 15 here, sir. I don't recall the rest of what was being  
11:13 16 done.

11:13 17 Q. And you agree your testimony said that a  
11:13 18 point-to-point wire connection can be a network.

11:13 19 A. I -- I agree that's what I testified to, sir.

11:13 20 Q. All right.

11:13 21 A. And I would agree that under certain  
11:13 22 circumstances, it could, yes, sir.

11:13 23 Q. Now, PPTP, you've already testified, creates a  
11:13 24 virtual private network, right?

11:13 25 A. Yes, sir.

11:13 1 Q. And PPTP stands for point-to-point, doesn't it?

11:13 2 A. Yes. It uses a point-to-point tunnel to  
11:13 3 connect the other multiple computers.

11:13 4 Q. All right.

11:13 5 MR. POWERS: Now, could we bring up  
11:13 6 DX3064, please, at Page 5, Chris?

11:14 7 And can you blow up the portion -- the  
11:14 8 second from the bottom, second paragraph from the  
11:14 9 bottom. Actually -- sorry -- the paragraph just above  
11:14 10 that. It's very small on this. Here we go.

11:14 11 Q. (By Mr. Powers) There it says -- and this is an  
11:14 12 exhibit from the user's perspective of the VPN as a  
11:14 13 point-to-point connection between the user's computer  
11:14 14 and a corporate server.

11:14 15 Do you see that?

11:14 16 A. Yes, sir, I do.

11:14 17 Q. And that's an accurate description, isn't it?

11:14 18 A. I think that's a reasonable description for  
11:14 19 what they're describing here, yes, sir.

11:14 20 Q. All right. Now let's turn to the '180 patent  
11:14 21 for a moment.

11:14 22 You testified --

11:14 23 THE COURT: Mr. Powers, you have about  
11:14 24 three or four minutes left.

11:14 25 MR. POWERS: Thank you, Your Honor.

11:14 1 Q. (By Mr. Powers) You testified that none of the  
11:14 2 prior art references satisfy the secure domain name  
11:14 3 requirement because they're just regular domain names,  
11:14 4 right?

11:14 5 A. Yes, sir.

11:14 6 Q. Now, Judge Davis' construction that the jury  
11:14 7 has to follow doesn't say that it can't be a regular  
11:15 8 domain name, right?

11:15 9 A. I believe it does. It says that they have  
11:15 10 to -- that the domain names must correspond to secure  
11:15 11 computer network addresses.

11:15 12 Q. And a secure address is one that just requires  
11:15 13 authority to access, right, under his construction?

11:15 14 A. I believe it has a -- my recollection is, it  
11:15 15 also requires being capable of DVPN communications.

11:15 16 Q. True. Exactly.

11:15 17 So as long -- and so a regular DNS -- a  
11:15 18 regular domain name, as long as it corresponds to a  
11:15 19 secure domain name address, that satisfies Judge Davis'  
11:15 20 construction, doesn't it?

11:15 21 A. Not -- what you said, sir, is not a  
11:15 22 possibility. So you've used the words, but that's not  
11:15 23 an accurate description of what would happen.

11:15 24 Q. Now, you're -- the reason in your expert report  
11:15 25 that you gave as to why a -- you believe Judge Davis'



11:15 1 construction can't be satisfied by a regular domain name  
11:15 2 is that the domain name has to be designed in order to  
11:15 3 correspond to a secure website, not just that it, in  
11:16 4 fact, corresponds to one. That's true, isn't it?  
11:16 5 That's what you said in your report?

11:16 6 A. That's one way -- being designed to correspond  
11:16 7 is one way that it can correspond, yes, sir.

11:16 8 Q. But that's not what you said in your deposition  
11:16 9 or your report. You said that's what you thought it  
11:16 10 meant to correspond, right?

11:16 11 A. I -- I don't recall whether I used that as an  
11:16 12 example, sir, or I said that it meant that.

11:16 13 Q. Now, you'll recall that VirnetX argued that  
11:16 14 claim construction, and Judge Davis did not adopt it.  
11:16 15 Do you recall that, that it has to be designed  
11:16 16 limitation. Judge Davis said it merely corresponds.  
11:16 17 That was his construction, wasn't it?

11:16 18 A. I don't -- I don't believe that there was an  
11:16 19 argument that it had to be designed, no, sir.

11:16 20 Q. In any event, Judge Davis did not include such  
11:16 21 a requirement of design into the -- into the  
11:16 22 construction, did he?

11:16 23 A. I believe that's one way in which it  
11:16 24 corresponds, so I believe he did by the way he made his  
11:16 25 construction, sir.

11:16 1 Q. Let's be clear. Judge Davis did not include  
11:16 2 anything saying that design to be correspond is  
11:16 3 required, just must correspond; that's fair?

11:17 4 A. He didn't use those exact words, no, sir.

11:17 5 Q. The exact word he used, which is has to  
11:17 6 correspond, right?

11:17 7 A. That's what -- corresponds, one way to satisfy  
11:17 8 that is to be designed to be a secure domain name.

11:17 9 Q. And another way to satisfy it would be, if I  
11:17 10 type in that name, it prints back that secure address,  
11:17 11 that corresponds then, doesn't it?

11:17 12 A. It does, sir.

11:17 13 Q. It does, or it does not?

11:17 14 A. No, sir.

11:17 15 Q. So if I type in the name of a secure address,  
11:17 16 and that goes out and brings back that secure address,  
11:17 17 your testimony to this jury is that that name doesn't  
11:17 18 correspond to the address?

11:17 19 A. Not -- you'd have to tell me the rest of the  
11:17 20 system, sir, but just doing that, no, sir, that doesn't  
11:17 21 meet the elements of the claims.

11:17 22 MR. POWERS: No further questions, Your  
11:17 23 Honor.

11:17 24 THE COURT: Thank you.

11:17 25 Redirect?

11:17 1 MR. McLEROY: Yes, Your Honor.

01:22 2 REDIRECT EXAMINATION

01:22 3 BY MR. McLEROY:

11:17 4 Q. Professor Jones, I'll start where -- the same  
11:18 5 place Mr. Powers started with the Windows NT  
11:18 6 demonstration that we saw in the courtroom here.

11:18 7 Is www.ebay.com, is that a real domain  
11:18 8 name or a bogus domain name?

11:18 9 A. That's a real domain name that you can go find  
11:18 10 on the internet.

11:18 11 Q. What happened when Mr. Pall typed in  
11:18 12 www.ebay.com into the demonstration system?

11:18 13 A. The system set up a VPN.

11:18 14 Q. And what does that indicate to you about  
11:18 15 whether or not Windows NT 4 makes or does not make a  
11:18 16 determination to set up or initiate a VPN based on a DNS  
11:18 17 request?

11:18 18 A. Well, that confirms the understanding I got  
11:18 19 from looking at the rest of the evidence and the source  
11:18 20 code for this, that there's not a determination based on  
11:18 21 a DNS request to set up a VPN in Windows NT.

11:18 22 Q. A little bit more about the demonstration.  
11:18 23 Mr. Powers referred to the time you spent inspecting the  
11:19 24 demonstration system before it was shown here in court.

11:19 25 Do you remember that?

11:19 1 A. Yes, sir.

11:19 2 Q. All right. And he focused on what software was  
11:19 3 running on the computer sitting over there on  
11:19 4 Microsoft's counsel table; is that right?

11:19 5 A. Yes, sir.

11:19 6 Q. And he was careful not to ask you what software  
11:19 7 was running on these three computers on this side of the  
11:19 8 courtroom.

11:19 9 A. Yes, sir.

11:19 10 Q. What software was running on some of the  
11:19 11 computers on this side of the courtroom?

11:19 12 A. Well, on two of those computers, an early  
11:19 13 version, a beta version, of Windows 2000 or what became  
11:19 14 Windows 2000 was running.

11:19 15 Q. Now, turning to DVPN, why did you choose to  
11:19 16 show the source code up here on the screen that you did?

11:19 17 A. That was the source code that Dr. Wicker cited  
11:19 18 to in his chart, and it's the source code he showed to  
11:19 19 the jury, so that was the source code that I discussed,  
11:19 20 but --

11:19 21 Q. Did you just review that source code, or did  
11:19 22 you review all the source code in that file in  
11:19 23 Plaintiff's Exhibit 985 that we saw?

11:19 24 A. Well, I certainly reviewed all the source code  
11:19 25 in that file, but I also reviewed other files in the

11:20 1 DVPN system to understand what was being put forward.

11:20 2 Q. Does any of the other code, any of the other  
11:20 3 source code in Plaintiff's 985 or any of the other DVPN  
11:20 4 source code change your opinion that DVPN does not make  
11:20 5 determinations based on a DNS request?

11:20 6 A. No, sir. It confirms my opinion of how it  
11:20 7 works.

11:20 8 Q. All right. Then on Aventail, on the discussion  
11:20 9 of point-to-point connections, what does PPTP stand for?

11:20 10 A. I believe it's point-to-point tunneling  
11:20 11 protocol.

11:20 12 Q. Is that the same thing as a point-to-point  
11:20 13 connection, or is that something different?

11:20 14 A. That's something different. It uses -- PPTP  
11:20 15 uses a -- what's called a point-to-point tunnel to  
11:20 16 allow, say, a client computer on one side to communicate  
11:20 17 with a network of computers on the other.

11:20 18 That client computer can send a packet  
11:20 19 with -- as it showed, with an IP address in it and have  
11:20 20 that packet delivered to any of the computers on the  
11:20 21 private network on the other side of the tunnel.

11:21 22 So it's not -- it's using a point-to-point  
11:21 23 connection. Many things use a point-to-point  
11:21 24 connection. It, however, is creating a virtual private  
11:21 25 network.

11:21 1 Q. So is the PPTP protocol, does that create a  
11:21 2 garden hose, or does that create something else?

11:21 3 A. That doesn't create a garden hose; that creates  
11:21 4 a network, sir.

11:21 5 Q. Okay. Now, finally, let's look at the secure  
11:21 6 domain names. That's a claim term in the '180 patent,  
11:21 7 right?

11:21 8 A. Yes, sir.

11:21 9 Q. Can you give me an example of what a regular,  
11:21 10 standard domain name was, you know, something that's  
11:21 11 been in existence since the '80s?

11:21 12 A. How about the -- if I can go as far back in the  
11:21 13 '80s in my head, but how about [www.yahoo.com](http://www.yahoo.com) as a  
11:21 14 conventional domain name?

11:21 15 Q. What did the inventors use as examples of  
11:21 16 secure domain names in their '180 patent?

11:21 17 A. Well, in that they would use something like  
11:21 18 [www.yahoo.scom](http://www.yahoo.scom) to -- in that case, indicating that  
11:21 19 that's for a secure domain name.

11:22 20 Q. What would have happened if you sent a secure  
11:22 21 domain name to a regular DNS server?

11:22 22 A. You would have gotten back an error that would  
11:22 23 indicate that it didn't have that address or that it  
11:22 24 couldn't understand that address.

11:22 25 Q. In the Microsoft accused products, and

11:22 1 specifically, the PeerNet interfaces, do those use  
11:22 2 regular domain names, or do they use something  
11:22 3 different?

11:22 4 A. They use something different. They use --  
11:22 5 remember that long string of characters that were  
11:22 6 numbers and letters and dots followed by another string?  
11:22 7 That -- that name is not a conventional domain name  
11:22 8 either.

11:22 9 Q. What happens if that Windows PeerNet name --  
11:22 10 peer name was sent to a regular DNS -- regular standard  
11:22 11 DNS server?

11:22 12 A. You would get an error returned, and I've  
11:22 13 tested and verified that myself.

11:22 14 Q. Just like a secure domain name that's listed in  
11:22 15 the '180 patent?

11:22 16 A. Yes, sir.

11:22 17 MR. McLEROY: Pass the witness.

11:22 18 THE COURT: Any recross?

11:22 19 MR. POWERS: Yes, Your Honor, very brief.

11:23 20 THE COURT: It's going to have to be.

11:23 21 You're out of time.

11:23 22 MR. POWERS: Then I'll make it very brief.

02:44 23 RE CROSS-EXAMINATION

02:44 24 BY MR. POWERS:

11:23 25 Q. Just two subjects, Dr. Jones.

11:23 1                   One, you were asked just then by VirnetX's  
11:23 2 lawyer about the demonstration that Mr. Pall gave  
11:23 3 regarding ebay.com.

11:23 4                   Do you recall that?

11:23 5           A.    Yes, sir, I do.

11:23 6           Q.    Now, the computers that were set up were not  
11:23 7 actually connected to the internet, were they?

11:23 8           A.    They were not.

11:23 9           Q.    So it's not going to find ebay.com, is it?

11:23 10          A.    No, it's not.

11:23 11          Q.    And ebay.com was not in the address book, was  
11:23 12 it?

11:23 13          A.    No, sir, it wasn't in the address book.

11:23 14          Q.    Secondly, with respect to Aventail -- could you  
11:23 15 get Exhibit 362, Plaintiff's Exhibit 362, in front of  
11:23 16 you, please?

11:23 17                   Now, this is an SAIC document, correct?

11:23 18          A.    Yes, sir, I believe it is.

11:24 19          Q.    If you could turn to Page 27.

11:24 20          A.    Is that marked 27 down at the bottom, or the  
11:24 21 page -- which --

11:24 22          Q.    Marked 27 down at the bottom.

11:24 23          A.    Okay, sir. I'm there.

11:24 24          Q.    And if you go --

11:24 25                   MR. POWERS: Chris, could you bring up --



11:24 1 just about, oh, 60 percent down, there's a discussion of  
11:24 2 VPN system providers. See if you can pull that out.

11:24 3 Well, let's get a little less text, if we  
11:24 4 could. Do you see where I'm referring to? About 60  
11:24 5 percent down.

11:24 6 Q. (By Mr. Powers) And VPN starts on the far  
11:24 7 right-hand side, Dr. Jones.

11:24 8 A. Yes, sir, I do.

11:24 9 Q. And it says VPN system providers in the  
11:24 10 parenthetical, and the first one it lists is Aventail.

11:24 11 Do you see that?

11:24 12 A. Yes, sir.

11:24 13 Q. This is a situation where SAIC is calling  
11:24 14 Aventail a VPN system provider, right?

11:24 15 A. I believe it is. I haven't examined this  
11:24 16 document, sir.

11:24 17 MR. POWERS: No further questions, Your  
11:24 18 Honor, but we would offer PX362.

11:24 19 THE COURT: Okay. Any objection?

11:24 20 MR. McCLEROY: No, Your Honor.

11:24 21 Two follow-up questions?

11:24 22 THE COURT: Yes, uh-huh.

11:24 23 That exhibit will be admitted, and you may  
11:25 24 redirect.

01:22 25 REDIRECT EXAMINATION

01:22 1 BY MR. POWERS:

11:25 2 Q. Professor Jones, do you still have Plaintiff's  
11:25 3 362 in front of you?

11:25 4 A. Yes, sir.

11:25 5 Q. What is the date of that document?

11:25 6 A. I don't know, sir. July 8th, 1999, I believe  
11:25 7 is the -- is the date.

11:25 8 Q. Okay. At that time, had Judge Davis defined  
11:25 9 the term VPN yet?

11:25 10 A. No, sir, he had not.

11:25 11 Q. Is it at all possible that SAIC could have been  
11:25 12 applying the Court's definition of VPN when they were?

11:25 13 A. No, sir.

11:25 14 MR. McLEROY: Pass the witness.

11:25 15 THE COURT: Okay. Anything further?

11:25 16 MR. POWERS: No, Your Honor.

11:25 17 THE COURT: Okay. Very good.

11:25 18 All right. You may step down. Thank you.

11:25 19 All right. Microsoft have any further  
11:25 20 evidence -- I'm sorry. VirnetX?

11:25 21 MR. CAWLEY: VirnetX has no further  
11:25 22 evidence and rests, Your Honor.

11:25 23 THE COURT: All right. VirnetX rests.  
11:25 24 Microsoft finally closes?

11:25 25 MR. POWERS: Yes, Your Honor.

11:25 1 THE COURT: And VirnetX finally closes?

11:26 2 MR. CAWLEY: Yes, Your Honor.

11:26 3 THE COURT: All right.

11:26 4 All right, Ladies of the Jury. That  
11:26 5 concludes the evidence stage of the case. I think it  
11:26 6 was a week ago today that we did the opening statements,  
11:26 7 and I told you we would, after that, go through the  
11:26 8 evidence. And then following the evidence, you will  
11:26 9 hear the Court's charge and then the final arguments of  
11:26 10 counsel.

11:26 11 But what I'm going to do now, I have some  
11:26 12 matters I have to take up with the attorneys, so I'm  
11:26 13 going to go ahead and let you recess for lunch, and  
11:26 14 we'll plan to start back here at 1:45. That will give  
11:26 15 you an hour and 20 minutes for lunch. We'll come back  
11:26 16 at 1:45, and at that time, you'll hear the charge and  
11:26 17 the arguments of counsel.

11:26 18 I, again, want to remind you of your  
11:26 19 instructions. Even though the evidence is all closed,  
11:26 20 you still should not discuss this case among yourselves  
11:26 21 or with anyone else.

11:26 22 So enjoy your lunch, and then we'll hear  
11:27 23 the arguments, and finally, later this afternoon, you'll  
11:27 24 be released to begin your deliberations.

11:27 25 I'm going to take about a five-minute

11:27 1 recess, and then I'll be back to visit with the  
11:27 2 attorneys.

11:27 3 So at this time, we are in recess until  
11:27 4 1:45.

11:27 5 COURT SECURITY OFFICER: All rise.  
6 (Jury out.)  
7 (Recess.)

10 CERTIFICATION

12 I HEREBY CERTIFY that the foregoing is a  
13 true and correct transcript from the stenographic notes  
14 of the proceedings in the above-entitled matter to the  
15 best of my ability.

19 /s/ \_\_\_\_\_ Date \_\_\_\_\_  
20 SUSAN SIMMONS, CSR  
21 Official Court Reporter  
22 State of Texas No.: 267  
23 Expiration Date: 12/31/10

23 /s/ \_\_\_\_\_ Date \_\_\_\_\_  
24 JUDITH WERLINGER, CSR  
25 Deputy Official Court Reporter  
State of Texas No.: 731  
Expiration Date: 12/31/10

EXHIBIT F12

1 IN THE UNITED STATES DISTRICT COURT  
 2 FOR THE EASTERN DISTRICT OF TEXAS  
 3 TYLER DIVISION

4 VIRNETX \* Civil Docket No.  
 5 \* 6:07-CV-80.  
 6 VS. \* Tyler, Texas  
 \*  
 \* March 15, 2010.  
 7 MICROSOFT CORPORATION \* 12:35 P.M.

8 TRANSCRIPT OF JURY TRIAL  
 9 BEFORE THE HONORABLE JUDGE LEONARD DAVIS  
 10 UNITED STATES DISTRICT JUDGE

11 APPEARANCES:

12 FOR THE PLAINTIFFS: MR. DOUGLAS CAWLEY  
 13 MR. BRADLEY CALDWELL  
 14 MR. JASON D. CASSADY  
 15 MR. LUKE MCLEROY  
 McKool-Smith  
 300 Crescent Court  
 Suite 1500  
 Dallas, TX 75201  
 16 MR. ROBERT M. PARKER  
 Parker, Bunt & Ainsworth  
 100 East Ferguson  
 Suite 1114  
 Tyler, TX 75702

17 APPEARANCES CONTINUED ON NEXT PAGE:

18 COURT REPORTERS: MS. SUSAN SIMMONS, CSR  
 19 Ms. Judith Werlinger, CSR  
 20 Official Court Reporters  
 21 100 East Houston, Suite 125  
 22 Marshall, TX 75670  
 903/935-3868.

23 (Proceedings recorded by mechanical stenography,  
 24 transcript produced on CAT system.)  
 25

1 APPEARANCES CONTINUED:

2 FOR THE DEFENDANT:

MR. MATTHEW POWERS  
MR. JARED BOBROW  
MR. PAUL EHRLICH  
MR. THOMAS KING  
MR. ROBERT GERRITY  
Weil Gotshal & Manges  
201 Redwood Shores Parkway  
5th Floor  
Redwood City, CA 94065

7 MS. ELIZABETH WEISWASSER  
MR. TIM DeMASI  
Weil Gotshal & Manges  
767 Fifth Avenue  
9 New York, NY 10153

10 MR. DANIEL BOOTH  
Weil Gotshal & Manges  
11 700 Louisiana  
Suite 1600  
12 Houston, TX 77002

13 MR. RICHARD SAYLES  
MR. MARK STRACHAN  
14 Sayles Werbner  
1201 Elm Street  
15 4400 Renaissance Tower  
Dallas, TX 75270

16 MR. ERIC FINDLAY  
17 Findlay Craft  
6760 Old Jacksonville Highway  
18 Suite 101  
Tyler, TX 75703

19 \* \* \* \* \*

21 P R O C E E D I N G S

22 (Jury out)

11:35 23 COURT SECURITY OFFICER: All rise.

11:35 24 THE COURT: Please be seated.

11:35 25 All right. Does Plaintiff have any

11:35 1 motions it wishes to make?

11:35 2 MS. CASSADY: Your Honor, our star  
11:35 3 quarterback has appeared to disappear from the --

11:35 4 THE COURT: Okay. I'll take that as a no  
11:35 5 then, right?

11:35 6 MS. CASSADY: We do have some motions,  
11:35 7 Your Honor.

11:35 8 THE COURT: Oh, okay.

11:35 9 MR. CALDWELL: You mind if I go grab  
11:35 10 Mr. Cawley?

11:35 11 THE COURT: That will be fine.

11:36 12 In the meanwhile, does Defendant have a  
11:36 13 motion they wish to make?

11:36 14 MR. POWERS: Yes, we do, Your Honor.

11:36 15 Before we begin, though, I want to ask the  
11:36 16 Court if I may take my leave. If all you're going to  
11:36 17 handle is instructions, verdict form, and the JMOL  
11:36 18 motions, Mr. Bobrow is going to handle.

11:36 19 If there was something else, I was going  
11:36 20 to stay for that, but if that's what it is, I'd like the  
11:36 21 Court's permission to leave for now.

11:36 22 THE COURT: Permission granted.

11:36 23 MR. POWERS: Thank you, sir.

11:36 24 THE COURT: All right.

11:36 25 MR. CAWLEY: Sorry, Your Honor.



11:36 1 THE COURT: Yes.

11:36 2 MR. CAWLEY: I didn't know we were back  
11:36 3 in.

11:36 4 Are we ready to take up Plaintiff's JMOLs?

11:36 5 THE COURT: Plaintiff have a motion to  
11:36 6 make?

11:36 7 MR. CAWLEY: Your Honor, the Plaintiff,  
11:36 8 VirnetX, makes its motions for judgment as a matter of  
11:36 9 law at the close of the Defendant's case-in-chief.

11:36 10 And pursuant to the agreement of the  
11:36 11 parties and the permission of the Court, we have agreed  
11:36 12 that this may be done at this time as if it were done  
11:36 13 immediately following the close of the Defendant's case.

11:37 14 I'd like to make these motions in two  
11:37 15 sets.

11:37 16 The first is a set of three that I'd like  
11:37 17 to call to the particular attention of the Court, and  
11:37 18 then I've got a second set that I'm going to make that  
11:37 19 I'm sure the Court will be quite attentive to as well.

11:37 20 But these are the ones -- these first  
11:37 21 three are the ones that I'd really like to highlight for  
11:37 22 purposes of the discussion.

11:37 23 The first is, on best mode on the '135  
11:37 24 patent, the Defendant has asserted the defense of  
11:37 25 invalidity based on the failure to disclose the

11:37 1 inventor's best mode of practicing the invention.

11:37 2 We have heard no evidence whatsoever  
11:37 3 during the course of the trial about what the best mode  
11:37 4 would be or certainly about the Defendant's knowledge of  
11:37 5 that and their failure to disclose the best mode.

11:37 6 So we would submit that as a matter of  
11:38 7 law, that defense fails for lack of any proof  
11:38 8 whatsoever.

11:38 9 THE COURT: Okay. Response?

11:38 10 MR. BOBROW: I have no objection. As Your  
11:38 11 Honor knows, we asked that the jury instruction, in  
11:38 12 fact, on that be pulled, and as I understand it, it was.

11:38 13 THE COURT: Okay. So with defense  
11:38 14 counsel's agreement, that motion is granted.

11:38 15 MR. CAWLEY: All right. The second of  
11:38 16 this category is a similar argument of written  
11:38 17 description of the '135 patent.

11:38 18 Once again, that's a factual inquiry.  
11:38 19 There has been no evidence offered whatsoever as to what  
11:38 20 one of skill in the art would have perceived to be the  
11:38 21 adequacy of the written description supporting the  
11:38 22 certain claims.

11:38 23 THE COURT: Response?

11:38 24 MR. BOBROW: Same position, Your Honor.  
11:38 25 We don't oppose. It was --

11:38 1 THE COURT: All right. Motion is granted.

11:38 2 MR. CAWLEY: And the third of this  
11:38 3 category is Microsoft's counterclaim on the invalidity  
11:38 4 of Claim 7 of the '135 patent. As the Court may recall,  
11:38 5 the Plaintiff withdrew that claim and is not asserting  
11:39 6 it.

11:39 7 Microsoft, however, did not withdraw its  
11:39 8 counterclaim as to invalidity. However, there has been  
11:39 9 no proof offered during the course of the trial that  
11:39 10 Claim 7 of the '135 patent is invalid.

11:39 11 THE COURT: Okay.

11:39 12 MR. BOBROW: We would withdraw that  
11:39 13 without prejudice, Your Honor.

11:39 14 MR. CAWLEY: Well, I think --

11:39 15 THE COURT: I think it's a little late  
11:39 16 for --

11:39 17 MR. BOBROW: But it was not put into the  
11:39 18 case at the beginning. In other words, there was  
11:39 19 nothing in the Court's instructions or the parties'  
11:39 20 briefs that said that our counterclaim on Claim 7 was  
11:39 21 in.

11:39 22 The Plaintiff withdrew that claim. We did  
11:39 23 not put forward, either in the materials going in to the  
11:39 24 Court, that that was still an issue. So that was never  
11:39 25 litigated.

11:39 1           So, certainly, it should be withdrawn only  
11:39 2 without prejudice. Should this claim ever be asserted  
11:39 3 against us again, we would have the opportunity to  
11:39 4 litigate that claim. But as things stand now, that  
11:39 5 claim was not in the case. Only Claims 1, 10, and 12 of  
11:39 6 the '135 patent were in this case.

11:40 7           MR. CAWLEY: They have a live counterclaim  
11:40 8 on that claim, which they do, Your Honor. It's in the  
11:40 9 case. They have chosen not to offer any evidence on it,  
11:40 10 and that's appropriate for judgment as a matter of law.

11:40 11           THE COURT: When they withdrew their  
11:40 12 assertion as to Claim 7, did -- Microsoft, did you  
11:40 13 withdraw your counterclaim as to the invalidity?

11:40 14           MR. BOBROW: In a sense, we did, because  
11:40 15 it was not put forward in the materials pretrial that  
11:40 16 said, we're going to try this. They dropped Claim 7 on  
11:40 17 the eve of trial, and we simply -- the issue then was  
11:40 18 moot. We did not put forward and litigate Claim 7 at  
11:40 19 all.

11:40 20           And so certainly, any issues that as to  
11:40 21 Claim 7 are withdrawn then without prejudice for  
11:40 22 Microsoft to later challenge that claim.

11:40 23           THE COURT: I'm going to take that one  
11:40 24 under advisement.

11:40 25           MR. CAWLEY: All right. Now, Your

11:40 1 Honor --

11:40 2 THE COURT: There's nothing in the charge  
11:40 3 as to Claim 7, right?

11:40 4 MR. BOBROW: That's right.

11:40 5 MR. CAWLEY: I think that's correct, Your  
11:40 6 Honor.

11:40 7 MR. BOBROW: That's correct.

11:40 8 MR. CAWLEY: Now, the second category is  
11:40 9 some motions that I'm going to make now, and in the  
11:41 10 interest of time and efficiency, Your Honor, I will say  
11:41 11 that all of these are based on failures of proof.

11:41 12 And we are prepared to drill as deeply  
11:41 13 down into the evidence in the record as Your Honor would  
11:41 14 care to, but I -- but I -- you know, unless -- unless  
11:41 15 Your Honor -- I mean, I'm going to do what I need to do  
11:41 16 to make my motion and preserve my record, and if Your  
11:41 17 Honor feels as though I'm giving it short shrift and  
11:41 18 that we should get more deeply into the facts --

11:41 19 THE COURT: Give it short shrift, and if I  
11:41 20 want to jump in somewhere, I will.

11:41 21 MR. CAWLEY: All right. Thank you.  
11:41 22 The first, as of this category, anyway, is, we move for  
11:41 23 judgment as a matter of law as to direct infringement of  
11:41 24 the '135 patent. VirnetX seeks judgment under Rule 50  
11:41 25 that it has established as a matter of law that

11:41 1 Microsoft directly infringes Claims 1, 10, and 12 of the  
11:41 2 '135 patent.

11:41 3 This motion is as to Windows XP, Windows  
11:41 4 Vista, Live Communications Server 2003, Live  
11:42 5 Communications Server 2005, Office Communications Server  
11:42 6 2007, Office Communicator 2005, Office Communicator  
11:42 7 2007, Messenger 5.0, Messenger 5.1, and Live Meeting  
11:42 8 Console.

11:42 9 VirnetX has established as a matter of law  
11:42 10 that the -- those accused products that I just named  
11:42 11 meet each claim under the Doctrine of Equivalents with  
11:42 12 testimony from Professor Jones that the website  
11:42 13 limitations are literally present or practiced by the  
11:42 14 '135 patent accused products.

11:42 15 Second, as to direct infringement of the  
11:42 16 '180 --

11:42 17 THE COURT: Just a moment. That motion is  
11:42 18 denied.

11:42 19 MR. CAWLEY: Yes, Your Honor.

11:42 20 As to direct infringement of the '180  
11:42 21 patent, VirnetX seeks judgment under Rule 50 that it has  
11:42 22 established as a matter of law that Microsoft directly  
11:42 23 infringes Claims 1, 4, 15, 17, 20, 31, 33, and 35 of the  
11:43 24 '180 patent in Windows XP and Windows Vista.

11:43 25 Professor Jones has testified that the

11:43 1 limitations of the claims are satisfied in the accused  
11:43 2 products and that no reasonable jury could find  
11:43 3 otherwise.

11:43 4 THE COURT: All right. Motion is denied.

11:43 5 MR. CAWLEY: Next, VirnetX moves for  
11:43 6 judgment as a matter of law on inducement of the '135  
11:43 7 patent and '180 patents. The evidence conclusively  
11:43 8 establishes that Microsoft took actions, such as  
11:43 9 marketing, participating in conferences, and leasing  
11:43 10 material that accuses others of infringing the patents.

11:43 11 There is evidence that the patents were  
11:43 12 directly infringed by Microsoft and others. There is  
11:43 13 undisputed evidence that Microsoft was aware of the  
11:43 14 patents and knew or should have known that the acts  
11:44 15 constituted and encouraged infringement.

11:44 16 And as I said, there is evidence of direct  
11:44 17 infringement, and there is evidence that Microsoft  
11:44 18 should have known that its encouragement or instruction  
11:44 19 would result in others infringing the claim. This  
11:44 20 evidence is so compelling that no reasonable jury could  
11:44 21 find otherwise.

11:44 22 THE COURT: Motion is denied.

11:44 23 MR. CAWLEY: Next, contributory  
11:44 24 infringement of the '135 patent.

11:44 25 Microsoft -- excuse me -- VirnetX has

11:44 1 established conclusively that Microsoft has sold,  
11:44 2 offered for sale, or imported a material component of  
11:44 3 the accused products or a material component used in the  
11:44 4 practicing method that is not a staple article of  
11:44 5 commerce suitable for substantial non-infringing use and  
11:44 6 that Microsoft had knowledge that the component was so  
11:44 7 made and adapted.

11:44 8 As already established, VirnetX has  
11:44 9 offered evidence that Microsoft knew of the '135 patent,  
11:45 10 and no reasonable jury could find otherwise.

11:45 11 THE COURT: Motion is denied.

11:45 12 MR. CAWLEY: VirnetX moves for judgment as  
11:45 13 a matter of law on its willfulness claims. It has  
11:45 14 proved by clear and convincing evidence that Microsoft  
11:45 15 willfully infringed the '135 and '180 patents; that it  
11:45 16 was aware of the patents; that it acted in spite of an  
11:45 17 objectively high likelihood that its actions infringed a  
11:45 18 valid patent, and no reasonable jury could find  
11:45 19 otherwise.

11:45 20 THE COURT: Motion is denied.

11:45 21 MR. CAWLEY: Microsoft -- VirnetX, that  
11:45 22 is, moves for judgment as a matter of law on damages.  
11:45 23 The evidence shows that it is entitled to a reasonable  
11:45 24 royalty in the amount of \$158,700,000 for the '135  
11:45 25 patent, and \$83.6 million for the '180 patent, and no



11:45 1 reasonable jury could find otherwise.

11:46 2 THE COURT: Motion is denied.

11:46 3 MR. CAWLEY: Likewise, VirnetX moves for  
11:46 4 judgment as a matter of law on the defenses of  
11:46 5 anticipation of the '135 and '180 patents on the grounds  
11:46 6 that all asserted references lack one or more central  
11:46 7 elements to establish invalidity, and no reasonable jury  
11:46 8 could find otherwise.

11:46 9 THE COURT: Motion is denied.

11:46 10 MR. CAWLEY: And VirnetX, finally, in this  
11:46 11 category, moves for a judgment as a matter of law on  
11:46 12 obviousness of the '135 and '180 patents on the ground  
11:46 13 that Microsoft has failed to meet its burden to produce  
11:46 14 clear and convincing evidence that any of the asserted  
11:46 15 claims of those patents would have been obvious at the  
11:46 16 time of filing to one of skill in the art, and no  
11:46 17 reasonable jury could find otherwise.

11:47 18 THE COURT: Motion is denied.

11:47 19 MR. CAWLEY: Thank you, Your Honor.

11:47 20 THE COURT: Thank you.

11:47 21 Defendant have any motions?

11:47 22 MR. BOBROW: Yes, Your Honor, we do.

11:47 23 Your Honor, we have a number of motions.

11:47 24 Let me begin by stating that we did file a formal JMOL  
11:47 25 motion this morning, but, obviously, I'm prepared to put

11:47 1 these on the record now for you and for your  
11:47 2 consideration.

11:47 3 THE COURT: If you'd like to just rest on  
11:47 4 your written motion...

11:47 5 MR. BOBROW: Well, we did submit the  
11:47 6 motion, but we do think that it is appropriate to go  
11:47 7 forward on this basis as well, setting forth for the  
11:47 8 record the motions that we are making.

11:47 9 THE COURT: All right.

11:47 10 MR. BOBROW: First of all, on the question  
11:47 11 of infringement, Microsoft moves for judgment as a  
11:47 12 matter of law on the question of infringement -- direct  
11:47 13 infringement of the '135 patent, that no reasonable jury  
11:47 14 could find that Microsoft directly infringes the  
11:47 15 asserted claims of the '135 patent.

11:48 16 There was overwhelming evidence that there  
11:48 17 is no anonymity; that there is no website; and that  
11:48 18 there is no gatekeeper computer.

11:48 19 And in addition, there is no evidence that  
11:48 20 Microsoft employees directly infringe or that making or  
11:48 21 licensing the software that's been accused to end users  
11:48 22 constitutes direct infringement.

11:48 23 THE COURT: Motion is denied.

11:48 24 MR. BOBROW: Secondly, Microsoft moves for  
11:48 25 judgment as a matter of law on the question of

11:48 1 inducement of infringement of the '135 patent. No  
11:48 2 reasonable jury could find that Microsoft induced  
11:48 3 infringement of the '135 patent.

11:48 4           There is no evidence of knowledge before  
11:48 5 2006 of the patent. There is no evidence of knowledge  
11:48 6 by Microsoft of infringement. There is no evidence of  
11:48 7 intent to cause the acts that Microsoft purportedly knew  
11:48 8 would infringe, and there is no evidence of intent to  
11:49 9 encourage infringement.

11:49 10           Of course, there also is no proof of  
11:49 11 direct infringement, and therefore, the motion should be  
11:49 12 granted.

11:49 13           THE COURT: Motion is denied.

11:49 14           MR. BOBROW: Your Honor, Microsoft next  
11:49 15 moves for judgment as a matter of law on the question of  
11:49 16 contributory infringement of the '135 patent. No  
11:49 17 reasonable jury could find contributory infringement by  
11:49 18 Microsoft of the '135 patent.

11:49 19           To begin, the software at issue cannot, as  
11:49 20 a matter of fact law, be a component. The component  
11:49 21 that the Plaintiff has focused on is the wrong thing.  
11:49 22 It is not what Microsoft sells, but instead is a  
11:49 23 specific string of code. There is no basis to find that  
11:49 24 that is a component as a matter of law.

11:49 25           In addition, there is no evidence of the

11:49 1 requisite knowledge that the feature at issue infringes  
11:49 2 or that Microsoft knew that the purported component was  
11:49 3 adapted for infringement.

11:50 4           And in addition, the evidence shows that  
11:50 5 Microsoft knew of substantial non-infringing uses. And  
11:50 6 so there has not been any showing that the accused  
11:50 7 products were especially made or especially adapted for  
11:50 8 infringement.

11:50 9           Finally, there is no evidence of a lack of  
11:50 10 substantial non-infringing uses.

11:50 11           THE COURT: Motion is denied.

11:50 12           MR. BOBROW: Next, Your Honor, on the '180  
11:50 13 patent, Microsoft moves for judgment as a matter of law  
11:50 14 of no infringement on direct infringement, induced  
11:50 15 infringement, and contributory infringement -- I'm  
11:50 16 sorry -- direct infringement and induced infringement.  
11:50 17 There is no claim -- that claim has been withdrawn on  
11:50 18 contributory negligence by VirnetX.

11:50 19           First of all, on direct infringement, no  
11:50 20 reasonable jury could find that Microsoft directly  
11:50 21 infringes the asserted claims of the '180 patent. There  
11:51 22 has been overwhelming evidence that the accused software  
11:51 23 does not include and does not use a virtual private  
11:51 24 network and does not use and there is not included a  
11:51 25 secure computer network address.

11:51 1           Furthermore, there is no evidence that any  
11:51 2 Microsoft employees use the accused software, and in  
11:51 3 addition, the evidence showed that the software would  
11:51 4 not be invoked -- the accused software would not be  
11:51 5 invoked in normal operation, and finally, that making or  
11:51 6 licensing the software to end users does not constitute  
11:51 7 direct infringement.

11:51 8           THE COURT: Okay. Motion is denied.

11:51 9           MR. BOBROW: Microsoft next moves for  
11:51 10 judgment as a matter of law on the question of  
11:51 11 inducement of the '180 patent. No reasonable jury could  
11:51 12 find that Microsoft induces infringement of the '180  
11:51 13 patent.

11:51 14           We introduced substantial evidence of  
11:51 15 non-infringing uses. We demonstrated certainly that  
11:51 16 since this claim was only filed in after this lawsuit  
11:52 17 was filed, we showed substantial defenses to the  
11:52 18 arguments and compelling arguments on the question of  
11:52 19 invalidity, so as a result, certainly, there's been no  
11:52 20 showing that Microsoft intended to cause acts of  
11:52 21 infringement, knew of the acts of infringement, or  
11:52 22 intended in any way to encourage infringement.

11:52 23           THE COURT: Motion is denied.

11:52 24           MR. BOBROW: Furthermore, Your Honor,  
11:52 25 Microsoft moves for judgment as a matter of law that

11:52 1 liability for indirect infringement must be limited  
11:52 2 under the Dyna Corp case to acts of direct infringement.

11:52 3 Any liability for indirect infringement of  
11:52 4 either patent must be limited by the quantifiable acts  
11:52 5 of direct infringement, and we move on that ground.

11:52 6 THE COURT: Motion is denied.

11:52 7 MR. BOBROW: Microsoft next moves for  
11:52 8 judgment as a matter of law on the question of  
11:52 9 invalidity.

11:52 10 And specifically, first of all, on the  
11:52 11 question of anticipation, Microsoft moves for judgment  
11:53 12 as a matter of law that no reasonable jury could fail to  
11:53 13 find, by clear and convincing evidence, that the  
11:53 14 asserted claims of the '135 and '180 patents are  
11:53 15 anticipated.

11:53 16 We submitted evidence -- overwhelming  
11:53 17 evidence on three pieces of prior art, none of which was  
11:53 18 in front of the Patent Office.

11:53 19 Microsoft's NT 4 software with the PPTP,  
11:53 20 VPN, and AutoDial; second, Dynamic VPN; and third, the  
11:53 21 Aventail software guide, all of those prior art, none  
11:53 22 before the Patent Office, and all of that, as a matter  
11:53 23 of law, provides clear and convincing evidence of  
11:53 24 anticipation of all of the claims.

11:53 25 THE COURT: Motion is denied.

11:53 1 MR. BOBROW: Microsoft next moves for  
11:53 2 judgment as a matter of law on the question of  
11:53 3 obviousness. No reasonable jury could fail to find, by  
11:53 4 clear and convincing evidence, that the asserted claims  
11:53 5 are obvious in light of the prior art just mentioned,  
11:54 6 the Microsoft NT 4 with PPTP, VPN, and AutoDial,  
11:54 7 Aventail 3.1, and the DVPN demonstration.

11:54 8 The obviousness certainly should be found  
11:54 9 as a matter of law, both based upon those references by  
11:54 10 themselves, that is, single reference of obviousness, or  
11:54 11 when the various materials for each reference are  
11:54 12 combined together, those prior art references render the  
11:54 13 claims invalid as a matter of law.

11:54 14 THE COURT: Motion is denied.

11:54 15 MR. BOBROW: Microsoft next moves for a  
11:54 16 judgment as a matter of law on the question of  
11:54 17 willfulness. No reasonable jury could find, by clear  
11:54 18 and convincing evidence, that Microsoft willfully  
11:54 19 infringed either the '135 or '180 patents because  
11:54 20 neither prong of the Seagate case has been satisfied.

11:54 21 Certainly, the objective prong has not  
11:54 22 been met. We have put forth compelling evidence of  
11:55 23 non-infringement and validity, and certainly, the cases  
11:55 24 have certainly shown that it is beyond a close case, and  
11:55 25 indeed, one on which we're entitled to judgment as a

11:55 1 matter of law.

11:55 2 On the subjective prong, certainly,  
11:55 3 there's been no evidence that Microsoft believed that  
11:55 4 there was an objectively high likelihood that the  
11:55 5 accused software would infringe any of the patents.

11:55 6 THE COURT: Motion is denied.

11:55 7 MR. BOBROW: Microsoft then moves for  
11:55 8 judgment as a matter of law on the question of damages.  
11:55 9 There is insufficient evidence, as a matter of law, to  
11:55 10 support Plaintiff's requested damages, or for that  
11:55 11 matter, any damage award over \$15 million.

11:55 12 To begin, the testimony of Mr. Reed should  
11:55 13 have been excluded for all of the reasons set forth in  
11:55 14 Microsoft's Daubert motion pretrial.

11:55 15 Secondly, the evidence on the rate base is  
11:55 16 insufficient to support the requested damages award or,  
11:55 17 again, any award over \$15 million, based upon the  
11:56 18 improper reliance on the entire market value, based upon  
11:56 19 the failure to apportion, and based upon the inclusion  
11:56 20 of foreign acts of infringement or alleged infringement.

11:56 21 In addition, the evidence of the royalty  
11:56 22 rate was insufficient to support the alleged claim or,  
11:56 23 again, any claim over \$15 million. Again, there was no  
11:56 24 apportionment. The bases for the rate were essentially  
11:56 25 noncomparable licenses, and the benchmark licenses that



11:56 1 were cited bore no royalties at all.

11:56 2 In addition, the requested amount of  
11:56 3 something on the order of \$242 million is not a  
11:56 4 reasonable royalty, and in this context, is excessive  
11:56 5 and shocks the conscience and is manifestly an excessive  
11:56 6 amount, and we move on that ground as well.

11:56 7 THE COURT: Motion is denied.

11:56 8 MR. BOBROW: And if I may, Your Honor, one  
11:56 9 final point on our judgment as a matter of law on  
11:56 10 contributory infringement. I should have mentioned as  
11:57 11 well an additional ground for that motion. And I  
11:57 12 apologize.

11:57 13 But the item that had been identified as  
11:57 14 the -- essentially, the automatic connection feature, in  
11:57 15 addition to not being a component, it is also not a  
11:57 16 material or apparatus for use in a patented method, and  
11:57 17 we move on that basis as well.

11:57 18 THE COURT: Over -- denied.

11:57 19 Anything further?

11:57 20 MR. BOBROW: That's all, Your Honor.

11:57 21 THE COURT: All right. Plaintiff have any  
11:57 22 objections to the Court's charge?

11:57 23 MR. CALDWELL: Yes, Your Honor.

11:57 24 First, just to get this out of the way, if  
11:57 25 it's okay and we have the Court's permission, the

11:57 1 parties have agreed that by submitting jury instructions  
11:57 2 with respect to the Court's claim constructions, the  
11:57 3 parties are not waiving and hereby expressly preserve  
11:57 4 their contentions in the Markman briefing and the  
11:57 5 arguments to the Court and reserves the right to appeal  
11:57 6 on these claim construction grounds.

11:57 7 THE COURT: Is that so agreed?

11:57 8 MR. BOBROW: Yes, it is, Your Honor, and  
11:57 9 neither side is waiving and is specifically preserving  
11:57 10 on the claim construction.

11:58 11 THE COURT: So noted.

11:58 12 MR. CALDWELL: And I have an observation  
11:58 13 about the verdict form. Are we going to get that -- get  
11:58 14 to that in a minute?

11:58 15 THE COURT: Sure.

11:58 16 MR. CALDWELL: Okay.

11:58 17 MR. BOBROW: Or you can cover whichever  
11:58 18 one you would like to.

11:58 19 MR. CALDWELL: Well, I just -- whichever  
11:58 20 one Your Honor has handy. We'll start with the charge.

11:58 21 THE COURT: I've them both handy.

11:58 22 MR. CALDWELL: Okay. In the charge, at

11:58 23 Page 9 --

11:58 24 THE COURT: Okay.

11:58 25 MR. CALDWELL: -- I direct Your Honor to

11:58 1 the second full paragraph that begins: A patent claim  
11:58 2 is directly infringed only if the accused product or  
11:58 3 method includes each and every element of the patent  
11:58 4 claim.

11:58 5           Following that sentence, VirnetX has  
11:58 6 proposed and we object to the absence of an instruction  
11:58 7 that the accused product infringes a claim but is  
11:58 8 reasonably capable of satisfying the claim element, even  
11:58 9 though it may also be capable of non-infringing modes of  
11:58 10 operation, citing the Hilgraeve Corporations case.

11:58 11           Your Honor gave that instruction in Mass  
11:58 12 Engineering, and it was actually not in the i4i  
11:59 13 instructions, but I think that was because i4i only  
11:59 14 involved a method claim, and so the issue of the  
11:59 15 apparatus being capable of was just sort of a non-issue  
11:59 16 for i4i, and that's why it was absent and -- absent  
11:59 17 there.

11:59 18           THE COURT: All right. Give me the  
11:59 19 sentence again very slowly.

11:59 20           MR. CALDWELL: An accused product  
11:59 21 infringes the claim --

11:59 22           THE COURT: Slower than that.

11:59 23           MR. CALDWELL: Okay. I'm sorry.

11:59 24           An accused product infringes a claim if it  
11:59 25 is reasonably capable of satisfying the claim element

11:59 1 even though it may also be capable of non-infringing  
12:00 2 modes of operation.

12:00 3 THE COURT: Response?

12:00 4 MR. BOBROW: Yes, Your Honor.

12:00 5 On that request, which I believe was not  
12:00 6 given in the i4i case, the issue there is that -- is  
12:00 7 that instruction can be very confusing in this context  
12:00 8 and I think prejudicial to the issue of what the jury  
12:00 9 needs to do.

12:00 10 The jury needs to look at the claim  
12:00 11 limitations and determine whether they are met in the  
12:00 12 methods, whether they're met in the products, whether  
12:00 13 they're met in the systems, and whether they're met in  
12:00 14 the computer-readable storage media claims.

12:00 15 And what, I think, this has the risk of  
12:01 16 doing is essentially lowering the Plaintiff's burden of  
12:01 17 proof by suggesting to the jury that somehow they can  
12:01 18 apply something that is not the limitations of the  
12:01 19 claim, but rather something much more vague and much  
12:01 20 more amorphous than that.

12:01 21 I'm afraid it would lower, essentially,  
12:01 22 VirnetX's burden of proof where it must prove that all  
12:01 23 of those limitations are there either literally or under  
12:01 24 the Doctrine of Equivalents.

12:01 25 THE COURT: All right. I'm going to give

12:01 1 this instruction, the same one that Microsoft -- I mean,  
12:01 2 that VirnetX suggested, except I'm going to strike the  
12:01 3 reasonably -- it-is-reasonably-capable-of language and  
12:01 4 change satisfy to satisfies.

12:01 5 So it will read: An accused product  
12:01 6 infringes the claim if it satisfies the claim elements  
12:01 7 even though it may also be capable of non-infringing  
12:01 8 modes of operation.

12:01 9 MR. CALDWELL: Just for the record,  
12:01 10 VirnetX objects to the exclusion of capable of, given  
12:02 11 that that is the law from the Federal Circuit, in terms  
12:02 12 of an apparatus. It doesn't have to necessarily always  
12:02 13 infringe as long as the apparatus is capable of, so...

12:02 14 THE COURT: What's your opinion on that?

12:02 15 MR. BOBROW: Well, I think the problem, in  
12:02 16 part, with that claim, as you've revised that language,  
12:02 17 Your Honor, is that it may be confusing for the jury on  
12:02 18 the question of indirect infringement because we have  
12:02 19 issues of substantial non-infringing uses and all of  
12:02 20 that, and I'm afraid, again, the jury may be confused in  
12:02 21 terms of understanding what it means when something  
12:02 22 might have other uses.

12:02 23 THE COURT: Well --

12:02 24 MR. BOBROW: That issue can be highly  
12:02 25 relevant in those contexts, so we would still object.

12:02 1 THE COURT: All right. I think the  
12:02 2 instruction is proper under the facts of this case, and  
12:02 3 I will give it the way that Microsoft -- I mean, that  
12:02 4 VirnetX originally proposed with the --

12:02 5 So it will read: An accused product  
12:02 6 infringes a claim if it is reasonably capable of  
12:02 7 satisfying the claim elements, even though it may also  
12:02 8 be capable of non-infringing modes of operation.

12:03 9 MR. CALDWELL: Yes, Your Honor.

12:03 10 THE COURT: Okay. What's next?

12:03 11 MR. CALDWELL: Ready for -- ready for the  
12:03 12 next one?

12:03 13 THE COURT: Uh-huh.

12:03 14 MR. CALDWELL: It's on Page 12.

12:03 15 THE COURT: Okay.

12:03 16 MR. CALDWELL: And do you see the numbered  
12:03 17 elements down toward the bottom.

12:03 18 THE COURT: Uh-huh.

12:03 19 MR. CALDWELL: And this is, I guess, as  
12:03 20 much a request for clarification as it is an objection,  
12:03 21 I would say.

12:03 22 In No. 2, after the words patented method,  
12:03 23 VirnetX had requested just a clause there, comma, which  
12:03 24 can be software, comma, because we believe that the law  
12:03 25 supports the argument in Microsoft's motions for JMOL.

12:03 1 I believe the law supports that the  
12:03 2 component in a contributory infringement analysis  
12:03 3 absolutely can be software, and we were hoping to make  
12:03 4 that express. So I don't know that that's the same  
12:03 5 thing as saying the sentence Your Honor has is legally  
12:03 6 error, but...

12:04 7 THE COURT: Any response?

12:04 8 MR. BOBROW: Well, Your Honor, our  
12:04 9 position -- we object to that. Our position is, is that  
12:04 10 software cannot be a component under the AT&T/Microsoft  
12:04 11 case. So we would object to that -- the inclusion of  
12:04 12 that language.

12:04 13 MR. CALDWELL: Your Honor, we have also  
12:04 14 the i4i Federal Circuit opinion, which I meant to cite  
12:04 15 to you and which also cites the RICO case.

12:04 16 THE COURT: Because there seems to be a  
12:04 17 dispute about it, I will insert the language which can  
12:04 18 be software, patent which can be software.

12:04 19 MR. CALDWELL: Thank you.

12:04 20 THE COURT: All right. What else?

12:04 21 MR. CALDWELL: Let me breeze through this.  
12:04 22 The next observation is on Page 24, Your  
12:04 23 Honor.

12:04 24 THE COURT: Okay.

12:04 25 MR. CALDWELL: There is -- the first full

12:04 1 paragraph that begins with to be relevant.

12:04 2 THE COURT: Okay.

12:04 3 MR. CALDWELL: And that first sentence,  
12:04 4 we -- or that whole paragraph was from Microsoft's  
12:04 5 proposals, not VirnetX's.

12:04 6 At this point, VirnetX is not objecting to  
12:05 7 the first sentence, but VirnetX objects to the second  
12:05 8 sentence beginning with, if a secondary consideration,  
12:05 9 on the grounds that at best, it's repetitious or  
12:05 10 redundant of the first sentence to the extent the first  
12:05 11 sentence properly captures the law, but beyond that, it  
12:05 12 appears to be expanding the scope of what the law is.

12:05 13 In other words, VirnetX is not objecting  
12:05 14 that the jury should consider a nexus between the  
12:05 15 secondary consideration.

12:05 16 THE COURT: So you're objecting -- you're  
12:05 17 asking that that last sentence of the paragraph be  
12:05 18 stricken?

12:05 19 MR. CALDWELL: Yes, Your Honor, because we  
12:05 20 think the first sentence is proper.

12:05 21 THE COURT: Response?

12:05 22 MR. BOBROW: I think the last sentence,  
12:05 23 Your Honor, helps a lay jury understand what that word  
12:05 24 in quotes nexus means. I think this sentence certainly  
12:05 25 gives that first sentence much more meaning and will



12:05 1 help the jurors understand what the requirements are for  
12:05 2 the secondary or objective considerations to be  
12:05 3 relevant.

12:05 4 THE COURT: Objection is overruled.

12:05 5 What's next?

12:06 6 MR. CALDWELL: The next one I would have  
12:06 7 is with the verdict form, Your Honor.

12:06 8 THE COURT: All right.

12:06 9 MR. CALDWELL: And this is just simply a  
12:06 10 matter of clarification. I -- my copy has actually been  
12:06 11 stolen and taken to the back room.

12:06 12 But the first three questions on the  
12:06 13 verdict form refer to Column 1, Column 2, Column 3, and  
12:06 14 VirnetX is merely suggesting that we entitle -- instead  
12:06 15 of Issue 1, Issue 2, and Issue 3 on the second page,  
12:06 16 that we entitle the headings of the top of the second  
12:06 17 page Your Honor is looking at -- we entitle those Column  
12:06 18 1, Column 2, Column 3.

12:06 19 THE COURT: Instead of Issue 1, Issue 2?

12:06 20 MR. CALDWELL: Yes, Your Honor, just for  
12:06 21 clarification.

12:06 22 THE COURT: All right. We'll replace  
12:06 23 column -- issue with column, if there's no objection.

12:06 24 MR. BOBROW: Your Honor, we do have other  
12:06 25 objections to the form, but not with that one per se.

12:06 1 THE COURT: All right. We'll change issue  
12:06 2 to column in those three spots on the second page.

12:07 3 All right. Anything further?

12:07 4 MR. CALDWELL: No, Your Honor.

12:07 5 THE COURT: All right. Microsoft have any  
12:07 6 objections?

12:07 7 MR. BOBROW: Your Honor, we do have a  
12:07 8 number of objections, and we would like the Court to  
12:07 9 know we have a spent a substantial amount of time going  
12:07 10 through these, and I'll be as diligent and expeditious  
12:07 11 as we can.

12:07 12 Would the Court prefer to start with the  
12:07 13 verdict form, since you were just there?

12:07 14 THE COURT: All right.

12:07 15 MR. BOBROW: So, first of all, on the  
12:07 16 verdict form, Microsoft objects to the infringement  
12:07 17 questions here, question No. 1 in the way it's been  
12:07 18 divided up. In particular, we object that there has  
12:07 19 been no division for direct, induced or contributory  
12:07 20 infringement. Those, of course, have separate elements  
12:07 21 and we think they should be broken out separately.

12:07 22 In addition, the infringement question  
12:07 23 does not break out the questions for infringement by the  
12:07 24 different accused software for -- for the different  
12:08 25 accused patents.

12:08 1 THE COURT: Okay. That's all covered in  
12:08 2 the instructions. It's overruled.

12:08 3 MR. BOBROW: Secondly, on the question of  
12:08 4 validity, we object on the grounds that, again,  
12:08 5 anticipation and obviousness have not been broken out,  
12:08 6 creating some -- what we consider to be some general  
12:08 7 verdict issues. We have -- it does not break the issues  
12:08 8 out by prior art reference.

12:08 9 We also object that it includes the clear  
12:08 10 and convincing burden of proof when all the art that we  
12:08 11 have relied upon was indisputably not before the Patent  
12:08 12 Office.

12:08 13 We also object to the submission of the  
12:08 14 obviousness question to the jury and also the  
12:08 15 non-submission to the jury of the underlying fact  
12:08 16 questions for obviousness. We also object on that  
12:08 17 ground.

12:08 18 THE COURT: Okay. Your objection's  
12:08 19 overruled.

12:08 20 MR. BOBROW: On damages, again, we object  
12:09 21 to the failure to break up the damages to ask about lump  
12:09 22 sum versus running royalty, and we think that there's  
12:09 23 been evidence in the case to that effect and that the  
12:09 24 jury should look at that question.

12:09 25 In addition, there has been evidence

12:09 1 presented to the jury on future damages and the form as  
12:09 2 it is now will leave that issue vague, and when it comes  
12:09 3 to any remedies for injunction, will make that issue  
12:09 4 difficult, if not impossible, to resolve. So we object  
12:09 5 to the form in which the amounts has been set forth for  
12:09 6 money damages.

12:09 7 THE COURT: Objection Is overruled.

12:09 8 MR. BOBROW: In addition, we object to the  
12:09 9 form for the failure to ask the jury to specify the term  
12:09 10 covered by the royalty, whether it's up through trial or  
12:09 11 going forward, and we also object to the omission from  
12:09 12 the form of a line that would ask the jurors to  
12:09 13 determine the number of directly infringing sales or  
12:10 14 installations, as it were, under the Dyna Corp. Case.

12:10 15 THE COURT: Overruled.

12:10 16 MR. BOBROW: Your Honor, I'd like to now  
12:10 17 move to the Court's charge.

12:10 18 THE COURT: All right.

12:10 19 MR. BOBROW: And one point in addition to  
12:10 20 the point made earlier about that both parties are  
12:10 21 preserving on the question of claim construction.  
12:10 22 Related to that, of course, is that we had requested  
12:10 23 that Appendix B be modified by motion to include the  
12:10 24 requirement of anonymity that the Court has said is  
12:10 25 there but is not in Appendix B, and we object to the --

12:10 1 the non-inclusion of the word anonymity in Appendix B  
12:10 2 per our prior motion that the Court denied.

12:10 3 THE COURT: Okay. Overruled.

12:10 4 MR. BOBROW: Turning to the Summary of  
12:10 5 Contentions. This is on page 4.

12:10 6 THE COURT: Let me just clarify. Your  
12:10 7 last request, I don't think there's anything, and  
12:10 8 correct me if I'm wrong, but there's any disagreement  
12:11 9 between the parties that anonymity is required. The  
12:11 10 only dispute that's been raised in the evidence is to --  
12:11 11 to what constitutes anonymity.

12:11 12 Is that not correct?

12:11 13 MR. BOBROW: Your Honor, that is correct.  
12:11 14 Our request was to include that requirement in Appendix  
12:11 15 B so that the jurors would have that in front of them in  
12:11 16 the course of their deliberations.

12:11 17 THE COURT: Okay. Overruled.

12:11 18 MR. BOBROW: So in the Summary of  
12:11 19 Contentions which is paragraph 2, we have several  
12:11 20 concerns about the way that the summary of the  
12:11 21 infringement allegations as made.

12:11 22 To begin, in the first part, about four or  
12:11 23 five lines down, it talks about making, using, selling,  
12:11 24 offering to sell and importing into the United States  
12:11 25 the patented apparatuses and/or using the patented

12:11 1 methods in Microsoft's accused software products.

12:11 2 I don't think that Microsoft objects that  
12:12 3 that does not accurately describe the state of play, but  
12:12 4 it doesn't describe the Plaintiff's allegations here.  
12:12 5 And we would propose the following as an alternative:  
12:12 6 That alternative would be to say by making, using,  
12:12 7 selling, offering to sell, or importing into the United  
12:12 8 States patented systems or apparatuses or by using  
12:12 9 Microsoft's accused software to perform the patented  
12:12 10 methods.

12:12 11 THE COURT: Plaintiff's response? Why  
12:12 12 don't you read that again very slowly just so...

12:12 13 MR. BOBROW: Certainly, Your Honor.

12:12 14 By making, using, selling, offering to  
12:12 15 sale or -- as opposed to and -- or importing into the  
12:12 16 United States patented systems or apparatuses, or by  
12:13 17 using Microsoft's accused software to perform the  
12:13 18 patented method or methods.

12:13 19 MR. CALDWELL: I don't think we have any  
12:13 20 problem with that, Your Honor.

12:13 21 THE COURT: All right. Let me ask,  
12:13 22 Ms. Li, did you get that down?

12:13 23 Yeah. Read it one more time very slowly,  
12:13 24 please, because we're making these changes real-time,  
12:13 25 real-time as you speak.

12:13 1 MR. BOBROW: Yes. Thank you.

12:13 2 By making, using, selling, offering to  
12:13 3 sell, or importing into the United States.

12:13 4 THE COURT: Okay. And so you delete the  
12:13 5 word and and replace it with or, right?

12:13 6 MR. BOBROW: Yep. Yes, that's correct.

12:13 7 THE COURT: Importing -- let me read it.  
12:13 8 Importing into the United States, strike the word the.  
12:13 9 Or no. Let's see. No. The stays in, doesn't it?

12:14 10 MR. BOBROW: No. We would ask that that  
12:14 11 be taken out.

12:14 12 THE COURT: All right. Strike the. And  
12:14 13 then patented systems.

12:14 14 MR. BOBROW: Or apparatuses. Or by using  
12:14 15 Microsoft's accused software to perform the patented  
12:14 16 methods.

12:14 17 THE COURT: Okay. Let me read it one more  
12:14 18 time to be sure we've got it right.

12:14 19 By making, using, selling, offering to  
12:14 20 sale or importing into the United States patented  
12:14 21 systems or apparatuses or by using the patented -- or by  
12:15 22 using Microsoft's accused software to perform the  
12:15 23 patented methods.

12:15 24 MR. BOBROW: Yes.

12:15 25 THE COURT: Okay. That's sustained.

12:15 1 What's next?

12:15 2 MR. BOBROW: The next is to -- a little  
12:15 3 further down on page 4, this dealing with the '135  
12:15 4 patent where it says who -- the second line from the  
12:15 5 bottom, who make or use the patented apparatuses or  
12:15 6 perform the patented methods with Microsoft's accused  
12:15 7 software products.

12:15 8 We propose to replace that so that it more  
12:15 9 accurately lines up with the allegations in the -- in  
12:15 10 the language of the claims. Who make or use the  
12:15 11 patented systems or perform the patented methods.

12:15 12 THE COURT: So you would be replacing  
12:15 13 apparatuses with systems.

12:15 14 MR. BOBROW: And also deleting the last  
12:16 15 part, with Microsoft's accused software products.

12:16 16 THE COURT: So you'd strike the last  
12:16 17 clause, with Microsoft's accused software products.

12:16 18 MR. BOBROW: That's what we propose, Your  
19 Honor.

20 THE COURT: Any objections to that change?

21 MR. CALDWELL: Still digesting it. Just  
22 one second.

23 THE COURT: Okay.

12:16 24 MR. CALDWELL: I don't think we have an  
12:16 25 objection. One second.



12:16 1 No objection, Your Honor.

12:16 2 THE COURT: All right. Granted.

12:16 3 MR. BOBROW: On page 5, Your Honor, this  
12:16 4 is dealing with the '180 patent. Second and third lines  
12:16 5 there's a clause that says, who make or use the patented  
12:17 6 apparatuses or perform the patented methods with  
12:17 7 Microsoft's accused software products?

12:17 8 THE COURT: Same change?

12:17 9 MR. BOBROW: I apologize.

12:17 10 THE COURT: Replace apparatuses with  
12:17 11 systems?

12:17 12 MR. BOBROW: We would propose, Your Honor,  
12:17 13 to strike that in its entirety because I think that it  
12:17 14 doesn't capture what is being asserted here in the case.  
12:17 15 The assertion is is that we are inducing others, but  
12:17 16 this is suggesting others who make these various items.  
12:17 17 It seems that the better course would just be to say  
12:17 18 that Microsoft is inducing indirect infringement of the  
12:17 19 '180 patent by others, or, at the very least, to delete  
12:17 20 the phrase, with Microsoft's accused software products.

12:17 21 THE COURT: Response?

12:17 22 MR. CALDWELL: We disagree with that, Your  
12:17 23 Honor. And actually -- and just to answer Your Honor's  
12:17 24 question a little more directly, it can't be the same  
12:17 25 change we made for the '135 patent because the '180

12:18 1 patent, whereas the '135 patent has method and system,  
12:18 2 this one also has computer-readable media claims.

12:18 3 THE COURT: Okay.

12:18 4 MR. CALDWELL: And when folks install that  
12:18 5 on their computer, they make the apparatus  
12:18 6 computer-readable media, et cetera.

12:18 7 THE COURT: Okay. That objection's  
12:18 8 overruled.

12:18 9 MR. BOBROW: Your Honor, at the bottom of  
12:18 10 page 3, in the burden of proof, we object to the  
12:18 11 sentence that, Microsoft has the burden by clear and  
12:18 12 convincing evidence.

12:18 13 THE COURT: That's overruled.

12:18 14 MR. BOBROW: Turning to instruction 6 on  
12:18 15 page 8, Microsoft had asked for an instruction on the  
12:18 16 different types of claims that the jury is considering  
12:19 17 because they have different requirements:

12:19 18 Computer-readable media, system, apparatus, method. We  
12:19 19 noted the Court did not include that proposed language.

12:19 20 THE COURT: Objection's overruled.

12:19 21 MR. BOBROW: On page 9, Your Honor, in the  
12:19 22 third full paragraph that begins, a person can directly  
12:19 23 infringe a patent without knowing that what it is doing  
12:19 24 is an infringement, all the way down to the end of that  
12:19 25 paragraph, which is two sentences, we object to both of

12:19 1 those sentences, again, on the grounds that it is an  
12:19 2 incorrect statement of the law, particularly for  
12:19 3 inducing infringement or contribution or contributory  
12:19 4 infringement, because in that context, knowledge and  
12:19 5 intent are requirements and here it, I think, will  
12:19 6 improperly suggest to the jury that you can directly  
12:19 7 infringe by inducement or by contribution even if you  
12:19 8 don't know what you're doing. And that's not what the  
12:20 9 law is.

12:20 10 THE COURT: Response?

12:20 11 MR. CALDWELL: Well, Your Honor, first of  
12:20 12 all, this is in the heading of Direct Infringement, and  
12:20 13 actually the paragraph says a person can directly  
12:20 14 infringe, and on the next sentence it says someone may  
12:20 15 also directly infringe. So the observation about that  
12:20 16 something might be different for contrib or induced  
12:20 17 is -- is, I think, in opposite. Besides, this is  
12:20 18 actually a correct statement of the law, and it came  
12:20 19 from the Court's instructions in i4i.

12:20 20 THE COURT: Okay. That objection's  
12:20 21 overruled.

12:20 22 MR. BOBROW: Your Honor, on page 10,  
12:20 23 Literal Infringement, we had requested an instruction  
12:20 24 essentially on the all limitations requirement for  
12:20 25 literal infringement, that, in effect, the literal

12:20 1 infringement instruction provide that all limitations  
12:20 2 have to be met literally. Presently, the instruction  
12:20 3 does not say that but just talks about what one must  
12:21 4 provide for an individual limitation as opposed to all  
12:21 5 the limitations together.

12:21 6 THE COURT: Objection's overruled.

12:21 7 MR. BOBROW: Your Honor, on 6.2, page 11,  
12:21 8 VirnetX has proposed language which the Court adopted on  
12:21 9 the standard for active inducement.

12:21 10 We object to this instruction on a number  
12:21 11 of grounds.

12:21 12 To begin, we object that the instruction  
12:21 13 in paragraph 3 provides for the should have known  
12:21 14 standard, which we think is inconsistent with the law.

12:21 15 In paragraph 4, which provides the person  
12:21 16 has an intent to cause the encouraged acts we believe  
12:21 17 doesn't correctly state the law on the question of  
12:21 18 intent. That you must have more intent than that, and  
12:21 19 you must have intent to infringe.

12:21 20 We also object, further down the page in  
12:22 21 the paragraph that talks about advice of counsel which  
12:22 22 we think is inconsistent with the law, to bring that  
12:22 23 issue up in the context of induced infringement.

12:22 24 And then similarly, on page 12, similar to  
12:22 25 the objections already made, there are references to

12:22 1 intent to cause the acts and also the should have known  
12:22 2 standard which we do -- which we do not think are  
12:22 3 correct statements of the law.

12:22 4 We had also asked for an instruction that  
12:22 5 the jury must determine the number of acts of direct  
12:22 6 infringement which was not included here.

12:22 7 THE COURT: All right. Objection's  
12:22 8 overruled.

12:22 9 MR. BOBROW: Your Honor, on contributory  
12:22 10 infringement, 6.3 on page 12 running over to 13, we have  
12:22 11 several objections.

12:22 12 First, in subparagraph 2 where it talks  
12:22 13 about a material component of the product or a material  
12:22 14 component used in practicing the patented method, this  
12:23 15 raises a similar issue as to what we have talked about  
12:23 16 before with respect to component, and we object on that  
12:23 17 ground. But it also misstates the statutory requirement  
12:23 18 here, because for the method, the operative language is  
12:23 19 a material or apparatus for use in practicing a patented  
12:23 20 process as opposed to a component. So we would object  
12:23 21 on that ground as well.

12:23 22 THE COURT: Objection's overruled.

12:23 23 MR. BOBROW: As mentioned before, we  
12:23 24 object to the use of the component here and that  
12:23 25 instruction is violating the -- and inconsistent with

12:23 1 the AT&T Microsoft case.

12:23 2 We also object that the instruction does  
12:23 3 not tell the jury that they must find that -- that the  
12:23 4 component or material or apparatus was a material part  
12:23 5 of the invention that is essential to the advance over  
12:23 6 the prior art.

12:23 7 THE COURT: Objection's overruled.

12:23 8 MR. BOBROW: And further, we object that,  
12:24 9 again, the instruction asks the jury to focus on whether  
12:24 10 the component itself, not the product in which the  
12:24 11 component is bedded is or is not suitable for  
12:24 12 substantial non-infringing use. We think that that is  
12:24 13 not a correct statement of the law.

12:24 14 THE COURT: Objection's overruled.

12:24 15 MR. BOBROW: On the willfulness --  
12:24 16 willfulness infringement instruction, 6.4, we have  
12:24 17 several objections. To begin, we had requested an  
12:24 18 instruction that gave some guidance to the jury on what  
12:24 19 the objective standard is. That instruction was not  
12:24 20 provided for. We are concerned that there is not enough  
12:24 21 guidance in the instruction for the jury to understand  
12:24 22 what that objectively high likelihood standard means or  
12:24 23 how to apply that instruction in practice. And we would  
12:24 24 object on that ground.

12:24 25 We had requested that language be

12:24 1 included, for example, about credible defenses to  
12:25 2 infringement and validity. And that language was not  
12:25 3 included by the Court.

12:25 4 THE COURT: Objection's overruled.

12:25 5 MR. BOBROW: On page 14, we object to the  
12:25 6 two subparagraphs concerning reasonable basis and good  
12:25 7 faith efforts. We think that these instructions  
12:25 8 impermissibly shift the burden to Microsoft to  
12:25 9 demonstrate either reasonable basis or good faith when,  
12:25 10 in fact, it is the Plaintiff's burden here by clear and  
12:25 11 convincing evidence to show that.

12:25 12 THE COURT: Objection's overruled.

13 MR. BOBROW: Your Honor, we further had  
12:25 14 requested language and an instruction providing guidance  
12:25 15 to the jury on what a reasonable basis for concluding  
12:25 16 that a claim was not valid or was not infringed, what  
12:25 17 that language meant. The Court declined to include that  
12:25 18 language in the instruction and we would object on that  
12:25 19 ground.

12:26 20 THE COURT: Overruled.

12:26 21 MR. BOBROW: We also requested in this  
12:26 22 section a sentence asking that you tell the jurors that  
12:26 23 simply notice that someone owns a patent doesn't give  
12:26 24 rise to a duty to investigate, and we asked that that be  
12:26 25 included in this instruction and it's not.

12:26 1 THE COURT: Overruled.

12:26 2 MR. BOBROW: Thank you.

12:26 3 With respect to invalidity, there were,  
12:26 4 again, any number of references to either No. 1, the  
12:26 5 clear and convincing burden and the presumption of  
12:26 6 validity. I see that, for example, at page 14, under  
12:26 7 section 7, we object in light of the proof that  
12:26 8 Microsoft admitted none of which was before the Patent  
12:26 9 Office.

12:26 10 THE COURT: Overruled.

12:26 11 MR. BOBROW: On page 15, there are a  
12:26 12 number of passages in this paragraph that discuss  
12:26 13 inherency and what that means. The -- at the beginning  
12:26 14 of the paragraph, the paragraph provides that for  
12:27 15 anticipation all the requirements must be present in a  
12:27 16 single previous device or described in a single previous  
12:27 17 device -- publication or patent. We had asked that  
12:27 18 inherency be included in there so the jurors knew that  
12:27 19 inherency was a way for something to anticipate and the  
12:27 20 Court declined to include that.

12:27 21 THE COURT: Overruled.

12:27 22 MR. BOBROW: In addition, Your Honor, we  
12:27 23 had objected to the phrasing of what inherency means.  
12:27 24 The Court is telling the jury that it means that  
12:27 25 something is always present in the prior art or always



12:27 1 results from the practice.

12:27 2 Further down, it says that the elements  
12:27 3 are always present in the prior art or always a result.  
12:27 4 We believe the proper phrasing for that should be  
12:27 5 something that essentially is the natural result of the  
12:27 6 prior art or the use of the prior art.

12:27 7 THE COURT: Overruled.

12:27 8 MR. BOBROW: Your Honor, on obviousness,  
12:28 9 to reiterate, we had requested here that the Court make  
12:28 10 the legal determination of obviousness. That does not  
12:28 11 appear to be set forth in the -- in the Court's  
12:28 12 instruction.

12:28 13 THE COURT: Overruled.

12:28 14 MR. BOBROW: Once again, the clear and  
12:28 15 convincing burden appears here, and I understand Your  
12:28 16 Honor's ruling already on that, but we object to the  
12:28 17 clear and convincing burden.

12:28 18 THE COURT: Overruled.

12:28 19 MR. BOBROW: In the next paragraph on page  
12:28 20 19, the Court has an instruction here that the jury  
12:28 21 should not consider what it learned from or about the  
12:28 22 patent during trial. One concern we have about this and  
12:28 23 objection to it, Your Honor, is that there are materials  
12:28 24 in the patent that actually are prior art. There are  
12:28 25 statements about what the prior art included and how the

12:29 1 prior art worked and what the prior art was, and it  
12:29 2 seems to us that that sentence could be clarified.

12:29 3 THE COURT: Which instruction is that?

12:29 4 MR. BOBROW: This is 7.3, third paragraph  
12:29 5 down. This is an instruction on hindsight, and the part  
12:29 6 of it which Microsoft objects to is on lines 3 running  
12:29 7 over to 4 which said, essentially, that the jury can't  
12:29 8 consider what it learned about the patent during the  
12:29 9 trial.

12:29 10 THE COURT: Do you have a suggested change  
12:29 11 to that?

12:29 12 MR. BOBROW: Your Honor, the -- the  
12:29 13 suggested change that -- that we would propose would be  
12:29 14 to make clear that -- essentially what it learned about  
12:29 15 the claimed invention. Because again, it's proper for  
12:29 16 the jury to consider the prior art.

12:29 17 THE COURT: A response?

12:29 18 MR. McLEROY: No objection, Your Honor.

12:30 19 THE COURT: Okay. Where will this  
12:30 20 sentence be inserted?

12:30 21 MR. CALDWELL: I think, actually, it's  
12:30 22 just a substitution of instead of saying what you  
12:30 23 learned from or about the patent during the trial, it  
12:30 24 would be changed to what you learned from or about the  
12:30 25 claimed invention.

12:30 1 THE COURT: Agreed?

12:30 2 MR. BOBROW: Agreed.

12:30 3 THE COURT: All right. We'll substitute  
12:30 4 claimed invention for the word patent.

12:30 5 MR. BOBROW: On page 19, Your Honor, just  
12:30 6 below that there's an instruction on the question of  
12:30 7 motivation. We consider that instruction to be  
12:30 8 inconsistent with KSR and potentially suggesting to the  
12:30 9 jury that that's something that they must consider, and  
12:30 10 we object on that ground.

12:30 11 THE COURT: It's overruled.

12:30 12 MR. BOBROW: On page 20 in 7.3.1 in the  
12:30 13 description of the -- of the person of ordinary skill,  
12:31 14 Microsoft had proposed some language from the KSR case  
12:31 15 to make clear to the jurors that those of ordinary skill  
12:31 16 would employ inferences and create steps appropriate to  
12:31 17 his or her discipline that, essentially, making clear  
12:31 18 what a person of ordinary skill in the art does when  
12:31 19 looking at a matter. That requested instruction was not  
12:31 20 included, and we would object on that ground.

12:31 21 THE COURT: Overruled.

12:31 22 MR. BOBROW: On page 21, in the second  
12:31 23 full paragraph, there are references here to the field  
12:31 24 of endeavor. And in the field of endeavor, the Court  
12:31 25 has defined it in terms of the problems or issues that

12:31 1 the inventor faced, and we believe that that is not the  
12:31 2 standard. The standard is broader than that.

12:31 3 And of course that the issues the inventor  
12:31 4 faced may be relevant, but it could be the standard we  
12:31 5 think should be reasonably related to any need or  
12:32 6 problem known in the field of endeavor including the  
12:32 7 problems or issues faced by the inventors.

12:32 8 THE COURT: Okay. Where is that on page  
12:32 9 21?

12:32 10 MR. BOBROW: Yes, it is, Your Honor. It's  
12:32 11 in the second full paragraph.

12:32 12 THE COURT: All right. And tell me what  
12:32 13 change you're proposing and where it goes.

12:32 14 MR. BOBROW: Well, the change, Your Honor,  
12:32 15 would be at lines 3 and 5. It says, The reference must  
12:32 16 be reasonably related to the particular problem or issue  
12:32 17 the inventor faced or addressed. And we think that  
12:32 18 instead of that, the language should be as we requested  
12:32 19 in our proposed instruction that the reference must be  
12:32 20 reasonably related to any need or problem known in the  
12:32 21 field of endeavor, comma, including --

12:32 22 THE COURT: Just a second. Slow down a  
12:32 23 second.

12:32 24 MR. BOBROW: Certainly.

12:32 25 THE COURT: Any need or problem known in

12:32 1 the --

12:32 2 MR. BOBROW: The field of endeavor.

12:33 3 THE COURT: Okay.

12:33 4 MR. BOBROW: Comma, including the  
12:33 5 particular problem or issue the inventor faced.

12:33 6 And then the next --

12:33 7 THE COURT: All right. Just a moment.

12:33 8 Before you go on, let me see if there's any objection to  
12:33 9 inserting that. I mean, if there's -- what Plaintiff's  
12:33 10 position is with regard to that proposed change.

12:33 11 MR. CALDWELL: Plaintiff's position is  
12:33 12 that the instruction Plaintiff proposed is actually the  
12:33 13 correct one. It's the one that was given in i4i against  
12:33 14 Microsoft, Your Honor.

12:33 15 Now that said, I mean, if -- if the issue  
12:33 16 of -- sorry.

12:33 17 THE COURT: Yeah. Objection's overruled.  
12:33 18 What's next?

12:33 19 MR. BOBROW: Your Honor, next 7.3.3,  
12:33 20 differences over the prior art. We object to the second  
12:33 21 and third sentences of the first paragraph. In that  
12:34 22 section, we think that the instruction is an incorrect  
12:34 23 statement of the law. This section asks the jurors to  
12:34 24 focus on the differences between the prior art and the  
12:34 25 claimed invention, and then immediately says that they

12:34 1 should not focus on those differences between the prior  
12:34 2 art and the invention.

12:34 3           We think that those sentences should be  
12:34 4 struck since, again, this is part of the obviousness  
12:34 5 analysis where the differences are the correct focus for  
12:34 6 the jury.

12:34 7           THE COURT: All right. Objections's  
12:34 8 overruled.

12:34 9           Anything further?

12:34 10           MR. BOBROW: Yes, Your Honor. I  
12:34 11 apologize. I'm just going through my notes.

12:34 12           Yes, we also object to several requested  
12:34 13 instructions that were not included. Microsoft had  
12:34 14 requested an instruction regarding the fact that  
12:34 15 motivation -- motivation combined is a factor but is not  
12:35 16 a requirement. We would ask that that instruction be  
12:35 17 included.

12:35 18           THE COURT: Overruled.

12:35 19           MR. BOBROW: We had also asked for an  
12:35 20 instruction that when there is a design need or market  
12:35 21 pressure to solve a problem and there are a finite  
12:35 22 number of identified predictable solutions, a person of  
12:35 23 ordinary skill has good reason to pursue the known  
12:35 24 options within his or her technical grasp. That also  
12:35 25 was not included.

12:35 1 THE COURT: Overruled.

12:35 2 MR. BOBROW: 7.3.4, Your Honor, additional  
12:35 3 considerations. These are the secondary considerations  
12:35 4 of non-obviousness.

12:35 5 We have two issues here. Issue No. 1 is  
12:35 6 that factor No. 4 is a factor that discusses copying of  
12:35 7 the invention.

12:35 8 The Court might remember that there was a  
12:35 9 stipulation before trial on that question of copying in  
12:35 10 terms of the parties not introducing evidence that  
12:36 11 either Microsoft did copy or Microsoft didn't copy and  
12:36 12 the like. And we think that there has been no evidence  
12:36 13 introduced on copying as a result and so this is not an  
12:36 14 appropriate factor to be listed in the jury instruction.

12:36 15 THE COURT: Response?

12:36 16 MR. CALDWELL: We're fine taking out No. 4  
12:36 17 and just...

12:36 18 THE COURT: All right. No. 4 will come  
12:36 19 out and we'll re-number those 5 through 10.

12:36 20 MR. BOBROW: Your Honor, we also object to  
12:36 21 factor No. 7 on the question of whether or not others  
12:36 22 have taken licenses to use the invention. This was not  
12:36 23 a factor that either party's expert discussed in their  
12:36 24 testimony. It was not anything that was tied to the  
12:36 25 question of obviousness. And since there is no proof on

12:36 1 that subject, we would propose striking No. 7 as well.

12:36 2 THE COURT: Any objection?

12:36 3 MR. CALDWELL: Yes, Your Honor. There is  
12:36 4 objection because their evidence of license is taken to  
12:37 5 the technology from VirnetX.

12:37 6 THE COURT: All right. And overrule the  
12:37 7 objection.

12:37 8 MR. BOBROW: Your Honor, another issue  
12:37 9 here. We had asked for an instruction on page 24, right  
12:37 10 after the numbered factors. We asked for a sentence and  
12:37 11 instruction that apprised the jury that the question of  
12:37 12 the relevance and relative importance of these various  
12:37 13 factors was for them to consider. The Court did not  
12:37 14 provide that instruction and we request that it be so  
12:37 15 given to the jury.

12:37 16 THE COURT: All right. Overruled.

12:37 17 MR. BOBROW: On to the question of  
12:37 18 damages. In Section 8.1, we had objected to the  
12:37 19 requirement as set forth in the instruction that the  
12:38 20 hypothetical negotiation is the required analysis. We  
12:38 21 think that the correct law is that it is one factor in  
12:38 22 the Georgia-Pacific analysis, and the language that  
12:38 23 essentially says that it is the -- the only perspective  
12:38 24 through which to analyze this is not a correct statement  
12:38 25 of the law.



12:38 1 THE COURT: Overruled.

12:38 2 MR. BOBROW: Microsoft also objects to the  
12:38 3 exclusion of an instruction we requested on a lump-sum  
12:38 4 royalty essentially saying that royalties can be running  
12:38 5 or lump sum, and there certainly has been evidence on a  
12:38 6 lump-sum royalty and we think that the jury should be  
12:38 7 instructed on it.

12:38 8 THE COURT: Overruled.

12:38 9 MR. BOBROW: We also object to the  
12:38 10 exclusion of an instruction that asks the jury and tells  
12:38 11 the jury that, essentially, that the number of acts of  
12:38 12 infringement limit the number of damages. This is from  
12:38 13 the Dyna Corp. Case. We think that that should be  
12:38 14 reflected in the instruction.

12:39 15 THE COURT: Overruled.

12:39 16 MR. BOBROW: We have concerns about the --  
12:39 17 and object to the statement that the infringer's actual  
12:39 18 profits may or may not bear on the reasonableness of an  
12:39 19 award based on a reasonable royalty. We have -- we  
12:39 20 object that that violates the entire market value rule  
12:39 21 by having, essentially, profits on a system as a whole,  
12:39 22 on an operating system as a whole or a software as a  
12:39 23 whole as opposed to reflecting any sort of value of that  
12:39 24 which is accused of infringing. In this case which is a  
12:39 25 much, much, much smaller piece of the software at issue.

12:39 1 THE COURT: Overruled.

12:39 2 MR. BOBROW: Microsoft also objects to the  
12:39 3 sentence that says that the jury's determination does  
12:39 4 not depend on the actual willingness of the parties to  
12:39 5 the lawsuit to engage in such negotiations. The  
12:39 6 objection there, Your Honor, is that the jury will be  
12:39 7 asked to consider evidence of what actually happened in  
12:39 8 real life in the hypothetical negotiation, and the  
12:40 9 concern is that they will not understand that they may  
12:40 10 take into account actual license practices, actual  
12:40 11 licenses; for example, the SafeNet license that was  
12:40 12 rejected and the like.

12:40 13 THE COURT: Overruled.

12:40 14 MR. BOBROW: On the reasonable royalty  
12:40 15 factors, 8.2, paragraph 1, we object to the phrasing,  
12:40 16 whether the licensor has established a royalty for the  
12:40 17 patented invention such as by granting other licenses  
12:40 18 for a royalty. We had proposed different language than  
12:40 19 that.

12:40 20 Our concern with this is that this  
12:40 21 language could be misconstrued by the jury as suggesting  
12:40 22 that an established royalty could be met by, for  
12:40 23 example, one or two licenses which we think is not the  
12:40 24 law. It also does not provide that the jury should  
12:40 25 consider the royalties received by the licensor and it's

12:40 1 the royalties received tending to prove or not prove the  
12:41 2 establishment of an established royalty.

12:41 3 THE COURT: Overruled.

12:41 4 MR. BOBROW: Your Honor, we had requested  
12:41 5 an instruction that we had labeled 8.3. This was an  
12:41 6 instruction on apportionment and the entire market  
12:41 7 value. The Court has declined to include that in its  
12:41 8 charge and we object to that exclusion.

12:41 9 THE COURT: Overruled.

12:41 10 MR. BOBROW: Your Honor, those are  
12:41 11 Microsoft's objections to the charge.

12:41 12 THE COURT: Very well. Thank you.

12:41 13 MR. BOBROW: Thank you.

12:41 14 We will be in recess until 1:00 o'clock.  
12:41 15 Please inform the jury they'll have an extra 15 minutes.

12:41 16 COURT SECURITY OFFICER: All rise.

12:41 17 (Recess.)

01:07 18 COURT SECURITY OFFICER: All rise for the  
01:07 19 jury.

01:07 20 (Jury in.)

01:07 21 THE COURT: Please be seated.

01:08 22 All right. Ladies of the Jury, I hope you  
01:08 23 had a good lunch. We all worked during most of the noon  
01:08 24 hour, so I think everyone had sort of an abbreviated  
01:08 25 lunch that's involved in the case, but I am going to

01:08 1 give you your final jury instructions at this time.

01:08 2 I'm going to have my staff pass out to you  
01:08 3 a copy of the Court's charge, and you can follow along,  
01:08 4 if you wish, or -- but I would encourage you to not get  
01:08 5 too caught up in reading it that you don't listen. But  
01:08 6 we may get to some parts that I'll just refer you to and  
01:08 7 let you read at your -- at your leisure to move through  
01:08 8 it.

01:08 9 So do we have those copies made? Let's go  
01:08 10 ahead and pass those out.

01:08 11 Is the verdict form attached to those,  
01:08 12 also?

01:08 13 LAW CLERK: It's also stapled.

01:09 14 THE COURT: It's a separate -- separate  
01:09 15 document? Okay.

01:09 16 All right. You should have a copy of the  
01:09 17 Court's charge, which is a rather thick stack, and then  
01:09 18 you should have a copy of the verdict form. Do you find  
01:09 19 both of those? I believe he's passing out the verdict  
01:09 20 form now.

01:09 21 All right. I'm going to -- let's just  
01:09 22 look at the verdict form first. I'll just cut to sort  
01:09 23 of the bottom line. These are the questions that you're  
01:09 24 going to be answering in light of the legal instructions  
01:09 25 that I'm going to be giving you in a moment.

01:09 1 But we'll go to the end of the chapter  
01:09 2 first and let you see where -- where you're going to end  
01:09 3 up, and then we'll go back and go through all of the  
01:09 4 legal instructions. But, basically, you're going to  
01:09 5 have three or four questions to answer.

01:09 6 The first question is: Did VirnetX prove  
01:09 7 by a preponderance of the evidence that Microsoft  
01:09 8 infringes certain claims of the '135 patent and certain  
01:10 9 claims of the '180 patent as listed there?

01:10 10 Then if you'll look on the next page, the  
01:10 11 top of the page, there's sort of a chart, and it has  
01:10 12 three columns; Column 1 dealing with infringement;  
01:10 13 Column 2 with willfulness; and Column 3 with invalidity.

01:10 14 And then down the left-hand side, you'll  
01:10 15 see the '135 patent and the three asserted claims; the  
01:10 16 '180 patent and the eight asserted claims underneath it.

01:10 17 So that first question, you would answer  
01:10 18 in Column 1, and that question is: Did VirnetX prove by  
01:10 19 a preponderance of the evidence that Microsoft  
01:10 20 infringes, and then it lists all of those claims of the  
01:10 21 '135 patent and the '180 patent.

01:10 22 And for the ones you find -- if you find  
01:10 23 infringement, then you would write yes in that blank.  
01:10 24 If you do not find infringement, then you would write  
01:10 25 no.

01:10 1           Then going back to Page -- the first page  
01:10 2 of the verdict form, you'll see Question No. 2: Of the  
01:11 3 claims that you have found infringed, in other words,  
01:11 4 the ones that you answered yes to, if any, did VirnetX  
01:11 5 prove by clear and convincing evidence that Microsoft's  
01:11 6 infringement was willful? And then an instruction to  
01:11 7 answer in Column 2.

01:11 8           So go back to that second page. For each  
01:11 9 one that you've answered yes to in Column 1, then you  
01:11 10 will answer either yes or no in Column 2 as to  
01:11 11 willfulness.

01:11 12           Then the third question is: Did Microsoft  
01:11 13 prove by clear and convincing evidence that any of the  
01:11 14 listed claims of the following patents are invalid?

01:11 15           And, again, if you find the claim invalid,  
01:11 16 answer yes; otherwise, answer no in Column 3.

01:11 17           And, again, on Column 3, you would answer  
01:11 18 yes or no for each claim.

01:11 19           Now, after you've answered those first  
01:11 20 three questions, then you have an instruction. If you  
01:11 21 have found that any claim -- any claim infringed and  
01:12 22 valid, answer Question 4; otherwise, do not answer  
01:12 23 Question 4.

01:12 24           So if you've found any claim to have been  
01:12 25 infringed and that it was not invalid, in other words,

01:12 1 you answered yes to infringement for that claim and no  
01:12 2 to invalidity for that claim, then you would answer  
01:12 3 Question No. 4, which is the damages question.

01:12 4 And it asks: What sum of money, if paid  
01:12 5 now in cash, do you find, from a preponderance of the  
01:12 6 evidence, would fairly and reasonably compensate VirnetX  
01:12 7 for Microsoft's infringement of the following patents?

01:12 8 First, as to the '135 patent, and then for  
01:12 9 the '180 patent and a dollar sign and a place for your  
01:12 10 answer and then a place at the bottom for your jury  
01:12 11 foreperson to sign and date the verdict form.

01:12 12 Now, that's the end of the chapter, as I  
01:12 13 said. Now we'll go back through the detailed  
01:12 14 instructions. Some of these you've heard earlier and  
01:13 15 will be a repeat, but just please bear with me as we go  
01:13 16 through them.

17 Members of the Jury: You have now heard  
18 all of the evidence in this case. I'm now going to  
19 instruct you about the law which you must apply. It is  
20 your duty to follow the law as I give it to you.

21 On the other hand, you, the jury, are the  
22 judges of the facts. Do not consider any statement that  
23 I may have made during the trial or may make during  
24 these instructions as any indication that I have any  
25 opinion about the facts of this case.

1           After I instruct you on the law, the  
2 attorneys will have an opportunity to present their  
3 closing arguments. Again, the statements of the -- and  
4 arguments of the attorneys are not evidence and are not  
5 instructions on the law. They are only intended to  
6 assist you in understanding the evidence and the  
7 parties' contentions.

8           Again, as I told you at the beginning, the  
9 evidence will come -- is what you heard from the witness  
10 stand that was admitted into evidence and the documents  
11 and exhibits that were admitted.

12           Now, when you come to the questions,  
13 answer them from the facts as you find them. Do not  
14 decide who you think should win and then answer the  
15 questions accordingly. Your answers and your verdict  
16 must be unanimous.

17           In determining whether any fact has been  
18 proved in this case, you may, unless otherwise  
19 instructed, consider the testimony of all witnesses,  
20 regardless of who may have called them, and all exhibits  
21 received in evidence, regardless of who may have  
22 produced them.

23           Now, regarding considering witnesses'  
24 testimony, again, you, the jurors, are the sole judges  
25 of the credibility of all witnesses and the weight and



1 effect of all evidence.

2 By the Court allowing testimony or other  
3 evidence to be introduced over the objection of an  
4 attorney, the Court did not indicate any opinion as to  
5 the weight or effect of such evidence.

6 When the Court sustained an  
7 objection to a question addressed to a witness, you must  
8 disregard the question entirely and may draw no  
9 inference from the wording of it or speculate as to what  
10 the witness would have testified to if he or she had  
11 been permitted to answer the question.

12 At times during the trial, it was  
13 necessary for the Court to talk with the lawyers here at  
14 the bench out of your hearing or by calling a recess.  
15 We met because often during a trial something comes up  
16 that does not involve the jury. You should not  
17 speculate on what was discussed during those times.

18 In determining the weight to give  
19 the testimony of a witness, you should ask yourself  
20 whether there was evidence tending to prove that the  
21 witness testified falsely concerning some important fact  
22 or whether there was evidence that at some other time,  
23 the witness said or did something or failed to say or do  
24 something that was different from the testimony the  
25 witness gave before you during the trial.

1                   You should, of course, keep in mind  
2 that a simple mistake by a witness does not necessarily  
3 mean that the witness was not telling the truth as he or  
4 she remembers it, because people may forget some things  
5 or remember other things inaccurately.

6                   So if a witness has made a misstatement,  
7 you need to consider whether that misstatement was an  
8 intentional falsehood or simply an innocent lapse of  
9 memory, and the significance of that may depend on  
10 whether it has to do with an important fact or only with  
11 some unimportant detail.

12                   Now, with regard to examining the  
13 evidence, certain testimony in this case has been  
14 presented to you through a deposition. As I instructed  
15 you during the trial, a deposition is the sworn,  
16 recorded answers to questions asked of a witness in  
17 advance of trial.

18                   Under some circumstances, the witness  
19 cannot be present to testify from the witness stand and  
20 the witness's testimony may be presented under oath in  
21 the form of a deposition.

22                   Sometime before this trial, attorneys  
23 representing the parties in this case questioned this  
24 witness under oath. A court reporter was present and  
25 recorded the testimony.

1           This deposition testimony is entitled to  
2 the same consideration and is to be judged by you, as to  
3 credibility and weight, and otherwise considered by you,  
4 insofar as possible, the same as if the witness had been  
5 present and had testified from the witness stand in open  
6 court.

7           While you should consider all -- only the  
8 evidence in this case, you are permitted to draw such  
9 reasonable inferences from the testimony and exhibits as  
10 you feel are justified in the light of common  
11 experience.

12           In other words, you may make deductions  
13 and reach conclusions that reason and common sense leads  
14 you to draw from the facts that have been established by  
15 the testimony and in the case.

16           Unless you are instructed otherwise, the  
17 testimony of a single witness may be sufficient to prove  
18 any fact even if a greater number of witnesses may have  
19 testified to the contrary if, after considering all of  
20 the other evidence, you believe that single witness.

21           There are two types of evidence that you  
22 may consider in properly finding the truth as to the  
23 facts of the case.

24           One is the direct evidence, such as the  
25 testimony of an eyewitness.

1           The other is indirect or circumstantial  
2 evidence; that is, the proof of a chain of circumstances  
3 that indicates the existence or non-existence of certain  
4 other facts.

5           As a general rule, the law makes no  
6 distinction between direct and circumstantial evidence,  
7 but simply requires that you find the facts from a  
8 preponderance of all the evidence, both direct and  
9 circumstantial.

10           The parties may have stipulated or agreed  
11 to some facts in this case. When the lawyers on both  
12 sides stipulate to the existence of a fact, you must,  
13 unless otherwise instructed, accept the stipulation as  
14 evidence and regard that fact as proved.

15           Now, with regard to expert witnesses, when  
16 the knowledge of a technical subject matter may be  
17 helpful to the jury, a person who has special training  
18 or experience in that technical field is called an  
19 expert witness and is permitted to state his or her  
20 opinion on those technical matters.

21           However, you are not required to accept  
22 that opinion. As with any other witness, it is up to  
23 you to decide whether to rely upon it. In deciding  
24 whether to accept or rely upon the opinion of an expert  
25 witness, you may consider any bias of the witness.

1           Now, with regard to the contentions of the  
2 parties, I'm going to first give you a brief summary of  
3 each side's contentions in this case, and I will then  
4 tell you what each side must prove to win on these  
5 issues.

6           Plaintiff, VirnetX, contends that the  
7 Defendant, Microsoft Corporation, is directly infringing  
8 Claims 1, 10, and 12 of the '135 patent and Claims 1, 4,  
9 15, 17, 20, 31, 33, and 35 of the '180 patent by making,  
10 using, selling, offering to sell, or importing into the  
11 United States patented systems or apparatuses or by  
12 using Microsoft's accused software to perform the  
13 patented methods.

14           These claims have been referred to as the  
15 asserted claims, and these patents have been referred as  
16 the patents-in-suit.

17           VirnetX also contends that Microsoft is  
18 inducing direct infringement of the '135 patent and  
19 contributing to direct infringement of the '135 patent  
20 by others who make or use the patented systems or  
21 perform the patented methods.

22           VirnetX also contends that Microsoft is  
23 inducing direct infringement of the '180 patent by  
24 others who make or use the patented apparatuses or  
25 perform the patented methods with Microsoft's accused

1 software products.

2 VirnetX also claims that Microsoft has  
3 infringed the '135 and '180 patents willfully. That's  
4 the second question, as you'll recall from the verdict  
5 form. And VirnetX is seeking damages for Microsoft's  
6 alleged infringement.

7 In response to VirnetX's contentions,  
8 Microsoft contends that it is not infringing any of the  
9 asserted claims, whether willfully or otherwise.

10 Microsoft also contends that the asserted  
11 claims are invalid as being anticipated by or obvious in  
12 light of the prior art. Microsoft also contends that  
13 VirnetX is not entitled to any damages.

14 Now, with regard to the burdens of proof,  
15 we visited about this the first day.

16 VirnetX, in asserting infringement of the  
17 asserted claims of the '135 and '180 patents, has the  
18 burden of proving such infringement by a preponderance  
19 of the evidence.

20 Preponderance of the evidence means  
21 evidence that persuades you that a claim is more likely  
22 true than not true.

23 In determining whether any fact has been  
24 proved by a preponderance of the evidence, you may,  
25 unless otherwise instructed, consider the stipulations,

1 the testimony of all the witnesses, regardless of who  
2 may have called them, and all the exhibits received into  
3 evidence regardless of who may have produced them.

4           If the proof establishes that VirnetX's  
5 infringement claims are more likely true than not true,  
6 then you should find for VirnetX as to that claim.

7           If you find that Microsoft infringed  
8 one or more of the asserted claims of the '135 and '180  
9 patents, then as a separate question, VirnetX has the  
10 burden of proving its additional contention that the  
11 infringement was willful by clear and convincing  
12 evidence.

13           Microsoft has the burden of proving  
14 invalidity by clear and convincing evidence.

15           Clear and convincing evidence means  
16 evidence that produces in your mind a firm belief or  
17 conviction as to the matter at issue.

18           In determining whether any fact has been  
19 proved by clear and convincing evidence, you may, unless  
20 otherwise instructed, again, consider the stipulations  
21 all the witnesses' testimony, regardless of who may have  
22 called them, and all of the exhibits admitted into  
23 evidence, regardless of who may have produced them.

24           Although proof to an absolute certainty is  
25 not required, the clear-and-convincing-evidence standard

1 requires a greater degree of persuasion than is  
2 necessary for the preponderance-of-the-evidence  
3 standard. If the proof establishes in your mind a firm  
4 belief or conviction, then the standard has been met.

01:23 5           So if you'll look back at the verdict  
01:24 6 form, the three -- first three questions and on the  
01:24 7 second page, the Columns 1, 2, and 3, the first column,  
01:24 8 infringement, that's under the  
01:24 9 preponderance-of-the-evidence standard.

01:25 10           The next two columns: Willfulness and  
01:25 11 invalidity, that's under the clear-and-convincing  
01:25 12 standard.

01:25 13           Everybody follow that?

01:25 14           Okay. Now, a glossary of patent terms is  
01:25 15 contained in Appendix B to this charge. I'm not going  
01:25 16 to read through all of those. They're there for your  
01:25 17 reference.

01:25 18           You'll see them over as the last two  
01:25 19 pages -- most of those have been testified to and  
01:25 20 explained, but that's there for your reference, and you  
01:25 21 should read them. They are part of the charge.

22           All right. Now, with regard to the claims  
23 of the patents-in-suit, the claims of a patent are  
24 numbered sentences at the end of the patent.

25           The claims describe the invention made by



1 the inventor and describe what the patent owner owns and  
2 what the owner may prevent others from doing. Claims  
3 may describe products, such as machines or chemical  
4 compounds or processes for making or using a product.

5           Claims are usually divided into parts or  
6 steps called limitations or elements. For example, a  
7 claim that covers the invention of a table may recite  
8 the tabletop, four legs, and the glue that secures the  
9 legs on the tabletop. The tabletop, the legs, and the  
10 glue are each a separate limitation or element of the  
11 claim.

12           Now, there are two types of claims. This  
13 case involves independent claims and dependent claims.

14           An independent claim sets forth all the  
15 requirements that must be met in order to be covered by  
16 that claim. Thus, it is not necessary to look at any  
17 other claim to determine what an independent claim  
18 covers.

19           In this case, Claims 1 and 10 of the '135  
20 patent and Claims 1, 17, and 33 of the '180 patent are  
21 each independent claims.

22           The other claims being asserted in this  
23 case are dependent claims. A dependent claim does not  
24 itself recite all of the requirements of the claim but  
25 refers to another claim for some of its requirements.

1 In this way, the claim depends on another claim.

2           The law considers a dependent claim to  
3 incorporate all of the requirements of the claims to  
4 which it refers. The dependent claim then adds its own  
5 additional requirements.

6           To determine what a dependent claim  
7 covers, it is necessary to look at both the dependent  
8 claim and any other claims to which it refers. A  
9 product or method that meets all of the requirements of  
10 both the dependent claim and the claims to which it  
11 refers is covered by that dependent claim.

12           Construction of the claims.

13           In deciding whether a claim has been  
14 infringed, the first step is to understand the meaning  
15 of the words used in the patent claims.

16           It is my job as judge to determine what  
17 the patent claims mean and to instruct you about that  
18 meaning. You must accept the meanings I give you and  
19 use those meanings when you decide whether or not the  
20 patent claims are infringed and whether or not they are  
21 invalid.

22           I have interpreted the meaning of some of  
23 the language in the patent claims involved in this case.  
24 My interpretation of those claims appears in Appendix A  
25 to this charge.

1           The claim language I have not interpreted  
2 for you in Appendix A is to be given its ordinary and  
3 accustomed meaning as understood by one of skill in the  
4 art.

5           Now, with regard to infringement, any  
6 person or business entity that, without the patent  
7 owner's permission, makes, uses, sells, or offers to  
8 sell a device or practices a method, that is covered by  
9 at least one claim of a patent before the patent expires  
10 infringes the patent.

11           A patent owner has the right to stop  
12 others from infringing the patent claims during the life  
13 of the patent.

14           In this case, VirnetX asserts that  
15 Microsoft has infringed the asserted claims. VirnetX  
16 has the burden of proving infringement by a  
17 preponderance of the evidence.

18           Only the claims of a patent may be  
19 infringed. You must compare each of the asserted  
20 claims, as I have defined them, to the accused acts of  
21 infringement and determine whether or not there is  
22 infringement.

23           You must not compare the accused products  
24 or methods with any specific example set out in the  
25 patents. The only correct comparison is with the

1 language of the claim itself with the meanings I have  
2 given you.

3           In order to prove infringement, VirnetX  
4 must prove that the requirements for one or more of  
5 these types of infringement are met by a preponderance  
6 of the evidence; that is, that it's more likely not,  
7 that all of the requirements of one or more of each of  
8 these types of infringement have been proved.

9           You must consider each claim individually  
10 and must reach your decision as to each assertion of  
11 infringement based on my instructions about the meaning  
12 and scope of the claims, the legal requirements for  
13 infringement, and the evidence presented to you by the  
14 parties.

15           In this case, there are three possible  
16 ways that a claim may be infringed: The first is direct  
17 infringement; the second is active inducement; and the  
18 third is contributory infringement.

19           VirnetX has alleged that Microsoft  
20 directly infringes the asserted claims.

21           In addition, VirnetX has alleged that  
22 customers of Microsoft directly infringe the asserted  
23 claims and that Microsoft is liable for actively  
24 inducing or contributing to that direct infringement by  
25 those customers.

1           I will now explain each of the types of  
2 infringement in more detail.

3           The first is direct Infringement. If any  
4 person makes, uses, sells, or offers to sell what is  
5 covered by the claims of a patent without the patent  
6 owner's permission, that person is said to infringe the  
7 patent. This type of infringement is also called direct  
8 infringement.

9           To determine direct infringement, you must  
10 compare the accused product or method with each of the  
11 asserted claims of the patents-in-suit using my  
12 instructions as to the meaning of the patent claims.

13           A patent claim is directly infringed only  
14 if the accused product or method includes each and every  
15 element in that patent claim. If the accused product or  
16 method does not contain one or more of the limitations  
17 recited in a claim, then that product or method does not  
18 directly infringe that claim.

19           An accused product infringes a claim if it  
20 is reasonably capable of satisfying the claim elements,  
21 even though it may also be capable of non-infringing  
22 modes of operation.

23           If you find that the accused product or  
24 method includes each element or step of the claim, then  
25 the product or method infringes the claim even if such

1 product or method contains additional elements or steps  
2 that are not recited in the claim.

3           A person can directly infringe a patent  
4 without knowing that what it is doing is an infringement  
5 of the patent.

6           It may also directly infringe, even  
7 though, in good faith, it believes that what it is doing  
8 is not an infringement of any patent, and even if it did  
9 not know of the patent infringement -- even if it did  
10 not know of the patent, infringement does not require  
11 proof that the person copied a product or the patent.

12           You must consider each of the asserted  
13 claims of the patents-in-suit individually and decide  
14 whether making, selling, or using the accused  
15 apparatuses or performing the accused methods infringes  
16 that claim.

17           You must be certain to compare such  
18 accused apparatus or method with each claim that such  
19 apparatus or method is alleged to infringe. Such  
20 accused apparatus or method should be compared to the  
21 limitations recited in the patent claims, not to -- and  
22 not to any preferred or commercial embodiment of the  
23 claimed invention.

24           Taking each asserted claim of the '135 and  
25 '180 patents separately, if you find that VirnetX has

1 proved by a preponderance of the evidence that each and  
2 every limitation of that claim is present in the accused  
3 product or method, then you must find that such product  
4 or method infringes the claim.

5           A claim limitation may be directly  
6 infringed in one of two ways: Either literally or under  
7 the Doctrine of Equivalents.

8           Literal infringement.

9           A claim limitation is literally met if it  
10 exists in the accused product or method just as it is  
11 described in the claim language, either as I have  
12 explained that language to you, or if I did not explain  
13 it, as it would be understood by one of skill in the  
14 art.

15           The second way is under the Doctrine of  
16 Equivalents. A claim limitation is present in an  
17 accused product or method under the Doctrine of  
18 Equivalents if the differences between the claim  
19 limitation and a comparable element of the accused  
20 product or method are insubstantial.

21           One way to determine whether a difference  
22 is insubstantial is to look at whether the accused  
23 product or method performs substantially the same  
24 function in substantially the same way to achieve  
25 substantially the same result as the claimed invention.

1           You may also consider whether, at the time  
2 of the alleged infringement, a person having ordinary  
3 skill in the field of technology of the patent would  
4 have known of the interchangeability of the alternative  
5 feature and the unmet requirement of the claim.

6           Interchangeability at the present time is  
7 not sufficient in order for the features to be  
8 considered to be interchangeable; rather, the  
9 interchangeability of the two features must have been  
10 known to persons of ordinary skill in the field of  
11 technology at the time the infringement began.

12           Thus, the inventor need not have foreseen  
13 and the patent need not describe all potential  
14 equivalents to the invention covered by the claims.

15           Also, slight changes in technique or  
16 improvements made possible by technology developed after  
17 the patent application is filed may still be considered  
18 equivalent for the purposes of the Doctrine of  
19 Equivalents.

20           Now, with regard to inducement, VirnetX  
21 alleges that Microsoft is also liable for infringement  
22 by actively inducing others to directly infringe the  
23 '135 and '180 patents.

24           As with direct infringement, you must  
25 determine whether there has been active inducement on a



1 claim-by-claim basis.

2 A person is liable for active inducement  
3 of a claim only if:

4 (1) the person takes action during the  
5 time the patent is in force, which encourages acts  
6 someone else;

7 And (2) the encouraged acts constitute  
8 direct infringement of that claim;

9 And (3) the person is aware of the patent  
10 and knows or should have known that the encouraged acts  
11 constitute infringement of that patent;

12 And (4) the person has an intent to cause  
13 the encouraged acts;

14 And (5) the encouraged acts are actually  
15 carried out by someone else.

16 In order to prove active inducement,  
17 VirnetX must prove that each of the above requirements  
18 is met. Further proof of each element must be by a  
19 preponderance of the evidence; i.e., that it is likely  
20 than not that each of the above requirements has been  
21 met.

22 In considering whether Microsoft has  
23 induced infringement by others, you may consider all the  
24 circumstances, including whether or not Microsoft  
25 obtained the advice of a competent lawyer, whether or

1 not Microsoft knew of the patents when designing and  
2 manufacturing its products, and whether or not Microsoft  
3 removed or diminished the allegedly infringing features.

4           You may not assume that merely because  
5 Microsoft did not obtain an opinion of counsel, the  
6 opinion would have been unfavorable.

7           Intent to cause the acts that constitute  
8 direct infringement may be demonstrated by evidence of  
9 active steps taken to encourage direct infringement,  
10 such as advertising an infringing use or instructing how  
11 to engage in an infringing use.

12           In order to establish active inducement of  
13 infringement, it is not sufficient that the accused  
14 infringer was aware of the acts that allegedly  
15 constitute the direct infringement; rather, you must  
16 find specifically that the inducer intended to cause the  
17 acts that constitute the direct infringement and must  
18 have known or should have known that its action would  
19 cause the direct infringement.

20           If you do not find that the accused  
21 infringer specifically meets these intent requirements,  
22 then you must find that the accused infringer has not  
23 induced the alleged infringement.

24           Next is contributory infringement.

25           VirnetX also alleges that Microsoft is

1 liable for contributory infringement by contributing to  
2 the direct infringement of the '135 patent by another.  
3 As with direct infringement, you must determine whether  
4 there has been contributory infringement on a  
5 claim-by-claim basis.

6           It is not necessary to show that Microsoft  
7 has directly infringed as long as you find that someone  
8 has directly infringed. If there is no direct  
9 infringement by anyone, Microsoft cannot have  
10 contributed to the infringement of the patent.

11           If you find someone has directly infringed  
12 the '135 patent, then contributory infringement exists  
13 if VirnetX proves by a preponderance of the evidence  
14 that:

15                   (1) Microsoft sold, offered for sale, or  
16 imported;

17                   (2) a material component of the product or  
18 material component used in practicing the patented  
19 method, which can be software, that is not a staple  
20 article of commerce suitable for substantial  
21 non-infringing use;

22                   (3) with knowledge that the component was  
23 especially made or adapted for use in an infringing  
24 manner.

25           A staple article of commerce suitable for

1 substantial non-infringing use is something that has  
2 uses other than a component of the product or patented  
3 method.

4           A substantial non-infringing use is one  
5 that is not occasional, farfetched, impractical,  
6 experimental, or hypothetical.

7           In determining whether or not the  
8 component is a staple article of commerce suitable for  
9 non-infringing use, you should focus on whether the  
10 component itself, not the product in which the component  
11 is embedded, is or is not suitable for substantial  
12 non-infringing use.

13           Whether the product in which the component  
14 is embedded is or is not suitable for substantial  
15 infringing use is not relevant.

16           Now, next is willful infringement.  
17 Again, willfulness is the second question, and you'll  
18 place your answers in Column 2 based on the  
19 clear-and-convincing-evidence standard.

20           VirnetX contends that Microsoft has  
21 willfully infringed the asserted claims. If you find,  
22 on the basis of the evidence and the law, as I have  
23 explained it, that Microsoft directly or indirectly  
24 infringes at least one of the asserted claims, then you  
25 must decide whether or not that infringement was

1 willful.

2 Willfulness is not relevant to your  
3 decision of whether or not there is infringement. It is  
4 relevant only to the amount of damages, if any, and may,  
5 in certain circumstances, entitle the patent owner to  
6 increased damages.

7 But it would be my job to decide whether  
8 to award increased damages to a patent owner, after you  
9 have rendered a verdict. Therefore, you should not  
10 consider willful infringement in making your damage  
11 award, if any.

12 To prove willfulness, a patent owner must  
13 prove by clear and convincing evidence that the accused  
14 infringer acted with reckless disregard to the claims of  
15 the asserted patent.

16 Willfulness requires you to determine  
17 three things:

18 First, that the accused infringer was  
19 aware of the asserted patent;

20 Second, that the alleged infringer acted  
21 despite an objectively high likelihood that its actions  
22 infringed a valid patent;

23 And third, that this objectively high risk  
24 was either known or so obvious that it should have been  
25 known to the alleged infringer.

1           In deciding whether or not the alleged  
2 infringer committed willful infringement, you must  
3 consider all of the facts, including:

4           (1) whether or not the alleged infringer  
5 possessed a reasonable basis to believe that it has a  
6 substantial defense to infringement and reasonably  
7 believed that the defense would be successful if  
8 litigated, including the defense that the patent is  
9 invalid;

10           And (2) whether or not the alleged  
11 infringer made a good faith effort to avoid infringing  
12 the patent; for example, the alleged infringer took  
13 remedial action upon learning of the patent by ceasing  
14 infringing activity or attempting to design around the  
15 patent.

16           Now that covers infringement and  
17 willfulness.

18           Now my instructions regarding invalidity.  
19 That's the third question that you'll answer in Column  
20 3, and that standard of proof is clear and convincing  
21 evidence.

22           Microsoft has challenged the validity of  
23 all of the asserted claims of the '135 and '180 patents  
24 on a number of different grounds. Microsoft must prove  
25 that a patent claim is invalid by clear and convincing

1 evidence.

2           An issued patent is accorded a presumption  
3 of validity based on the presumption that the United  
4 States Patent & Trademark Office acted correctly in  
5 issuing a patent.

6           For a patent to be valid, the invention  
7 claimed in the patent must be new, useful, and obvious.  
8 A patent cannot take away from people their right to use  
9 what was known or what would have been obvious when the  
10 invention was made.

11           In addition, the patent must comply with  
12 certain statutory requirements of disclosure.

13           I will now explain to you in some detail  
14 Microsoft's grounds for invalidity. In making your  
15 determination as to invalidity, you should consider each  
16 claim and each ground for invalidity separately.

17           The first is anticipation. And you've  
18 heard testimony about all of these during the course of  
19 the trial from both sides.

20           Microsoft contends that all of the  
21 asserted claims are invalid for being anticipated by  
22 prior art. Microsoft bears the burden of proof of  
23 establishing anticipation by clear and convincing  
24 evidence.

25           A patent claim is invalid if the claimed

1 invention is not new. For a claim to be invalid on the  
2 basis of anticipation because it is not new, all of its  
3 requirements must be present in a single previous device  
4 or method or described in a single previous publication  
5 or patent. We call these things prior art.

6           Microsoft must prove by clear and  
7 convincing evidence that these items are prior art. The  
8 description in a reference does not have to be in the  
9 same words as the claim, but all the requirements of the  
10 claim must be there, either stated expressly or  
11 necessarily implied or inherent in the level of ordinary  
12 skill in the field of technology of the patent so that  
13 someone of ordinary skill in the field of technology of  
14 the patent, looking at that one reference would be able  
15 to make and use the claimed invention.

16           Something is inherent in an item of prior  
17 art if it is always present in the prior art or always  
18 results from the practice of the prior art.

19           Inherency may not be established by  
20 probabilities or possibilities. The mere fact that a  
21 certain thing may coincidentally result from a given set  
22 of circumstances is not sufficient.

23           A party claiming anticipation by inherency  
24 must show that the elements of the claim are always  
25 present in the prior art or always result from the



1 practice of the prior art. You may not combine one or  
2 more items of prior art to make out an anticipation.

3 Let me now instruct you on two principles  
4 of patent law pertaining to the making of an invention.  
5 Conception and reduction to practice are those two  
6 areas.

7 Conception is the mental part of an  
8 invention; in essence, the formation in one's mind of  
9 the inventor of a definite and permanent idea of the  
10 complete and operative invention as it is hereafter to  
11 be applied in practice.

12 Conception of an invention is complete  
13 when the idea is so clearly defined in the inventor's  
14 mind that a person of ordinary skill in the field of the  
15 technology would be able to reduce the invention to  
16 practice without extensive research or experimentation.

17 Conception may be proved when the  
18 invention is shown in its complete form by drawings,  
19 disclosure to another person or other forms of evidence  
20 presented at trial.

21 The second, a claimed invention is reduced  
22 to practice when it has been tested sufficiently to show  
23 that it will work for its intended purpose.

24 An invention may be reduced to practice  
25 even if the inventor has not made or tested a prototype

1 of the invention. The invention may be reduced to  
2 practice by being fully described in a filed patent  
3 application.

4 Anticipation by public knowledge or use by  
5 another. I will now describe the specific requirements  
6 for the prior art categories relied on by Microsoft in  
7 this case.

8 A patent claim is invalid if the invention  
9 recited in that claim was publicly known or used in the  
10 United States by someone other than the inventor before  
11 the patent applicant invented it or more than one year  
12 before the United States patent application was filed.

13 For the '135 patent, the parties agree  
14 that the invention date was February 15, 2000.

15 For the '180 patent, the parties agree  
16 that the invention date was April 26, 2000.

17 A prior public use by another may  
18 anticipate a patent claim even if the use was accidental  
19 or was not appreciated by the other person. Thus, a  
20 prior public use may anticipate an invention even if the  
21 user did not intend to use the invention or even realize  
22 he or she had done so.

23 Private or secret knowledge, such as  
24 knowledge confidentially discussed within a small group,  
25 is not enough to invalidate a prior -- invalidate a

1 patent claim.

2 Now anticipation by a printed publication.

3 A patent claim is invalid if the invention  
4 defined by that claim was described in a printed  
5 publication anywhere in the world before it was invented  
6 by the patent applicant or more than one year prior to  
7 the filing date of the United States patent application.

8 The effective filing date of the  
9 application of the '135 patent is February 15, 2000.

10 The effective filing date of the  
11 application for the '180 patent is April 26, 2000.

12 Printed publications may include issued  
13 patents, as well as articles, treatises, and other  
14 written materials.

15 A printed publication or patent will not  
16 be an anticipation unless it contains a description of  
17 the invention covered by the patent claims that is  
18 sufficiently detailed to teach a skilled person how to  
19 make and use the invention without undue  
20 experimentation.

21 Factors to be considered in determining  
22 whether a disclosure would require undue experimentation  
23 include:

24 (1) the quantity of the experimentation  
25 necessary;

1                   (2) the amount of direct -- the amount of  
2 direction or guidance disclosed in the printed  
3 publication or patent;

4                   (3) the presence or absence of working  
5 examples in the printed publication or patent;

6                   (4) the nature of the invention;

7                   (5) the state of the prior art;

8                   (6) the relative skill of those in the  
9 art;

10                   (7) the predictability of the art;

11                   And (8) the breadth of the claims.

12                   A printed publication must be reasonably  
13 accessible to those members of the public who would be  
14 interested in its contents. It is not necessary that  
15 the printed publication be available to every member of  
16 the public. The date that a printed publication becomes  
17 prior art is the date that it becomes available to the  
18 public.

19                   So long as the printed publication was  
20 available to the public, the form in which the  
21 information was recorded is unimportant. The  
22 information must, however, have been maintained in some  
23 permanent form, such as printed or typed pages, magnetic  
24 tape, microfilm, photographs, or photocopies.

25                   Now, anticipation by prior sale or offer

1 for sale.

2           The sale or offer for sale in the United  
3 States of a product may be prior art to a patent claim  
4 covering the product or a method of making the product  
5 if the product or method was sold or offered for sale in  
6 the United States more than one year before the  
7 application for the patent was filed.

8           This is known as the on-sale bar. The  
9 date of the invention for the patent claims is  
10 irrelevant to this category of prior art.

11           In order for there to be an offer for  
12 sale, two requirements must be met.

13           First, the product have been the subject  
14 of a commercial offer for sale in the United States.  
15 Even a single offer sale to a single customer may be a  
16 commercial offer, even if the customer does not accept  
17 the offer.

18           The on-sale bar is not limited to sales by  
19 the inventor but may result from sales or offers for  
20 sale by a third party that anticipate the invention.

21           Second, the product must be ready for  
22 patenting. This can be satisfied in at least two ways:

23           (1) by proof of reduction to practice;  
24 that is, the alleged invention worked as actually  
25 intended before the critical date;

1                   Or (2) by proof that prior to the critical  
2 date, the inventor had prepared drawings or other  
3 descriptions of the invention that were sufficiently  
4 specific to enable a person skilled in the art to  
5 practice the invention.

6                   The product may be ready for patenting  
7 even if it is not ready for commercial production or has  
8 not been technically perfected.

9                   Corroboration of oral testimony.

10                  Oral testimony alone is insufficient to  
11 prove prior invention or that something is prior art or  
12 that a particular event or reference occurred before the  
13 filing date of the patents-in-suit.

14                  A party must provide evidence that  
15 corroborates any oral testimony, especially where the  
16 oral testimony comes from an interested witness or a  
17 witness testifying on behalf of an interested party.

18                  This includes any individual or company  
19 testifying that his or her -- or its invention predates  
20 the patents-in-suit and also includes a patent owner  
21 seeking to prove an earlier date of invention than the  
22 effective -- than the effective filing date stated on  
23 the face of the patent.

24                  Documentary or physical evidence that is  
25 made contemporaneously with the inventive process

1 provides the most reliable proof that the testimony has  
2 been corroborated, but corroborating evidence may also  
3 consist of testimony of a witness, other than an  
4 inventor, to the actual reduction to practice, or it may  
5 consist of evidence of surrounding facts and  
6 circumstances independent of information received from  
7 the inventor.

8           If you find that the party has not  
9 corroborated the oral testimony with other evidence, you  
10 are not permitted to find that the subject of the oral  
11 testimony qualifies as prior art or supports a prior  
12 date of invention.

13           Next is the defense of obviousness.

14           Not all innovations are patentable. A  
15 patent claim is invalid for obviousness if the claimed  
16 invention as a whole would have been obvious to one  
17 having ordinary skill in view of all the prior art at  
18 the time the invention was made.

19           The issue is not whether the claimed  
20 invention would have been obvious to you as a layman, to  
21 me as a judge, or to a genius in the art, but whether it  
22 would have been obvious to one of ordinary skill in the  
23 art at the time it was made.

24           Microsoft bears the burden of proving this  
25 defense by clear and convincing evidence.

1           You must not use hindsight when comparing  
2 the prior art to the invention for obviousness. You  
3 should consider only what was known before the invention  
4 was made. You may not judge the invention in light of  
5 present-day knowledge or by what you learned from or  
6 about the claimed invention during trial.

7           In placing yourself in the shoes of one of  
8 ordinary skill in the art at the time that the invention  
9 was made, you may consider whether such a person would  
10 have been motivated to combine the prior art references  
11 in order to arrive at the claimed invention.

12           First, you must decide the level of  
13 ordinary skill in the field that someone would have had  
14 at the time the claimed invention was made.

15           Second, you must decide the scope and  
16 content of the prior art put into evidence in this case.

17           Third, you must decide the differences, if  
18 any, that existed between the claimed invention and the  
19 prior art.

20           Finally, you should consider any  
21 additional considerations relating to the obviousness or  
22 non-obviousness of the invention.

23           I will now describe in detail the specific  
24 determinations you must make.

25           These instructions often refer to a person



1 of ordinary skill in the art. It is up to you to decide  
2 the level of ordinary skill in the field of the claimed  
3 inventions.

4 You should consider all the evidence  
5 introduced at trial in making this decision, including:

6 (1) the levels of education and experience  
7 of persons working in the field;

8 (2) the types of problems encountered in  
9 the field;

10 And (3) the sophistication of the  
11 technology.

12 VirnetX contends a person of ordinary  
13 skill in the art would have a master's degree in  
14 computer science or computer engineering or in a related  
15 field, as well as approximately two years of experience  
16 in computer networking and in security with respect to  
17 computer networks, including actual experience with  
18 networking protocols, as well as the security of those  
19 protocols.

20 Microsoft contends that the level of  
21 ordinary skill in the field was a person with a  
22 bachelor's degree in computer engineering or computer  
23 science or equivalent and two to three years experience  
24 with data networks.

25 Now, with regard to the scope and content

1 of the prior art, in determining whether or not the  
2 invention is valid, you must determine the scope and  
3 content of the prior art at the time the invention was  
4 made.

5           You must decide whether the specific  
6 references relied upon by Microsoft in this case are  
7 prior art to the invention described in the asserted  
8 claims of the patents-in-suit.

9           Prior art includes previous devices,  
10 articles, and methods that were publicly used or offered  
11 for sale and printed publications or patents that  
12 disclose the invention or elements of the invention.

13           Once you decide whether or not specific  
14 references are prior art, you must also decide what  
15 those references would have disclosed or taught to one  
16 having ordinary skill in the field of the technology of  
17 the patent at the time the invention was made.

18           In order for a reference to be relevant,  
19 the reference must be within the field of the inventor's  
20 endeavor, or if it is from another field of endeavor,  
21 the reference must be reasonably related to the  
22 particular problem or issue the inventor faced or  
23 addressed when making the inventions described in the  
24 asserted claims of the patents-in-suit.

25           A reference from a field of endeavor,

1 other than the inventor's, is reasonably related to the  
2 problem or issues the inventors faced if the reference  
3 is one which, because of the matter -- because of the  
4 matter with which the reference deals, logically would  
5 have commended itself to the attention of the inventors  
6 when considering the problems or issues they faced.

7           It is for you to decide what the problems  
8 or issues were that the inventors faced at the time the  
9 inventions in the asserted claims were made.

10           Now the differences over the prior art.

11           The next question you must answer in  
12 determining whether or not the invention was obvious at  
13 the time it was made is what differences there are, if  
14 any, between the prior art and the patented invention.

15           In analyzing this issue, do not focus on  
16 the differences between the prior art and the invention  
17 because the test is not whether there are differences;  
18 rather, the test is whether or not the invention, taken  
19 as a whole, would have been obvious to one having  
20 ordinary skill in view of all the prior art at the time  
21 the invention was made.

22           If you conclude that the prior art  
23 discloses all the elements of the asserted claims, but  
24 those elements are in separate items, you must then  
25 consider whether or not it would have been obvious to

1 combine those items.

2           A claim is not obvious merely because all  
3 of the elements of that claim already existed. One way  
4 to decide whether one of ordinary skill in the art would  
5 combine what is described in various items of prior art  
6 is whether there is some teaching, suggestion, or  
7 motivation in the prior art for a skilled person to make  
8 the combination covered by the patent claims.  
9 Motivation can be implicit or explicit.

10           In considering whether a claimed  
11 combination of prior art elements is obvious, you must  
12 consider whether the improvement is more than the  
13 predictable use of prior art elements according to their  
14 established functions.

15           When a patent simply arranges old elements  
16 with each performing the same function it had been known  
17 to perform and yields no more than one would expect from  
18 such an arrangement, the combination is obvious.

19           It is common sense that familiar items may  
20 have obvious uses beyond their primary purposes, and a  
21 person of ordinary skill often will be able to teach --  
22 to fit the teachings of multiple patents together like  
23 the pieces of a puzzle. Multiple references in the  
24 prior art can be combined to show that a claim is  
25 obvious.

1           Any need or problem known in the field and  
2 addressed by the patent can be -- can provide a reason  
3 for combining the elements in the manner claimed.

4           To determine whether there was an apparent  
5 reason to combine the known elements in the way a patent  
6 claims, you can look to interrelated teachings of  
7 multiple patents, to the effects of demands known to the  
8 design community or present in the marketplace, and to  
9 the background knowledge possessed by a person of  
10 ordinary skill in the art.

11           Neither the particular motivation nor the  
12 alleged purpose of the patentee controls. One of  
13 ordinary skill in the art is not confined only to prior  
14 art that attempts to solve the same problem as the  
15 patent claim.

16           Teachings, suggestions, and motivations  
17 may also be found within the knowledge of a person with  
18 ordinary skill in the art, including inferences and  
19 creative steps that a person of ordinary skill in the  
20 art would employ.

21           Additionally, teachings, suggestions, and  
22 motivations may found in the nature of the problems  
23 solved by the claimed invention. The fact that a  
24 combination was obvious to try may demonstrate that the  
25 combination itself was obvious.

1 Additional considerations.

2 The next question you must answer in  
3 determining whether or not the invention was obvious at  
4 the time it was made is what evidence there is, if any,  
5 of additional considerations relating to the obviousness  
6 or non-obviousness of the invention.

7 You may consider in your analysis any  
8 evidence about the following factors, and then it lists  
9 ten separate factors that are additional considerations  
10 there, and if there's no objection, I'll just leave  
11 those to the jury for reading.

12 To be relevant to your determination of  
13 obviousness, any of these secondary considerations must  
14 have a connection or nexus to the claimed invention set  
15 forth in the patent claims.

16 If a secondary consideration is unrelated  
17 to the claimed invention but is, instead, attributable  
18 to something else, such as innovative marketing, then  
19 you should not consider it relevant to your obviousness  
20 determination.

21 So that concludes the instructions on the  
22 first three questions to be answered in Columns 1, 2,  
23 and 3. The next question is the damage question, and  
24 I'll now give you instructions about that.

25 By instructing you on damages, however, I

1 am not suggesting which party should win this case on  
2 any issue. If you find that Microsoft infringed any  
3 valid asserted claim of the '135 and '180 patents, you  
4 must then determine the amount of money damages to be  
5 awarded to VirnetX to compensate it for the  
6 infringement.

7           VirnetX seeks patent damages in the form  
8 of a reasonable royalty. Generally, a reasonable  
9 royalty is defined by the patent laws as the reasonable  
10 amount that someone wanting to use the patented  
11 invention would expect to pay to the patent owner and  
12 the owner should expect to receive.

13           A damages award should put the patent  
14 owner in approximately the financial position it would  
15 have been in had the infringement not occurred. You may  
16 not add anything -- you may not add anything to the  
17 amount of damages to punish the infringer or to set an  
18 example.

19           VirnetX has the burden to persuade you by  
20 a preponderance of the evidence that it has suffered the  
21 damages it seeks. While VirnetX is not required to  
22 prove damages with mathematical precision, it must prove  
23 them with reasonable certainty. The patent owner is not  
24 entitled to damages that are remote or speculative.

25           Now, reasonable royalty.

1           A royalty in the amount -- a royalty is  
2 the amount of money a licensee pays to a patent owner to  
3 make, use, or sell the patented invention.

4           A reasonable royalty is the amount of  
5 money a willing patent owner and a willing prospective  
6 licensee would have agreed upon at the time of the  
7 infringement for a license to make the invention.

8           It is the royalty that would have resulted  
9 from an arm's-length negotiation between a willing  
10 licensor and a willing licensee, assuming that both  
11 parties understood the patent to be valid and infringed  
12 and that the licensee would respect the patent.

13           Unlike a real world negotiation, in the  
14 hypothetical negotiation, all parties are presumed to  
15 know that the patent is infringed and is valid.

16           In making your determination about the  
17 amount of a reasonable royalty, it is important that you  
18 focus on the time period when the infringer first  
19 infringed the patent and the facts that existed at that  
20 time.

21           Your determination does not depend on the  
22 actual willingness of the parties to this lawsuit to  
23 engage in such negotiations. Your focus should be on  
24 what the parties' expectations would have been had they  
25 entered negotiations for royalties at the time of the



1 infringing activity.

2           The infringer's actual profits may or may  
3 not bear on the reasonableness of an award based on a  
4 reasonable royalty.

5           Reasonable royalty factors.

6           In deciding what is a reasonable royalty,  
7 you may consider the factors that the patent owner and  
8 the alleged infringer would consider in setting the  
9 amount the alleged infringer should pay.

10           Listed below are a number of factors you  
11 may consider. This is not every possible factor, but it  
12 will give you an idea of the kinds of things to consider  
13 in setting a reasonable royalty.

14           You've heard various ones testified about  
15 during this trial. There are 15 of them listed there  
16 for you, and unless, there's an objection, I will just  
17 refer those to you for your reading.

18           No one of these factors is dispositive,  
19 and you can and should consider the evidence that has  
20 been presented to you in this case on each of these  
21 factors. The attorneys, in their arguments, will focus  
22 on the factors that they deem raised by the evidence and  
23 most important.

24           The framework which you should use in  
25 determining a reasonable royalty is, again, a

1 hypothetical negotiation between normally prudent  
2 business people.

3           Now, let me give you some instructions for  
4 your deliberations.

5           You must perform your duties as jurors  
6 without bias or prejudice as to any party. The law does  
7 not permit you to be controlled by sympathy, prejudice,  
8 or public opinion.

9           All parties expect that you will carefully  
10 and impartially consider all the evidence, follow the  
11 law, as it is now being given to you, and reach a just  
12 verdict, regardless of the consequences.

13           You should consider and decide this case  
14 as a dispute between persons of equal standing in the  
15 community, of equal worth, and holding the same or  
16 similar stations in life.

17           A corporation is entitled to the same fair  
18 trial as a private individual. All persons, including  
19 corporations, and other organizations stand equal before  
20 the law, regardless of size or who owns them, and are to  
21 be treated as equals.

22           When you retire to the jury room to  
23 deliberate on your verdict, you may take this charge  
24 with you, as well as the exhibits which the Court has  
25 admitted into evidence.

1           You should first select your foreperson  
2 and then begin your deliberations.

3           If you recess during your deliberations,  
4 follow all of the instructions that the Court has given  
5 you about and on your conduct during the trial.

6           After you have reached your verdict, your  
7 foreperson is to fill in on the form your answers to the  
8 four questions that have been asked of you. Do not  
9 reveal your answers until such time as you are  
10 discharged, unless otherwise directed by me.

11           You must never disclose to anyone, not  
12 even to me, your numerical division on any question.

13           Any notes that you may have taken during  
14 this trial are only aids to your memory. As I told you  
15 earlier, if your memory should differ from your notes,  
16 then you should rely on your memory, not on your notes.  
17 The notes are not evidence.

18           A juror who has not taken notes should  
19 rely on his or her independent recollection of the  
20 evidence and should not be unduly influenced by the  
21 notes of other jurors. Notes are not entitled to any  
22 greater weight than the recollection or impression of  
23 each juror about the testimony.

24           If you wish to communicate with me at any  
25 time, please give a written message or question to the

1 court security officer, who will bring it to me. I will  
2 then respond as promptly as possible either in writing  
3 or having you brought into the courtroom so that I can  
4 address you orally.

5 I will always first disclose to the  
6 attorneys your question and my response before I answer  
7 your question.

8 After you have reached a verdict, you are  
9 not required to talk with anyone about the case unless  
10 the Court orders otherwise.

11 Now, the next sentence doesn't apply yet,  
12 because it says you are to retire to the jury room to  
02:13 13 begin your deliberations. But we're not going to do  
02:15 14 that yet, because you haven't heard the closing  
02:15 15 arguments.

02:15 16 But what I am going to do is give you a  
02:15 17 15-minute break. I'm going to ask you to continue to  
02:15 18 follow my instructions. Even though you've heard the  
02:15 19 opening statements, all the evidence, the Court's  
02:15 20 charge, you still haven't heard the final closing  
02:15 21 arguments.

02:15 22 So I'm going to ask you not to discuss the  
02:15 23 case among yourselves or with anyone else, but just have  
02:15 24 a -- it's been a lengthy time of instruction for you.  
02:16 25 You've been sitting there for well over an hour, so

02:16 1 we're going to take a 15-minute break.

02:16 2           When we come back, each side has been  
02:16 3 given one hour -- is that correct?

02:16 4           MR. CAWLEY: Yes, Your Honor.

02:16 5           THE COURT: One hour for closing argument.

02:16 6           So we're going to come back at 3:30, and  
02:16 7 that's going to push us until 5:30 until the argument is  
02:16 8 over.

02:16 9           Once the arguments are over, I'm going to  
02:16 10 dismiss you to the jury room, and I'm then going to ask  
02:16 11 you to select your jury foreperson, and then you will  
02:16 12 make a decision as to whether you would like to begin  
02:16 13 deliberations tonight for however long you wish or  
02:16 14 whether you would like to go home and come back in the  
02:16 15 morning and begin deliberations.

02:16 16           So I'll remind you of those instructions  
02:16 17 at the end of the case, but I just want to tell you  
02:16 18 that, because in all probability, you're going to be  
02:16 19 here until at least 5:30 to 6:00 o'clock tonight.

02:16 20           So if you need to notify any family  
02:16 21 members or -- now, did somebody have a child issue or  
02:16 22 not on this jury? I guess that was the last case.

02:17 23           Okay. If -- if anyone has any issues with  
02:17 24 that time or need to make arrangements to let anyone  
02:17 25 know, please do so during your break.

02:17 1           Again, as I've instructed you, I've  
02:17 2 allowed you to have your cell phones for purposes of  
02:17 3 coordinating with family and that type of thing. But,  
02:17 4 again, don't discuss the case in any phone calls that  
02:17 5 you might choose to make to let people know what your  
02:17 6 schedules are going to be.

02:17 7           I will allow you during this break, if you  
02:17 8 wish, to discuss between yourselves for scheduling  
02:17 9 purposes your collective thought as to whether you think  
02:17 10 you'd like to begin deliberating tonight or whether  
02:17 11 you'd like to come back in the morning.

02:17 12           But in making that, you're not to discuss  
02:17 13 the case, the merits, one way or the other; just from a  
02:17 14 tiredness standpoint or from a scheduling standpoint.  
02:17 15 You may discuss whether y'all have reached some  
02:18 16 collective decision as to whether you'd like to work for  
02:18 17 a little while tonight.

02:18 18           Once we get through with the arguments,  
02:18 19 you're going to be in charge. You can go home, come  
02:18 20 back in the morning. You can work for an hour tonight.  
02:18 21 You can work till midnight. You can do whatever you  
02:18 22 want to do. We're going to be at your pleasure.

02:18 23           You've been at everyone else's pleasure  
02:18 24 all week, and you're going to be in the driver's seat as  
02:18 25 soon as we're through with closing arguments.

02:18 1 So with that, please follow my  
02:18 2 instructions, and you are released to the jury room  
02:18 3 until 2:35. I'm sorry. That will be 3:35.

02:18 4 COURT SECURITY OFFICER: All rise.

02:18 5 (Recess.)

02:37 6 (Jury out.)

02:37 7 COURT SECURITY OFFICER: All rise.

02:37 8 THE COURT: Please be seated.

02:38 9 All right. Now, does someone want to  
02:38 10 withdraw a JMOL?

02:38 11 MR. CAWLEY: I do, Your Honor.

02:38 12 THE COURT: Okay.

02:38 13 MR. CAWLEY: I was reminded over the break  
02:38 14 by Mr. Bobrow that we, in fact, had had some e-mail  
02:38 15 exchange on the -- that issue about claim 7 of the '135  
02:38 16 patent, and I requested that it be JMOL and they  
02:38 17 requested they withdraw it without prejudice, and it  
02:38 18 looks like we agreed to withdraw without prejudice.

02:38 19 THE COURT: Claim 7 is dismissed without  
02:38 20 prejudice.

02:38 21 MR. CAWLEY: We stand by that.

02:38 22 MR. CALDWELL: Thank you, Your Honor.

02:38 23 THE COURT: Thank you.

02:38 24 All right. Ready for the jury to be  
02:38 25 brought in?

02:38 1 MR. CAWLEY: Yes, sir. I would like to  
02:38 2 reserve 10 minutes for rebuttal.

02:38 3 THE COURT: All right. Bring the jury in,  
02:38 4 please.

02:39 5 (Jury in).

02:39 6 THE COURT: Please be seated.

02:39 7 All right, ladies of the jury, we're  
02:39 8 getting near the end now. So we're -- we've now made it  
02:39 9 all the way down to closing arguments which we're about  
02:39 10 to hear in just a moment.

02:39 11 Let me just inquire of you, did y'all have  
02:39 12 a chance to discuss whether you'd like to begin  
02:39 13 deliberations tonight or whether you would like to come  
02:39 14 back in the morning?

02:39 15 JUROR: Both.

02:39 16 THE COURT: Both. Okay. Begin tonight  
02:39 17 and work for a little while and then maybe come back in  
02:39 18 the morning is --

02:39 19 JUROR: We have one that needs to be home  
02:39 20 by 7:00.

02:39 21 THE COURT: Okay.

02:39 22 JUROR: So we thought we would work till  
02:39 23 6:30.

02:39 24 THE COURT: Okay. Very good. Very good.  
02:39 25 You're working well together already. So, very good.



02:39 1 Thank you for your attention. Please bear  
02:39 2 with us and pay attention to the attorneys' closing  
02:39 3 arguments. And I know my instructions were very lengthy  
02:39 4 and somewhat overwhelming, but I promise you the  
02:40 5 attorneys will, just as they -- both sides have done  
02:40 6 throughout this case, they will bring the issues that  
02:40 7 the case is really -- that are dispositive into focus  
02:40 8 for you, point out the instructions that are important,  
02:40 9 and you'll have a -- have a good -- good sense when you  
02:40 10 go to the jury room.

02:40 11 So with that, Mr. Cawley, the Court will  
02:40 12 recognize you for purposes of closing argument.

02:40 13 MR. CAWLEY: Thank you, Your Honor.

02:40 14 When we first met two weeks ago for the  
02:40 15 jury selection, I suggested to you that every lawsuit is  
02:41 16 a story, and as this lawsuit has been tried, it's been  
02:41 17 occurring to me that what we heard is a lot like an old  
02:41 18 story that many of you may have heard.

02:41 19 It's a story about a mustard seed. And  
02:41 20 the story is that the mustard seed is the least of all  
02:41 21 the seeds, because it's so tiny. But the story goes  
02:41 22 that if you plant that tiny seed in a garden and you  
02:41 23 wait, if you wait until its time is right and its time  
02:41 24 comes, that that tiny seed can grow into a mighty tree.  
02:41 25 And the story concludes by telling us that when that

02:41 1 happens, the birds of the air made nests in its  
02:41 2 branches.

02:42 3           The lawsuit is a story about a seed, a  
02:42 4 seed of an idea. You may remember that that seed first  
02:42 5 arose in war time for application on the battlefield.  
02:42 6 The United States was faced with a grave crisis  
02:42 7 involving scud missiles. Those were missiles that the  
02:42 8 Iraqi Army could bring out of hiding and, within 10  
02:42 9 minutes, launch off into Israel. The United States had  
02:42 10 agreed to try and stop that.

02:42 11           They hired Mr. Gif Munger and Mr. Bob  
02:42 12 Short and a handful of other men to find a solution, and  
02:42 13 the solution they came up with was called the Global  
02:42 14 Hawk.

02:42 15           You'll remember that one of the unusual  
02:42 16 things about the Global Hawk system was that it used a  
02:42 17 commercially available satellite rather than a military  
02:42 18 satellite. A satellite that anyone who wanted to rent  
02:42 19 time on could use to broadcast television or radio or  
02:43 20 anything else.

02:43 21           And this presented a real problem for the  
02:43 22 military to be able to secure the communications that  
02:43 23 went from that satellite down to the ground. Without  
02:43 24 securing them, it was possible that someone on the  
02:43 25 ground, a hacker, a member of the enemy military might

02:43 1 be able to intercept those communications and know what  
02:43 2 was about to happen.

02:43 3 Mr. Munger and Mr. Short and their team,  
02:43 4 therefore, came up with a way to secure those satellite  
02:43 5 communications so that any hackers on the ground would  
02:43 6 be locked out.

02:43 7 Now that set Mr. Munger to thinking. You  
02:43 8 heard him testify from the witness stand. This is the  
02:43 9 mid-to-late 1990s, and it began to occur to him that  
02:43 10 this was going to happen more and more frequently. That  
02:43 11 as communications around the world grew, cellular  
02:43 12 telephones, the normal telephone system, the internet,  
02:44 13 satellite communications, that it was going to become  
02:44 14 more and more common that the military would have to use  
02:44 15 publicly-available communications facilities.

02:44 16 He also began to observe that not only the  
02:44 17 military but that all of us were coming to depend on the  
02:44 18 communications through the internet, and not just to  
02:44 19 send our friends e-mail and to send out pictures of our  
02:44 20 grandchildren. But a lot of the commerce of our nation  
02:44 21 was being conducted over the internet, so Mr. Munger  
02:44 22 began to see that in terms of being part of our national  
02:44 23 security, to be able to secure communications on the  
02:44 24 internet.

02:44 25 He wrote a paper about that that he called

02:44 1 the Aladdin paper because he saw a world where you could  
02:44 2 rub a magic lamp and get all kinds of communications  
02:44 3 abilities for the military and for others. And  
02:45 4 eventually his company, SAIC, entered into a contract  
02:45 5 with the CIA, and the purpose of this contract was to  
02:45 6 help the CIA find a way to easily, but safely and  
02:45 7 securely, communicate over the internet.

02:45 8           Mr. Bob Short -- Dr. Bob Short took the  
02:45 9 stand and explained to you that in doing research for  
02:45 10 that project that was called NetEraser, he and his team  
02:45 11 bought all the available software and hardware they  
02:45 12 could find that could be used in that time, 1998 and  
02:45 13 1999, to set up a virtual private network.

02:45 14           Now everybody in the case agrees that  
02:45 15 Mr. Munger and Dr. Short didn't invent virtual private  
02:45 16 networks. Those were already available. And once they  
02:45 17 were set up, could already be used to send  
02:45 18 communications securely across the internet when they  
02:46 19 were doing this job for the CIA.

02:46 20           But what you did hear Mr. Short explain,  
02:46 21 standing right down here, at some length is how  
02:46 22 difficult it was to set up the virtual private networks  
02:46 23 that were available at that time period.

02:46 24           You saw him draw on this board on many  
02:46 25 pages of it with a red marker that showed you step after

02:46 1 step the complicated procedures that had to be followed  
02:46 2 to set up a virtual private network. And although  
02:46 3 Microsoft told you, well, there were other ways to do  
02:46 4 it, we had other projects and documents like this  
02:46 5 Defendant's Exhibit 3021, when we examined them about  
02:46 6 it, we discovered that this supposedly easy way to do it  
02:46 7 has 25 pages of instructions. Again, an example of how  
02:46 8 difficult, how unwieldy, and how impractical the setup  
02:46 9 of virtual private networks were in the late 1990s.

02:47 10 But then these men who had been working on  
02:47 11 this problem, researching it, studying it for about six  
02:47 12 months, had a breakthrough. In their breakthrough they  
02:47 13 planted the seed.

02:47 14 You'll remember, they explained to you the  
02:47 15 vision that they had was that a remote user of a  
02:47 16 computer who wanted to communicate securely could click  
02:47 17 one key on the keypad and their computer would  
02:47 18 automatically use something called a DNS request. That  
02:47 19 DNS request would go to software on the sender's end  
02:47 20 that was part of the invention which would communicate  
02:47 21 back to the remote user the information necessary to set  
02:47 22 up the secure virtual private network.

02:47 23 Again, without having to do anything but  
02:48 24 the click of that one key, that computer would then  
02:48 25 communicate with other computers on the network which in

02:48 1 turn had software that was part of the invention, and  
02:48 2 those computers would negotiate how the virtual private  
02:48 3 network would be set up. It would be just as secure as  
02:48 4 the virtual private network set up the old-fashioned,  
02:48 5 laborious way, but it could be done with one click of  
02:48 6 the key. And Dr. Short showed you that on the laptop  
02:48 7 computer that he had set up that you'll remember went  
02:48 8 out over the internet, came back into the courtroom  
02:48 9 through a completely different channel from Mr. Munger's  
02:48 10 Verizon card, communicated with Mr. Munger's computer,  
02:48 11 and Dr. Short was able to show you he could set up a  
02:48 12 virtual private network actually over the internet  
02:48 13 within five seconds by pushing one key.

02:49 14           After that seed had been planted, there  
02:49 15 was a few dried rocky years for these inventors. You  
02:49 16 heard they had a lot of difficulty getting their  
02:49 17 invention to grow and faced a lot of obstacles getting  
02:49 18 that done. But you heard that eventually the use of  
02:49 19 their invention became widespread, and that today anyone  
02:49 20 who needs to send important information confidentially  
02:49 21 and safely over the internet can shelter in the branches  
02:49 22 of the invention of Gif Munger and Bob Short.

02:49 23           Now, in this case, Judge Davis has already  
02:49 24 showed you the questions that he will ask you in writing  
02:49 25 the final chapter to this particular story. And what

02:50 1 I'd like to do over the next part of this argument is to  
02:50 2 go through those questions with you one by one.

02:50 3 Now you've already seen them, so you know  
02:50 4 that there are quite a few subparts to them that  
02:50 5 eventually you'll have to answer. But what I'd like to  
02:50 6 focus on for the next few minutes is just the four  
02:50 7 questions that he'll ask you.

02:50 8 These aren't the exact words that the  
02:50 9 judge uses but this is shorthand for the general subject  
02:50 10 that he's going to ask you in these first four  
02:50 11 questions.

02:50 12 First, does Microsoft infringe the  
02:50 13 patents? Second, is Microsoft's infringement willful?  
02:50 14 Third, are the patents invalid? And finally, how much  
02:50 15 is VirnetX entitled to as a reasonable royalty?

02:50 16 So let's start with the first of those  
02:50 17 questions. Does Microsoft infringe the patents.

02:51 18 Now, in bringing that evidence to you, we  
02:51 19 brought you Dr. Jones, Dr. Mark Jones from Virginia Tech  
02:51 20 University. You will remember that he testified on I  
02:51 21 think it was the second day of the trial and again this  
02:51 22 morning.

02:51 23 Dr. Jones, you heard, was allowed by Judge  
02:51 24 Davis to study the actual secret computer code that  
02:51 25 Microsoft uses in its products. You heard that he spent

02:51 1 hundreds of hours comparing the claims of the patents to  
02:51 2 the Microsoft products and the Microsoft computer code.

02:51 3           Now two weeks ago at the opening statement  
02:51 4 I apologized and warned you that this testimony was  
02:51 5 going to be lengthy and it was going to be detailed.  
02:51 6 Turns out it was almost three hours long, and I  
02:51 7 explained to you then and as I explain to you again and  
02:52 8 apologize to you again now, the reason we had to do that  
02:52 9 is because we want you to be convinced that Microsoft  
02:52 10 uses each of these claims of both patents just as  
02:52 11 Dr. Jones went through in detail and explained to you  
02:52 12 step by step.

02:52 13           He didn't stop with a generalized  
02:52 14 conclusion, yeah, that claim is infringed, let's go on  
02:52 15 to the next one. Everyone of these checkmarks  
02:52 16 represents Dr. Jones taking the time to go through and  
02:52 17 show you step by step, yes, Microsoft does this, this,  
02:52 18 this, and this before he reached the conclusion and  
02:52 19 explained to you why Microsoft infringes that claim of  
02:52 20 the patent.

02:52 21           But what does Microsoft have to say about  
02:52 22 it? As I suggested to you in the opening statement, I  
02:53 23 think you have heard in this case that Microsoft will  
02:53 24 make any argument to you that they think will lead you  
02:53 25 off the path of requiring them to pay fair value for



02:53 1 their use of this invention. If you don't buy the first  
02:53 2 one, they'll go on to the second one, and if the third  
02:53 3 and the fourth and fifth don't work, they have yet  
02:53 4 another argument in the hopes that eventually you'll  
02:53 5 find something that you think sticks and decide that  
02:53 6 Microsoft shouldn't have to pay fair value for their use  
02:53 7 of Dr. Short and Dr. Munger's -- or Mr. Munger's  
02:53 8 invention.

02:53 9                   So what does Microsoft say at first?  
02:53 10 Well, of course they say we don't infringe. And the  
02:53 11 first reason that they give for claiming that they don't  
02:53 12 infringe is there's no virtual private network in our  
02:54 13 products. We don't have anonymity.

02:54 14                   Well, we heard quite a bit of testimony  
02:54 15 and saw some evidence about that and here's an  
02:54 16 interesting piece of it.

02:54 17                   This is a diagram that you were shown that  
02:54 18 was prepared by Dr. Johnson. You remember that he  
02:54 19 testified late last week. He was Microsoft's expert who  
02:54 20 was going to explain to you why they don't infringe.  
02:54 21 And he the testified to you that there's no anonymity  
02:54 22 because this sender of a message, Sue, her computer puts  
02:54 23 an address on the outside of the message that goes over  
02:54 24 the internet. That message goes over the internet  
02:54 25 addressed to, in this case, this Office Communication

02:54 1 Server which has its own address, and he told you this  
02:54 2 is not anonymous because this hacker can see those  
02:54 3 addresses as it travels across the internet. That's not  
02:55 4 anonymous.

02:55 5 But then remember when Mr. Caldwell was  
02:55 6 asking him some questions on cross-examination, and what  
02:55 7 he asked him was, well, Dr. Johnson, let's look at what  
02:55 8 you left out of your drawing. This is what he left out.  
02:55 9 The reason that you can send a communication safely  
02:55 10 across the internet to the Office Communication Server  
02:55 11 is there's nobody home on the Office Communication  
02:55 12 Server. That server doesn't have a keyboard, that  
02:55 13 server doesn't have a person sitting in it. That's  
02:55 14 sitting in a building somewhere that just does its job  
02:55 15 by its lonely self without any humans even being there.

02:55 16 What it does is to route this message down  
02:55 17 to the people who are actually intended to get it. And  
02:55 18 this address, Dr. Johnson admitted, is inside this  
02:55 19 envelope and is encrypted.

02:56 20 So what he told you is that, yeah, the  
02:56 21 hacker can see the information to send this envelope to  
02:56 22 the communication server, but he left out the part that  
02:56 23 told you that the actual identity of the recipient of  
02:56 24 the message is anonymous. Exactly what Judge Davis  
02:56 25 tells us the claims of the patent require.

02:56 1 We also talked about sender anonymity.  
02:56 2 Now you may remember here we were talking about a system  
02:56 3 called PeerNet. You remember that Dr. Johnson explained  
02:56 4 that you can have a whole group of computers and someone  
02:56 5 in the group may send a message out and a hacker may be  
02:56 6 able to see that the group sent a message but the hacker  
02:56 7 can't tell who it is within the group that sent the  
02:56 8 message. Is that anonymous?

02:56 9 Here's an excerpt from Plaintiff's Exhibit  
02:57 10 2, the actual filing for the patent before the U.S.  
02:57 11 Trademark Office -- Patent & Trademark Office.

02:57 12 You remember there was testimony that this  
02:57 13 is an article about what anonymity in this context of  
02:57 14 internet communication means, and what it says is, A  
02:57 15 sender's anonymity is beyond suspicion though if the  
02:57 16 attacker can see evidence of a sent message, the sender  
02:57 17 appears no more likely to be the originator of that  
02:57 18 message than any other potential sender in the system.  
02:57 19 Exactly the situation that we talked about in  
02:57 20 Microsoft's PeerNet organization where yes, the attacker  
02:57 21 or the hacker may be able to see that somebody in the  
02:57 22 group sent a message, there's no way they can tell who  
02:57 23 it is in that group that sent the message. That is  
02:57 24 sender anonymity beyond suspicion.

02:57 25 Well, if you don't buy Microsoft's

02:58 1 argument that there's no anonymity, how about that  
02:58 2 there's no website. This invokes something that you've  
02:58 3 heard about from Judge Davis a couple of times called  
02:58 4 the Doctrine of Equivalents. And the simple meaning of  
02:58 5 that is there's two ways to show that there's  
02:58 6 infringement. One way is to show that Microsoft does  
02:58 7 exactly what's listed in the claim. The other way is to  
02:58 8 show that Microsoft does something that's substantially  
02:58 9 different, and that's just as good.

02:58 10 Here's what Judge Davis said. A claim  
02:58 11 limitation may be met in one of two ways; either  
02:58 12 literally or under the Doctrine of Equivalents.

02:58 13 A claim limitation is present in an  
02:58 14 accused product or method under the Doctrine of  
02:58 15 Equivalents if the differences between the claim  
02:58 16 limitation and a comparable element of the accused  
02:58 17 product or method are insubstantial.

02:58 18 Well, what about in this instance? This  
02:59 19 again may remind you of some of the testimony of  
02:59 20 Dr. Johnson.

02:59 21 Do you remember that when he was asking  
02:59 22 him some questions, Mr. Caldwell wrote on this board,  
02:59 23 all right, Dr. Johnson, you're talking about the  
02:59 24 differences between a website, that's what the claim  
02:59 25 says, and Office Communication Server, what Microsoft

02:59 1 does. And you're testifying to the jury that these two  
02:59 2 have nothing in common. That's what he said. And then  
02:59 3 he testified that they're completely different.

02:59 4 But then do you remember that Mr. Caldwell  
02:59 5 showed him a document from Microsoft saying they do have  
02:59 6 something in common, and then he showed him another  
02:59 7 document and another document and another document that  
02:59 8 all said the same thing until finally Dr. Johnson had to  
02:59 9 admit to you, well, this was wrong. I was wrong to say  
02:59 10 that they have nothing in common.

03:00 11 Completely different? Same story.

03:00 12 Mr. Caldwell showed him first one  
03:00 13 document, then another document, then another document  
03:00 14 to say they're basically the same until Dr. Johnson had  
03:00 15 to tell you, well, I was wrong about that too. When I  
03:00 16 testified to you that they were completely different,  
03:00 17 they really weren't.

03:00 18 Well, if you won't buy Microsoft's  
03:00 19 argument that they don't infringe because of the  
03:00 20 website, how about the gatekeeper computer? Well,  
03:00 21 really the only testimony you heard in this case has  
03:00 22 been from Dr. Jones and he testified to you that yes,  
03:00 23 the gatekeeper computer can be met by the Microsoft  
03:00 24 software, the functionality of that in the Office  
03:00 25 Communications Server product.

03:00 1                   Okay. If you don't buy that, how about  
03:00 2 secure computer network address. This again is  
03:01 3 Dr. Johnson. He showed you this picture and he said,  
03:01 4 well, see this part over here, this is out of the  
03:01 5 patent. And you see what it shows is that what the  
03:01 6 patent is talking about is to have this secure address,  
03:01 7 you have the SCOM, that's the secure communication, and  
03:01 8 the COM, that's the regular unsecured, and you see that  
03:01 9 they each have their own independent connection to the  
03:01 10 internet.

03:01 11                   Well, that's not what we do at Microsoft.  
03:01 12 At Microsoft, if you're in a group meeting using our  
03:01 13 software, you can communicate securely with other  
03:01 14 members of the group, but at the same time, over the  
03:01 15 same connection, you can communicate just out in the  
03:01 16 regular unsecured internet, so we don't -- we don't have  
03:01 17 this different connection.

03:01 18                   But then Mr. Caldwell said to him, yeah,  
03:01 19 but what about this part of the picture. What this part  
03:01 20 shows is the secured communication and the unsecured  
03:01 21 communication both communicating with the internet  
03:01 22 through the same communication channel. Exactly what  
03:02 23 Dr. Johnson told you Microsoft does.

03:02 24                   Ladies and gentlemen [sic] of the jury, I  
03:02 25 think you'll find that every argument about infringement

03:02 1 Microsoft has made to you is nothing more than an  
03:02 2 attempt to lead you off the path of requiring Microsoft  
03:02 3 to pay fair value for using this invention.

03:02 4           If after considering all of the evidence  
03:02 5 in your deliberation, if you believe in response to  
03:02 6 question 1 that VirnetX has proved by a preponderance of  
03:02 7 the evidence that Microsoft infringes, then you should  
03:02 8 answer yes as to the '135 patent and answer yes as to  
03:02 9 the '180 patent.

03:02 10           The second question that Judge Davis will  
03:02 11 ask you to consider is is Microsoft's infringement  
03:02 12 willful. The first thing that we, VirnetX, are required  
03:03 13 to show you in order for you to find that infringement  
03:03 14 willful is that Microsoft knew of the patent. Well,  
03:03 15 there's not any question about that. Here's a  
03:03 16 communication that Microsoft got in 2003 from the U.S.  
03:03 17 Patent Office specifically telling Microsoft that its  
03:03 18 patent was being rejected because of the Munger '135  
03:03 19 patent, the patent we're here, one of them, talking  
03:03 20 about.

03:03 21           And then we've seen this document several  
03:03 22 times. In May of 2006, SAIC who owned the patent at the  
03:03 23 time sent this letter to Mr. Gupta who sent it to  
03:03 24 Mr. Smith in the Microsoft legal department who sent to  
03:03 25 it Mr. Marshall Phelps who was the head patent lawyer

03:03 1 for Microsoft.

03:03 2 In this letter that you've seen a number  
03:03 3 of times, SAIC suggested we'd like to contact you to  
03:03 4 discuss the possibility of offering a license to the  
03:03 5 patent. It enclosed a copy of the patent; it named the  
03:04 6 Microsoft products that we're talking about here today.

03:04 7 Now several letters went back and forth  
03:04 8 between the parties, but the fact of the matter is that  
03:04 9 Microsoft has never agreed to pay fair value for this  
03:04 10 patent.

03:04 11 And after getting this letter, what steps  
03:04 12 have they told you about that they took to avoid  
03:04 13 infringing after they've been told you need to take a  
03:04 14 look at this?

03:04 15 Mr. Pall testified did Microsoft, after  
03:04 16 receiving this letter, take any steps to avoid  
03:04 17 infringing the '135 patent?

03:04 18 He answers: I do not know of taking any  
03:04 19 steps. I know there was follow-up to the letter, but I  
03:04 20 do not know of any steps we would take on infringing the  
03:04 21 letter.

03:04 22 And I said now you said it. And he  
03:04 23 corrects himself I -- I said it on infringing the  
03:04 24 patents.

03:04 25 Mr. Pall who was a vice-president in that



03:04 1 very business division, he doesn't know of any steps  
03:04 2 they took. And why is that? I'll suggest to you it's  
03:05 3 because of the next deposition testimony you heard, not  
03:05 4 from a man like Mr. Pall, very senior in Microsoft, but  
03:05 5 a deposition you heard from one of the little people,  
03:05 6 the man who spends his day writing software all day  
03:05 7 long. That's Mr. Ryan Kim.

03:05 8 He was deposed, a Microsoft design  
03:05 9 engineer, and he said, We were actually expressly told  
03:05 10 not to look at patents.

03:05 11 Question: Who told you not to look at  
03:05 12 patents during the development of Meeting Space?

03:05 13 Answer: It's a pretty well-known practice  
03:05 14 inside Microsoft for developers.

03:05 15 Ladies of the Jury, were you shocked when  
03:05 16 you heard that? Were you shocked that a company of the  
03:05 17 stature of Microsoft would tell its employees not to  
03:06 18 even look at the patents of others.

03:06 19 What does Microsoft have to say about its  
03:06 20 infringement being willful or not? Who have they  
03:06 21 brought to court to explain to you, well, here's the  
03:06 22 reasons why we really thought we were infringing, here's  
03:06 23 the reasons back when we got that letter in 2006, you  
03:06 24 know, we looked at this and we just decided the patent  
03:06 25 must not be valid? Nobody. Nobody has come to explain

03:06 1 to you any reason whatsoever that Microsoft can offer  
03:06 2 why it chose, after getting that letter or getting that  
03:06 3 notice from the Patent Office how it formed any kind of  
03:06 4 reasonable belief that it was not infringing a valid  
03:06 5 patent.

03:06 6           If you believe that Microsoft's  
03:06 7 infringement was willful, then when the time comes to  
03:07 8 answer the jury questions as to the '135, you should  
03:07 9 answer yes, and as to the '180, you should answer yes.

03:07 10           So that brings us to the third question  
03:07 11 Judge Davis will ask you to consider: Are the patents  
03:07 12 invalid?

03:07 13           Now here the situation is a little  
03:07 14 different because as Judge Davis has told you several  
03:07 15 times, it's Microsoft's responsibility to show you that  
03:07 16 the patent is invalid and to do so by clear and  
03:07 17 convincing evidence. Now why is that? Judge Davis has  
03:07 18 explained it to us.

03:07 19           On the very first day of the trial, he  
03:07 20 read you some instructions and here's what he said. He  
03:07 21 said that the granting of a patent by the United States  
03:07 22 Patent & Trademark Office, however, carries with it the  
03:07 23 presumption that the patent is valid.

03:07 24           However, the granting of a patent by the  
03:07 25 Patent & Trademark Office carries with it the

03:07 1 presumption that the patent is valid. This is another  
03:08 2 place in the same instruction he said that sentence.  
03:08 3 The presumption of patent validity imposes the burden on  
03:08 4 Microsoft to prove invalidity by the clear and  
03:08 5 convincing evidence standard.

03:08 6 In other words, what you've heard is that  
03:08 7 because the United States Patent Office spent more than  
03:08 8 two years examining the first patent and more than seven  
03:08 9 years studying and examining the '180 patent, there is a  
03:08 10 presumption that they did their job properly.

03:08 11 Judge Davis told you just today an issued  
03:08 12 patent is accorded a presumption of validity based on  
03:08 13 the presumption that the United States Patent &  
03:08 14 Trademark Office acted correctly in issue a patent.

03:08 15 So the question on this issue No. 3,  
03:08 16 invalidity, really is what has Microsoft done and shown  
03:08 17 you to convince you by clear and convincing evidence  
03:09 18 that Microsoft should not be required to pay fair value  
03:09 19 for their use of this invention.

03:09 20 Well, they'll tell you, of course, that  
03:09 21 the patent is invalid, and the first reason they'll give  
03:09 22 you is the Windows NT system using AutoDial, that did it  
03:09 23 first. That did it back in 1996, and indeed we'll bring  
03:09 24 you in a demonstration and show you.

03:09 25 Well, let's talk about that demonstration

03:09 1 you saw. The three computers, the three beige computers  
03:09 2 over here and the one beige computer here and under the  
03:09 3 table.

03:09 4                   The first thing we noticed on  
03:09 5 cross-examination was that sticker we've heard about  
03:09 6 that said Windows 2000 Professional on it. Now you've  
03:09 7 heard testimony that that's just a sticker on the  
03:09 8 outside of the computer. It doesn't necessarily tell  
03:09 9 you anything about the date of the software that's  
03:09 10 inside the computer, but it was the first red flag that  
03:09 11 maybe things weren't really like Microsoft was telling  
03:10 12 you they are.

03:10 13                   So the next thing I did was to ask  
03:10 14 Mr. Pall to go into the computer and to open up some  
03:10 15 critical software called the BIOS, the basic  
03:10 16 input/output system. You remember that he testified to  
03:10 17 you that without the BIOS, without that software, the  
03:10 18 computer would not work. Without that software the  
03:10 19 system that you saw demonstrated by Mr. Pall could not  
03:10 20 be built.

03:10 21                   And do you remember when I asked him to  
03:10 22 push the right buttons and pull up the right  
03:10 23 information, he had to admit to you that that software  
03:10 24 on the computer that he told you was from 1996 was dated  
03:10 25 July 2000. Six months after the patent was filed.

03:11 1 But we didn't stop there. Mr. Wicker testified about  
03:11 2 this feature in that demonstration called AutoDial and  
03:11 3 here's what he told you. He says that AutoDial only  
03:11 4 reconnects a user. Do you agree with that?

03:11 5 His answer: Reconnect -- yes. I would say it  
03:11 6 reconnects in the sense that you have to have it  
03:11 7 connected once before at some point in time.

03:11 8 Question: And its only function is to  
03:11 9 reconnect to a user, right?

03:11 10 Yes, that's correct.

03:11 11 Question: We don't know how that VPN was  
03:11 12 initiated for the first time, do we?

03:11 13 Answer: No.

03:11 14 When Mr. Pall sat here and told you that  
03:11 15 with one click he was connecting to a VPN, remember, the  
03:11 16 way Microsoft supposedly did it in 1996, what he didn't  
03:11 17 tell you was, that was a reconnection that he or  
03:12 18 Microsoft's lawyers had to do it for the first time a  
03:12 19 different way.

03:12 20 And my question, ladies of the jury is,  
03:12 21 why didn't they show you what they had to do to make  
03:12 22 that first connection? And I'll suggest to you, because  
03:12 23 it would look a lot like what Dr. Short spent about 20  
03:12 24 long minutes explaining to you how difficult it was to  
03:12 25 do it -- not in the reconnection, but the first time.

03:12 1 But there's more.

03:12 2           You'll remember that one of the claims of  
03:12 3 the '135 patent says that part of the invention is that  
03:12 4 the DNS request, the domain name service request that  
03:12 5 gets typed in and you hit the one click, that has to  
03:12 6 determine whether the user is looking for a secure site  
03:12 7 or just a regular site.

03:13 8           That determining step was something  
03:13 9 Mr. Pall was asked about. Isn't it true, don't you  
03:13 10 agree, Mr. Pall, that the system you're demonstrating is  
03:13 11 not determining whether the VPN DNS request transmitted  
03:13 12 is requesting access to a secure website?

03:13 13           And by that time he had to admit, the  
03:13 14 system is not determining that specifically, sir. The  
03:13 15 system from 1996, that supposedly means that Microsoft  
03:13 16 did it before these inventors, it didn't do what they  
03:13 17 invented. And Mr. Pall admitted it right here.

03:13 18           And finally on this subject of the  
03:13 19 Microsoft NT with AutoDial, this is how Mr. Wicker did  
03:13 20 his study to tell you about the source code, the  
03:13 21 computer code for that AutoDial and NT product.

03:14 22           You remember he told you that he studied  
03:14 23 that code and he says here that the key source code  
03:14 24 relating to Microsoft Windows NT 4 is what he studied,  
03:14 25 that's the product we're talking about from 1996, NT 4.

03:14 1 And now down here he lists one of the pieces of source  
03:14 2 code he looked at, sure enough, Windows 4. That's the  
03:14 3 NT 4 product.

03:14 4 But you remember when Mr. McLeroy asked  
03:14 5 him questions on cross-examination and he said flip  
03:14 6 about halfway through that big fat stack of computer  
03:14 7 code, and what we found was he slipped in Windows NT 5.  
03:14 8 Different software.

03:14 9 When Mr. Wicker -- Dr. Wicker testified to  
03:14 10 you that NT 4 did it all, they did the invention before  
03:14 11 Mr. Munger and Mr. Short, he didn't tell you that he  
03:14 12 mixed and matched that software and later software in  
03:14 13 order to be able to come to that conclusion.

03:15 14 Well, if you won't buy, says Microsoft,  
03:15 15 that Windows NT AutoDial makes the patents invalid, how  
03:15 16 about DVPN? Well, DVPN was a product that DARPA, this  
03:15 17 government agency, paid to have developed. It was --  
03:15 18 something was demonstrated exactly once in March of  
03:15 19 1998. But the question is what really got demonstrated?  
03:15 20 What clear and convincing evidence have you seen and  
03:15 21 heard to tell you what happened at that demonstration?

03:15 22 Well, you heard from one man who was  
03:15 23 there, Mr. Sami Saydjari. He's the man that Microsoft  
03:15 24 was paying \$475 an hour. He was asked, Do you have any  
03:15 25 recollection of whether the DVPN system used in the --

03:15 1 used the DNS request to trigger a VPN? Remember that?  
03:15 2 That's the basis of the invention you use the DNS  
03:16 3 request to trigger the VPN.

03:16 4 He said, I don't have a specific  
03:16 5 recollection, but given my recollection of the coalition  
03:16 6 manager, the CM being centrally involved, I would doubt  
03:16 7 that they would use the DNS call to trigger. He doubts  
03:16 8 that that even worked that away.

03:16 9 So what else has done -- has Microsoft  
03:16 10 done to bring you clear and convincing evidence? Well,  
03:16 11 they and VirnetX told you about one man who wrote the  
03:16 12 computer code for DVPN and who went to that  
03:16 13 demonstration and actually demonstrated it. He's the  
03:16 14 man who knows what was in it. He's the man who knows  
03:16 15 what parts of it were actually demonstrated to the  
03:16 16 public.

03:16 17 His name is Domenic Turchi. He was from  
03:16 18 Maryland we knew from some documents. So you heard that  
03:16 19 Mr. McLeroy, when he entered his name the search  
03:17 20 request, found Domenic Turchi, Jr., in Maryland, his  
03:17 21 phone number, his address. And if you click on this  
03:17 22 link right here, it'll even give you a map to his house.  
03:17 23 But Microsoft didn't bring Mr. Turchi here to testify to  
03:17 24 you.

03:17 25 Remember, it's Microsoft, with Microsoft's



03:17 1 resources, who bears the burden of trying to convince  
03:17 2 you that somebody else did this first and to convince  
03:17 3 you by clear and convincing evidence.

03:17 4 I would respectfully suggest to you that  
03:17 5 on this DVPN, the combination of Mr. Saydjari saying I  
03:17 6 don't really remember how it triggered, and Microsoft  
03:17 7 bringing no one else who can tell you what happened in  
03:17 8 that demonstration is a failure of their obligation to  
03:18 9 prove that to you.

03:18 10 Well, if you haven't bought Windows NT  
03:18 11 with AutoDial and you haven't bought DVPN, they've got  
03:18 12 more. How about Aventail. Maybe you'll believe that  
03:18 13 that should make the patents invalid.

03:18 14 Dr. Jones, though, you'll remember, just  
03:18 15 this morning testified that Aventail is a point-to-point  
03:18 16 technology. One computer to one computer, not a  
03:18 17 network-to-network technology.

03:18 18 And Mr. Pall testified, You agree,  
03:18 19 therefore, that a VPN is more than just a point-to-point  
03:18 20 connection?

03:18 21 And then here was some evidence on another  
03:18 22 issue about Aventail. Secure domain names. The patent  
03:18 23 required that there be secure domain names. Aventail  
03:18 24 doesn't use them. Didn't use the standard domain names.

03:18 25 Well, Dr. Wicker was asked about this, and

03:19 1 I have to say I believe and I'm going to suggest to you  
03:19 2 that in an effort to try and salvage his argument that  
03:19 3 Aventail renders the patents invalid, he said, well,  
03:19 4 yeah, Aventail uses standard domain names but they can  
03:19 5 overlap with secure domain names so they may be the same  
03:19 6 thing.

03:19 7 But Dr. Johnson for Microsoft was asked  
03:19 8 the same question, and he said no, they can't. They  
03:19 9 don't overlap. Microsoft's Dr. Wicker says yes,  
03:19 10 Microsoft's. Dr. Johnson says no.

03:19 11 Now, ladies of the jury, you may be asking  
03:19 12 yourself, well, how are we supposed to know? I mean --  
03:19 13 I mean, these two men are experts. A week ago some of  
03:19 14 us had never heard of domain names and standard and  
03:19 15 secure. How are we supposed to resolve one -- one says  
03:19 16 yes and one says no?

03:19 17 I will suggest to you, ladies of the jury,  
03:20 18 Judge Davis will tell you how. He's already told you  
03:20 19 there's a presumption of that the valid patent. And  
03:20 20 unless Microsoft proves different to you by clear and  
03:20 21 convincing evidence, you should find the patent is not  
03:20 22 invalid.

03:20 23 And I will finally suggest to you that  
03:20 24 this kind of contradiction between Microsoft's own  
03:20 25 experts is nothing like clear or convincing evidence.

03:20 1 If, after considering the evidence, you  
03:20 2 find that Microsoft has failed to prove to you that the  
03:20 3 patents are invalid by clear and convincing evidence,  
03:20 4 then on column 3, under Invalidity, you should answer  
03:20 5 no, the patents are not invalid as to the 135; and no,  
03:20 6 the patents are not invalid as to the 180.

03:21 7 Now that brings us to the last of the four  
03:21 8 questions that Judge Davis is going to ask you to  
03:21 9 consider. How much is VirnetX entitled to as a  
03:21 10 reasonable royalty?

03:21 11 This is the summary of the work that  
03:21 12 Mr. Reed did as he testified to you at some length about  
03:21 13 how he arrived at a total reasonable royalty of \$242  
03:21 14 million.

03:21 15 Now I'll go through this a little more in  
03:21 16 a minute to point out some specific matters to you that  
03:21 17 you might want to keep in mind. But let's talk about  
03:21 18 what Microsoft says to you: No, you -- there should be  
03:21 19 very little royalty for this invention.

03:21 20 Dr. Ugone, who you heard testify for  
03:21 21 Microsoft this morning, says IT shouldn't be anymore  
03:21 22 than \$15 million. Well, why do they say that that's so?

03:21 23 Well, first of all, they say what about  
03:21 24 all the failures. Remember the businesses that weren't  
03:22 25 interested in this invention and all the work that

03:22 1 Mr. Munger did, all those failures show this isn't worth  
03:22 2 anything.

03:22 3           You know, when I heard that, I couldn't  
03:22 4 help but remember back to an earlier time in my life,  
03:22 5 and I'll take just a minute to share it with you.

03:22 6           It was when I was in junior high. I was  
03:22 7 in the seventh grade. You remember I told you I grew up  
03:22 8 in Arlington and back then there were no big stadiums,  
03:22 9 no Six Flags, and the junior high that I went to was so  
03:22 10 small that they had one football team for the seventh  
03:22 11 and eighth graders.

03:22 12           And I'm new to junior high, so I decided  
03:22 13 to go out for the football team that year. And I was a  
03:22 14 lot smaller then than I am now and a lot skinnier, and I  
03:22 15 learned that I was just about the smallest kid who was  
03:22 16 going out for football.

03:22 17           Well, after a couple of days of that, I  
03:22 18 decided I was going to quit. So, I went home and my  
03:22 19 grandfather was there, and this was the kind of thing  
03:23 20 that I'd usually share with him. So I told him, I'm --  
03:23 21 I'm not going out for football. Football is boring.  
03:23 22 The coaches are stupid. I don't want to do it.

03:23 23           Well, as was his way, he didn't argue with  
03:23 24 me, he didn't give me any advice, he just sat there and  
03:23 25 after minute, he said to me son, a little man can beat a

03:23 1 big man if the little man's tough and keeps on comin'.  
03:23 2 Well, I took that advice to heart, and I was on the  
03:23 3 football team that year.

03:23 4 But I have to say that that reminded me of  
03:23 5 Mr. Munger and Dr. Short.

03:23 6 After they conceived of this invention,  
03:23 7 they went out and tried to raise money from venture  
03:23 8 capitalists. Mr. Munger talked on the road day after  
03:23 9 day to more than 30 investors and they all said no, but  
03:24 10 he kept on comin'.

03:24 11 Then he went off to some companies like  
03:24 12 Amazon, like J.P. Morgan, like others you've heard about  
03:24 13 in the proposal. Why don't we do this, why don't you  
03:24 14 invest money and we'll show you how to do it. They said  
03:24 15 no, we can do things ourselves. We're -- we don't --  
03:24 16 we're not interested. He kept on comin'.

03:24 17 He went to government agencies that you  
03:24 18 heard about, Homeland Security, others. Couldn't get  
03:24 19 them interested at that time. He kept on comin'. His  
03:24 20 own company decided they could no longer continue to  
03:24 21 fund the development. He got a license from the company  
03:24 22 called SafeNet, but they were required to spend a lot of  
03:24 23 money to develop the product and they decided they  
03:24 24 wouldn't do it. He kept on comin'.

03:24 25 By this time five years had gone by, and

03:25 1 Mr. Munger, pretty much by accident, discovers that  
03:25 2 Microsoft is already using his invention. And I'll  
03:25 3 suggest to you that at that point, he, Dr. Short, and  
03:25 4 others basically had two choices. One choice was they  
03:25 5 could contact Microsoft and propose a reasonable  
03:25 6 arrangement where Microsoft would pay them fair value  
03:25 7 for using the invention. Well, they did that.

03:25 8           The reason we're here today is Microsoft  
03:25 9 refused to pay fair value for the invention. The only  
03:25 10 other choice they had was to file a lawsuit against the  
03:25 11 largest software company in the world. And these two  
03:25 12 men have battled through three long years of litigation  
03:25 13 until they finally get to come to this day when they can  
03:26 14 present their case to eight jurors in Tyler, Texas.

03:26 15           Ladies and Gentlemen [sic], Microsoft may  
03:26 16 call these two men failures. I call them tough.

03:26 17           Now, what does Microsoft have to say about  
03:26 18 the value of this invention that supposedly no one  
03:26 19 wanted? Well, you saw this document.

03:26 20           Microsoft says, We believe unified  
03:26 21 communications which is -- depends on these inventions  
03:26 22 will transform business in the coming decade in the same  
03:26 23 way e-mail changed the business landscape of the 1990s.  
03:26 24 Here's a document from 2001 saying that, RTC which  
03:26 25 you've heard uses the invention, is one of the top five

03:26 1 reasons to buy Windows XP, Microsoft's new flagship  
03:26 2 operating system product.

03:26 3           In 2007, Microsoft said, For Windows  
03:27 4 peer-to-peer is a natural destiny. With market leading  
03:27 5 install base of clients, Windows can create the largest  
03:27 6 P2P systems. Over the past several years, we've been  
03:27 7 working to realize that P2P destiny. A destiny that  
03:27 8 depends on their use of these inventions.

03:27 9           In August of 2006, they said that Meeting  
03:27 10 Space -- you remember you heard that product described  
03:27 11 and you heard how it uses the invention -- is being  
03:27 12 positioned by marketing as one of the top enterprise  
03:27 13 features for Vista client.

03:27 14           Ladies of the jury, Microsoft thought this  
03:27 15 invention was very important.

03:27 16           Here's the back of the box of Windows  
03:27 17 Vista Operating System. You may remember that this was  
03:27 18 the hot new Microsoft product from about 18 months ago.  
03:27 19 On the back of the box this home edition, it lists seven  
03:27 20 reasons why you, the person looking at this box and  
03:28 21 trying to make a decision, should decide to buy this  
03:28 22 product. And one of those seven is you can collaborate  
03:28 23 and share documents with Windows Meeting Space, a  
03:28 24 feature that depends on this invention.

03:28 25           Well, the invention, I'd suggest to you,

03:28 1 hasn't been a failure at all. Microsoft has made a  
03:28 2 great success of it and has made an enormous amount of  
03:28 3 money from using it.

03:28 4 Well, what else will Microsoft tell you  
03:28 5 about why you should award only a little royalty. Well,  
03:28 6 they'll say the damages haven't been apportioned.  
03:28 7 There's lots of features in this complex software and  
03:28 8 you haven't accounted for all of those.

03:28 9 Well, here's the slide you saw from  
03:28 10 Mr. Reed setting forth in a lot of detail how he  
03:28 11 apportioned the money that Microsoft made from selling  
03:28 12 these products, 48 billion, down to 33 billion for some  
03:29 13 features in the software that he could say definitely  
03:29 14 had nothing to do with the invention, down to 30 billion  
03:29 15 from Microsoft's market size and contribution.

03:29 16 Then he arrived at the opinion that not 20  
03:29 17 percent like the SafeNet license but only 1 percent per  
03:29 18 patent would be a fair royalty.

03:29 19 But he didn't stop there. He said that  
03:29 20 because this tree of invention was still growing back in  
03:29 21 2003, it would really be fair only to start off at  
03:29 22 one-third of 1 percent growing to two-thirds of one  
03:29 23 percent per patent in 2008. What he's telling you then  
03:29 24 is he has apportioned down to what this invention is  
03:29 25 worth down to one-third of a penny per patent for the



03:29 1 money that Microsoft has made from the invention.

03:30 2 He explained to you here that if he hadn't  
03:30 3 done that, if he hadn't made that apportionment, the  
03:30 4 number he would have told you was reasonable was \$704  
03:30 5 million instead of the number he told you was  
03:30 6 reasonable, 242.

03:30 7 Well, finally Microsoft will tell you,  
03:30 8 okay, if you don't buy failure and you don't buy not a  
03:30 9 portion, how about lump sum. Maybe you'll believe that  
03:30 10 the parties would only have agreed to a lump sum. But  
03:30 11 you see, the thing about that is, what Mr. Reed  
03:30 12 explained to you is if Mr. Munger and Microsoft had set  
03:30 13 down at the table in 2003 and Microsoft had said, okay,  
03:30 14 we're not going to pay you as we go, we're just going to  
03:30 15 pay you one sum today, not just for today and not just  
03:30 16 from tomorrow, but all the way to the end of the life of  
03:30 17 this patent, that's what it would have taken to do that  
03:31 18 deal. And Mr. Reed explained to you that number would  
03:31 19 have been something like \$942 million.

03:31 20 Now, he didn't suggest to you that that's  
03:31 21 the amount you should award as a reasonable royalty. He  
03:31 22 suggests to you that because it would take so much money  
03:31 23 to compensate VirnetX and the inventors for the entire  
03:31 24 life of the patent, that Microsoft would have agreed and  
03:31 25 Mr. Munger would have agreed to a pay-as-you-go running

03:31 1 royalty deal.

03:31 2 Now, for those of you who -- who are  
03:31 3 accustomed to dealing with numbers on the page, here's  
03:31 4 how Mr. Reed arrived at the separate damages figure.  
03:31 5 First of all, on this top line, he calculated the '135  
03:31 6 damages, that's right here, for Windows XP Vista, and  
03:31 7 the '135 for Microsoft LCS/OCS. So the sum of these two  
03:32 8 numbers represents the total damages for the '135  
03:32 9 patent. That's \$158,700,000. I'll show you that number  
03:32 10 again in a second.

03:32 11 For the '108 patent, that's not implicated  
03:32 12 by these Microsoft Products, so the '180 patent is  
03:32 13 \$83,600,000.

03:32 14 Ladies of the jury, if you refuse to be  
03:32 15 led off the path of fair value by Microsoft's many  
03:32 16 arguments, and if you believe the testimony of Mr. Reed  
03:32 17 and others as to the amount that is a fair and  
03:32 18 reasonable royalty for the use of these patents, then  
03:32 19 the damages for the '135 patent would be \$158,700,000,  
03:33 20 and for the '180 patent \$83,600,000?

03:33 21 THE COURT: You have 10 minutes left, Mr.  
03:33 22 Cawley.

03:33 23 MR. CAWLEY: Thank you, Your Honor.

03:33 24 Ladies and gentlemen [sic] of the jury,  
03:33 25 Judge Davis has told me that I have 10 minutes left.

03:33 1 And the rules of these lawsuits that Judge Davis runs  
03:33 2 herd over so well allow me to save those 10 minutes so  
03:33 3 that I can come back and talk to you again just for  
03:33 4 those 10 minutes at the very end of this argument.

03:33 5 I'll tell that when I do that, I'm going  
03:33 6 to want to go back through these four questions that  
03:33 7 Judge Davis is going to ask you so that we can review  
03:33 8 one last time the evidence that you may find is  
03:33 9 important in making your decision. Thank you.

03:34 10 THE COURT: All right. Counsel for  
03:34 11 Microsoft.

03:34 12 MR. POWERS: Thank you, Your Honor.

03:34 13 MR. SAYLES: May I move these and give  
03:34 14 some room to Mr. Powers?

03:34 15 THE COURT: Yes, you may.

03:34 16 MR. POWERS: May I proceed, Your Honor?

03:34 17 THE COURT: Yes, you may.

03:34 18 MR. POWERS: Good afternoon.

03:34 19 This is a lawsuit that never should have  
03:34 20 been brought. The reason is the facts don't support it.  
03:34 21 Judge Davis told you at the very beginning of the case  
03:34 22 and he also told you again now that what should guide  
03:34 23 your decision in the case are the facts, the facts that  
03:34 24 are relevant to the issues he's asked you to decide, not  
03:34 25 emotion, not prejudice, not anything like that, but the

03:35 1 facts relevant to the issues he's asked you to decide.  
03:35 2 And those facts suggest this lawsuit should never have  
03:35 3 been brought.

03:35 4           As I sat listening to the witnesses  
03:35 5 testify, it occurred to me that there were three things  
03:35 6 that were happening, and those three things I wanted to  
03:35 7 summarize for you because they were helpful to me in  
03:35 8 organizing my thoughts about the case.

03:35 9           The first is that this case, unlike many  
03:35 10 others, is really about the difference between people's  
03:35 11 hopes and the reality. There's no doubt that Mr. Munger  
03:35 12 and Dr. Short hoped that they had solved the problem of  
03:35 13 the internet.

03:35 14           That's what they testified they thought  
03:35 15 they did. The reality is quite different. They're  
03:35 16 asking you to pay them as if they had solved that  
03:35 17 problem.

03:35 18           A second thought that occurred to me when  
03:35 19 I was listening to particularly the cross-examination of  
03:36 20 Microsoft witnesses was the difference between words and  
03:36 21 facts. And I'm going to show you some examples of that  
03:36 22 as well.

03:36 23           There's a lot of words that have been  
03:36 24 thrown around this courtroom, but the facts that are  
03:36 25 relevant to your decision I'm going to summarize in a

03:36 1 way that we think is relevant and ask you to decide  
03:36 2 based on those.

03:36 3           And last but not least is the question of  
03:36 4 distractions versus the real issues. You'll recall that  
03:36 5 Mr. Cawley, at the very beginning of his opening  
03:36 6 statement, put a picture of a sign post up with the  
03:36 7 distractions. I'm going to come back to and put it up  
03:36 8 on the screen and see how distracting they were.

03:36 9           Now let's talk about hope versus reality.  
03:36 10 This is from the opening statement by counsel for  
03:36 11 VirnetX, and he said they solved the problem of secure  
03:36 12 communications over the internet.

03:36 13           That was the hope. They thought they  
03:36 14 might have done that, but they didn't. How do we know  
03:36 15 they didn't? Because that is a real problem. It always  
03:36 16 has been and always will be.

03:37 17           And if you truly, truly solve that problem  
03:37 18 once and for all better than everybody else that did,  
03:37 19 that would be worth money. But we know that, in fact,  
03:37 20 everybody who looked at their technology said this  
03:37 21 doesn't do that. That may be your hope, but it's not  
03:37 22 the reality.

03:37 23           The CIA, who looked at their own  
03:37 24 invention, got the source code and said: Nope, we're  
03:37 25 not funding it anymore. Why? Because the product has

03:37 1 not lived up to expectations. That was the CIA's or  
03:37 2 In-Q-Tel's own analysis after looking at the source  
03:37 3 code.

03:37 4 High hopes before they looked at the  
03:37 5 product; rejection afterwards. And they actually use  
03:37 6 some pretty harsh words. The President -- the CEO of  
03:37 7 that group called it: The living dead category. And  
03:37 8 for that living dead, the product not living up to its  
03:37 9 expectations, they want \$242. The CIA wouldn't even  
03:37 10 give them two.

03:38 11 Their own company, SAIC, they knew exactly  
03:38 12 what this was worth. They say: We're not going to  
03:38 13 pull -- we're going to pull the plug. We're not going  
03:38 14 to fund you at all.

03:38 15 If it were really worth \$242 million,  
03:38 16 don't you think they would have invested the seven that  
03:38 17 Mr. Munger asked for? They knew what it was worth.  
03:38 18 They pulled the plug.

03:38 19 Venture capitalists, they were in the  
03:38 20 business of making money funding people who have great  
03:38 21 ideas. They talked to 32 of them. All 32 said no.

03:38 22 They talked to the CIA, the FBI, Homeland  
03:38 23 Security, each of which had a free license to these  
03:38 24 patents, free, and they still said no.

03:38 25 They talked to companies who are

03:38 1 interested in internet security, desperately interested  
03:38 2 in it. If this product with their technology really had  
03:39 3 any value, somebody, somebody would have funded it.  
03:39 4 Somebody would have bought it. It didn't. That's the  
03:39 5 reality.

03:39 6 The hope was they had done something  
03:39 7 great. The reality was very, very different.

03:39 8 SafeNet was the very last possibility.  
03:39 9 Remember that? They had gone through 2001 and SafeNet  
03:39 10 finally says: Well, we'll take a license, but we want  
03:39 11 to look at the source code first and really see if this  
03:39 12 is worth it.

03:39 13 When they got the source code and looked  
03:39 14 at it, they said: Well, it doesn't really accomplish  
03:39 15 any simplicity. It just moves that complexity around.  
03:39 16 SafeNet terminates the license, pays nothing. The  
03:39 17 reality is what they're asking you to give them \$242  
03:39 18 million for.

03:39 19 Everybody who has looked at their  
03:39 20 technology closely, who had the technical expertise to  
03:39 21 evaluate it, who had the economic motivation to invest  
03:39 22 in it or buy it because it would be worth a lot of money  
03:39 23 if it really worked, all of those people said no.  
03:40 24 That's the reality.

03:40 25 Now, what excuses have we heard for that?

03:40 1 Well, the first was: Well, September 11th changed  
03:40 2 everything. Nobody was going to invest in this type of  
03:40 3 technology anymore.

03:40 4 Well, it turns out it was the opposite.  
03:40 5 In fact, in a memo that Dr. Short had talked about, he  
03:40 6 admitted that, in fact, September 11th increased the  
03:40 7 demand. As an article they were circulating around  
03:40 8 internally said: They're jamming the pedal to the metal  
03:40 9 on spending for information security. It didn't slow it  
03:40 10 down; it sped it up.

03:40 11 So that excuse didn't work. What was the  
03:40 12 next excuse? Well, we're in a recession. Remember you  
03:40 13 heard that from both Mr. Short and Mr. Munger. But that  
03:40 14 recession didn't stop Aventail from getting funded.  
03:40 15 They were funded in October of 2001, not only after  
03:40 16 9/11, but right in the middle of the very recession  
03:40 17 these guys were talking about.

03:40 18 And they were not just funded by anybody.  
03:41 19 They got \$7 million from Mr. Munger and Dr. Short's  
03:41 20 employer, SAIC.

03:41 21 So the best analysis of reality that you  
03:41 22 can have is SAIC knew the facts back in 2001. They knew  
03:41 23 which technology was valuable. They knew which  
03:41 24 technology was first.

03:41 25 Mr. Munger asked \$7 million. SAIC said



03:41 1 no, even though it was their own project that they had  
03:41 2 already invested something in. They took that 7 million  
03:41 3 and gave to it Aventail, which was first and worked.

03:41 4           So it wasn't the recession. It wasn't  
03:41 5 9/11. So what's the next excuse? Well, the next  
03:41 6 question that's been given is: Well, we can't compete  
03:41 7 if Microsoft is out there. You heard that from almost  
03:41 8 everybody.

03:41 9           Well, the problem with that is timing. As  
03:41 10 Ronald Reagan once said, facts is stubborn things, and  
03:41 11 the timing just doesn't work. They ran out of money in  
03:42 12 October of 2001. The products they're complaining about  
03:42 13 competing with them didn't happen until 2003, two years  
03:42 14 later. Facts are stubborn things.

03:42 15           Now, we're not saying, as Counsel  
03:42 16 suggested, that these men are failures. No. They  
03:42 17 succeeded with Global Hawk. They succeeded with many  
03:42 18 things in their lives. We're saying this technology  
03:42 19 failed.

03:42 20           And that's okay. As I said in opening  
03:42 21 statement, there's no shame in having a project that you  
03:42 22 worked on fail. It happens to companies all over the  
03:42 23 place. It happens at Microsoft. We've had some  
03:42 24 clunkers over the years as well.

03:42 25           But what you're supposed to do then, as I

03:42 1 said in opening statement, is pick yourself back up and  
03:42 2 go make something people want. Go make something that  
03:42 3 works. That's what Mr. Pall did.

03:42 4 Mr. Munger and Dr. Short, instead of being  
03:42 5 in this courtroom, should be back working on something  
03:42 6 that works that people want. Then they'll get paid.  
03:43 7 Then they'll get money, because that's the way the  
03:43 8 system is supposed to work.

03:43 9 Words versus facts. Well, you saw them  
03:43 10 point to this word anonymous, and say, well, obviously,  
03:43 11 it's anonymous. No, no. That's not a fact; that's a  
03:43 12 word.

03:43 13 The fact, according to their own expert,  
03:43 14 is that that hacker, using our products, would know  
03:43 15 which computer is talking to which other computer. Not  
03:43 16 anonymous at all. Words versus facts.

03:43 17 Another word, they say: Well, Microsoft  
03:43 18 changed its website from serverless DNS. Is serverless  
03:43 19 DNS a requirement of the claims? No. Secure domain  
03:43 20 name service is a requirement. And we're not arguing  
03:43 21 about that. That's just words. Not a fact that's  
03:43 22 relevant.

03:43 23 Rejected. You heard Mr. Cawley talk about  
03:43 24 this: That Microsoft's patent was rejected based on  
03:44 25 Mr. Munger's patent in the Patent Office. Well, it

03:44 1 turns out later it was actually allowed. The Patent  
03:44 2 Office gave Microsoft the very patent that they were  
03:44 3 talking about.

03:44 4 The next thing I want to talk is  
03:44 5 distractions versus real issues. And this is actually a  
03:44 6 very central theme of this case. Mr. Cawley set this  
03:44 7 theme in his very initial opening statement. And he  
03:44 8 showed you this slide, and he said: These are  
03:44 9 Microsoft's distractions.

03:44 10 Well, no infringement, that's the very  
03:44 11 first question you're being asked to decide on the  
03:44 12 verdict form. That's a distraction? That's what they  
03:44 13 have to prove.

03:44 14 Not willful. That's the second on your  
03:44 15 verdict form. That's what they have to prove.

03:44 16 Third supposed distraction invalidity?  
03:44 17 Well, that's exactly the next issue on your verdict  
03:44 18 form. That's not a distraction. Those issues that he  
03:44 19 accused us of raising are the issues that they have to  
03:44 20 prove and that you have to decide. Those aren't  
03:44 21 distractions.

03:44 22 Fourth issue, that the patents aren't  
03:45 23 valuable. That goes directly to the fourth question,  
03:45 24 damages. How much is it worth?

03:45 25 So these supposed distractions for

03:45 1 Microsoft are exactly the four issues you have to  
03:45 2 decide. But there are distractions in this case, and I  
03:45 3 want to talk about a few of them.

03:45 4           The first is exactly the one that  
03:45 5 Mr. Cawley just referenced in his closing argument.  
03:45 6 Remember, Dr. Short, who got up in front of you and  
03:45 7 marked up all over the board, he was saying that he went  
03:45 8 out and investigated the ways that you could do remote  
03:45 9 access.

03:45 10           Remember our remote user? And he used  
03:45 11 this slide over here. Let's talk about it. He said: I  
03:45 12 looked at how people used remote users to contact and I  
03:45 13 found out that they're very complicated. And then he  
03:45 14 spent, as Mr. Cawley said, 20 more minutes marking up  
03:45 15 all of that.

03:45 16           Now, you would expect that if he spent  
03:45 17 that time, that he was talking about a product that was  
03:45 18 designed for exactly this situation, for a remote user.

03:45 19           This is his markup that he did  
03:46 20 extensively. It turns out, when you look at the product  
03:46 21 that he was marking up, it says that it's not supported  
03:46 22 for client remote access, VPN. That's not what it's  
03:46 23 for.

03:46 24           So he was criticizing a product for not  
03:46 25 being good for a purpose for which it was not designed,

03:46 1 and he knew it.

03:46 2 Now, there's another product that is  
03:46 3 designed for remote access that he could have looked at  
03:46 4 but didn't, and that was exactly the product that  
03:46 5 Mr. Pall described and demonstrated to you, which was  
03:46 6 PPTP.

03:46 7 It had come out four years earlier, and  
03:46 8 it's specifically designed for remote access and remote  
03:46 9 users. Did he mark up the user's manual for PPTP in  
03:46 10 front of you? No. He chose something called IP SEC  
03:46 11 that wasn't designed for it at all. That is a  
03:46 12 distraction.

03:46 13 The fact is, we weren't arguing that IP  
03:46 14 SEC was a relevant piece of prior art here. We weren't  
03:47 15 arguing that that's what you should consider, the old IP  
03:47 16 SEC. We were saying look at PPTP.

03:47 17 He didn't choose to mark that up. Why?  
03:47 18 Well, because it's easy. PPTP is easy of use -- easy to  
03:47 19 use, the easiest way to do it. He demonstrated with one  
03:47 20 click. That's why he didn't demonstrate that or  
03:47 21 criticize it, because he couldn't. That's why what he  
03:47 22 did do was an attempt to distract from the facts that  
03:47 23 are relevant to your decision.

03:47 24 Now, you've heard Mr. Cawley say: Well,  
03:47 25 PPTP has a user's manual that's 25 pages long. So is

03:47 1 theirs. That's the difference that Mr. Pall pointed out  
03:47 2 between the mechanic and the driver.

03:47 3           The mechanic has to look at a thick user's  
03:47 4 manual for any of this product. The issue is, how easy  
03:47 5 it is for the driver. Mr. Pall showed that with one  
03:47 6 click, 1996, four years before their invention.

03:47 7           The VPN connection can be set up and  
03:48 8 activated from one easy AutoDial phone book entry.  
03:48 9 Click on that entry, and you're done. They didn't  
03:48 10 criticize that. They didn't demonstrate that.

03:48 11           Other distractions that you've heard a lot  
03:48 12 about from the VirnetX side of this case, scud missiles,  
03:48 13 Global Hawk, FBI antiterrorism.

03:48 14           We applaud whatever work they've done in  
03:48 15 this area. They're not relevant to this case. They  
03:48 16 didn't invent anything relevant to this case with all of  
03:48 17 that. Yet they've spent a lot of their precious, scarce  
03:48 18 time talking about all of that.

03:48 19           The Windows 2000 sticker. Mr. Cawley  
03:48 20 still talked about it in closing argument. Remember he  
03:48 21 made Mr. Pall get down on his hands and knees. He made  
03:48 22 Ms. Weiswasser move out so that we could all huddle  
03:48 23 around and look at this 2000 sticker.

03:48 24           And then you heard their expert, their  
03:48 25 technical expert, Dr. Jones, say, well, that sticker

03:48 1 didn't mean anything. Why? Because you can look right  
03:48 2 on the monitor and see that the actual software running  
03:48 3 was 1996. That sticker was an older stick in an old  
03:49 4 box.

03:49 5 Dr. Jones admitted that in front of you  
03:49 6 today. And he knew it, and their lawyer knew it, but  
03:49 7 they chose to make everybody go down on the ground and  
03:49 8 look at a sticker that meant nothing. That's a  
03:49 9 distraction.

03:49 10 The facts are it was 1996 software. He  
03:49 11 talked about BIOS. Dr. Wicker explained how that  
03:49 12 doesn't affect 1996 software at all. The software was  
03:49 13 1996. Dr. Wicker said it. Dr. Jones said it. The  
03:49 14 lawyers' arguments don't change those facts.

03:49 15 The next distraction was consulting rates.  
03:49 16 Mr. Saydjari. Their suggestion, I guess, is that he's  
03:49 17 the only person who should be here for free, even though  
03:49 18 he doesn't have a dog in this fight.

03:49 19 Mr. Munger is getting paid. Dr. Short is  
03:49 20 getting paid. The lawyers are getting paid, and the  
03:49 21 other experts are getting paid. Saydjari should come  
03:49 22 here from Wisconsin for free, even though it takes him  
03:49 23 away from his business? That's a distraction.

03:49 24 What is the evidence? Well, the evidence  
03:50 25 is, he was there at the demonstration, and it was wildly

03:50 1 successful.

03:50 2 Now, the next distraction, Domenic Turchi.  
03:50 3 Saw it again in closing arguments. Why didn't Microsoft  
03:50 4 call him? Why didn't -- why didn't they call him? We  
03:50 5 called three people to testify about this product, VPN:  
03:50 6 Mr. Saydjari, Mr. Sterne, and Mr. Kindred.

03:50 7 Mr. Sterne led that project; Mr. Kindred  
03:50 8 led that project after Mr. Turchi; and Mr. Saydjari was  
03:50 9 the one who was funding that project. They are the  
03:50 10 right people. If they wanted Mr. Turchi here, they  
03:50 11 could have brought him here.

03:50 12 Now, those are the distractions. There's  
03:50 13 a real question, though, about missing witnesses.

03:50 14 Where is Kendall Larsen? Kendall Larsen  
03:50 15 is the CEO, founder, President, Chairman of the Board,  
03:50 16 largest single stockholder of VirnetX. He's the man who  
03:51 17 stands to gain the most from this, and he didn't even  
03:51 18 bother to show up.

03:51 19 Now, there's a reason for that, because  
03:51 20 his testimony tells you the reason for that. You  
03:51 21 remember all this testimony about the letter that was  
03:51 22 sent from SAIC in May of 2006. VirnetX counsel showed  
03:51 23 it to you again in closing argument.

03:51 24 It asserted that this RFC 3263 is the  
03:51 25 reason Microsoft infringes. Well, Mr. Larsen said:



03:51 1 Yeah. That was a mistake. They didn't want Mr. Larsen  
03:51 2 here to talk -- to have to answer to that.

03:51 3           You know, another very important about  
03:51 4 Mr. Larsen is that you'll remember in 2006, he asked  
03:51 5 that company called Magenic, Magenic, M-A-G-E-N-I-C, to  
03:51 6 take the two specific products that are accused here of  
03:51 7 infringing, Office Communicator and Live Communications  
03:51 8 Server, and he said: Please add to them and make them  
03:51 9 work using our patents. Add our patented technologies  
03:51 10 to those products.

03:51 11           And he had raised a little bit of money by  
03:52 12 that point, and he spent it all trying to do that. But  
03:52 13 here VirnetX says those products already infringe. Why  
03:52 14 in the world would VirnetX have spent the only money it  
03:52 15 had raised trying to make those products work, according  
03:52 16 to their patents, if they already did?

03:52 17           Mr. Larsen could have answered that.  
03:52 18 Mr. Munger first disagreed with me, said: Well, I don't  
03:52 19 think he was trying to modify those products to add  
03:52 20 VirnetX's patented technology. He disagreed. And then  
03:52 21 he said: Well, that's a real surprise once I showed him  
03:52 22 the documentation.

03:52 23           I guess Mr. Kendall Larsen would have to  
03:52 24 answer that because he was there, and I wasn't. So what  
03:52 25 did Mr. Larsen say?

1                   QUESTION: The objectives were to modify  
2 Microsoft's products to utilize patents -- VirnetX's  
3 patented technology in those products.

4                   ANSWER: Correct.

5                   Yet those are the very same products that  
6 VirnetX is standing in front of you here and saying  
03:52 7 already use them.

03:53 8                   Now, why in the world would Mr. Larsen  
03:53 9 spend the only money he had raised trying to convert  
03:53 10 Microsoft's products into one that used the patents if  
03:53 11 they already do. Well, Mr. Larsen chose not to come  
03:53 12 here to have to answer that.

03:53 13                   But it goes beyond that. You'll recall  
03:53 14 that he submitted a sworn affidavit about when these  
03:53 15 patents were invented, September 23rd, 1999. I showed  
03:53 16 that to Mr. Munger. He said: Oops, that sworn  
03:53 17 statement is not true. It was false.

03:53 18                   They chose not to bring him here for that  
03:53 19 reason, too.

03:53 20                   The second person that's not here that  
03:53 21 should be, particularly when you're asking for \$272 is  
03:53 22 Dr. Victor Larson. And he's not here for a reason.  
03:53 23 He's one of the co-inventors, so they certainly could  
03:53 24 have brought him. And why didn't they bring him?

03:53 25                   Well, he said the patents provide -- don't

03:53 1 provide any amount of protection. It's real hard to see  
03:53 2 from here, but don't provide any amount of protection  
03:54 3 for something which is SIP secure. But that's exactly  
03:54 4 what they're accusing here.

03:54 5           So Victor Larson, one of the inventors, he  
03:54 6 knew there was no infringement. He knew it, and that's  
03:54 7 why they didn't bring him to testify to you.

03:54 8           Mr. Munger says the products they say  
03:54 9 infringe here use SIP plus TLS. Mr. Munger agrees.  
03:54 10 That's what they're here in front of you saying  
03:54 11 infringes.

03:54 12           So what does Dr. Larson say? This was in  
03:54 13 the deposition testimony that we played today. He had a  
03:54 14 strong feeling that the patent provided no protection  
03:54 15 against secure SIP using TLS. And he hadn't changed his  
03:54 16 mind even after studying the patent and all of that  
03:54 17 information.

03:54 18           That's why those two key people aren't  
03:54 19 here. Both of them knew there was no infringement, and  
03:54 20 they said it, and their actions confirmed it. So they  
03:54 21 bring other people here to ask for \$242 million.

03:55 22           So what excuse did they give? Dr. Short  
03:55 23 says: Well, we have pretty limited time. Well, they  
03:55 24 could have spent a little less time talking about Global  
03:55 25 Hawk and scud missiles just to bring the two key people

03:55 1 who could have answered the questions that this Court  
03:55 2 has asked you to answer, particularly when they're  
03:55 3 asking for \$242 million.

03:55 4           Why didn't VirnetX call any SAIC  
03:55 5 witnesses? The letter they keep relying upon is from  
03:55 6 Pamela Bumann from SAIC. And they say: Well, she says  
03:55 7 she never even got that September 2006 letter from us.

03:55 8           Hmmm, maybe that's why. Because  
03:55 9 Mr. Larsen said, yeah, he got it, and it wasn't even  
03:55 10 addressed to him. So where did he get it from, if not  
03:55 11 her?

03:55 12           So probably that's why they didn't bring  
03:55 13 her, but she's the one who sent the letter who could  
03:55 14 have testified about why she didn't send Microsoft the  
03:55 15 information it asked for when it said: Put up. Show us  
03:55 16 the reason we really infringe, according to you. They  
03:55 17 didn't.

03:56 18           And why there was no meeting when  
03:56 19 Microsoft said, yes, let's have a meeting; why, instead  
03:56 20 of having a meeting, why, instead of giving us the  
03:56 21 information we asked for, why all they did was transfer  
03:56 22 the patent to VirnetX so they could sue us. That tells  
03:56 23 you what kind of case this is, what the case is about.  
03:56 24 Not distractions.

03:56 25           First, do we use the VirnetX's patents?

03:56 1 That's infringement.

03:56 2 Second, was VirnetX first? That's  
03:56 3 anticipation.

03:56 4 Third, are those claimed inventions  
03:56 5 obvious?

03:56 6 Let's talk about infringement first.  
03:56 7 Judge Davis' construction says, if they're missing only  
03:56 8 one of those limitations of the claims, there's no  
03:56 9 infringement.

03:56 10 On the '135 patent, they're missing two:  
03:56 11 The VPN and the website. Those aren't distractions.  
03:56 12 Those are things they have to prove. Those aren't  
03:56 13 distractions off the path. That's part of the  
03:56 14 requirements for their claim that Judge Davis has laid  
03:57 15 out in the instructions.

03:57 16 So let's talk about VPN first. The issue  
03:57 17 is anonymity, of course. You've heard a lot about that.  
03:57 18 Judge Davis' construction. Dr. Jones admitted that the  
03:57 19 order requires anonymity, so the question is, does it  
03:57 20 provide anonymity?

03:57 21 The patent tells you what that means. You  
03:57 22 want to prevent an eavesdropper from discovering that  
03:57 23 Terminal 100 -- that's a computer -- is talking to  
03:57 24 Terminal 110, another computer.

03:57 25 So let's look at the accused product and

03:57 1 see if that's true. Can an eavesdropper determine that  
03:57 2 one computer is talking to a second computer?

03:57 3 Dr. Jones says that's exactly what that  
03:57 4 means. Anonymity says you can't determine the identity  
03:57 5 of the computers that are talking with each other. They  
03:57 6 agree.

03:57 7 Now, this is what they're accusing. Now,  
03:57 8 Office Communicator talking to OCS, those two computers  
03:57 9 have one address that defines them and one only. That's  
03:57 10 like their name. And that address is visible plainly  
03:58 11 over the internet. There's nothing hidden as to that  
03:58 12 address. That address identifies those computers, and  
03:58 13 it can be seen.

03:58 14 And Dr. Jones admitted that. He admitted  
03:58 15 that by his own Wireshark data. This is his slide that  
03:58 16 he showed you. That address from that sender is  
03:58 17 visible. That address from that recipient is visible.

03:58 18 And he admits that our eavesdropper would  
03:58 19 know that this computer is in communication with that  
03:58 20 computer. That's about Office Communicator. He admits  
03:58 21 that that is true. But that is exactly what the patents  
03:58 22 say can't be true for infringement.

03:58 23 In the '135, anonymity is preventing an  
03:58 24 eavesdropper from knowing that one computer is in  
03:58 25 communication with another. But that's exactly what he

03:58 1 admitted is true in our case. Their own expert, who  
03:58 2 they brought to try to prove infringement, admitted no  
03:58 3 anonymity.

03:58 4                   And on the question of whether it's a VPN,  
03:59 5 we showed you lots of marketing material that said one  
03:59 6 of the benefits of Office Communicator is you don't need  
03:59 7 a VPN. We said over and over again that it doesn't  
03:59 8 require a VPN. That's why it's -- one of the reasons  
03:59 9 it's better.

03:59 10                   Remember, Dr. Jones said: Well, I think  
03:59 11 that might be saying you don't need another VPN. And  
03:59 12 then he admitted that's not what any of the facts said,  
03:59 13 and even more so, Office Communicator is beneficial when  
03:59 14 VPN connections are not possible.

03:59 15                   So not only is it not a VPN, as required  
03:59 16 for the claims; the advantage of it is you can use when  
03:59 17 VPNs aren't even possible.

03:59 18                   So what does VirnetX have to say? They  
03:59 19 have a lot of arguments here.

03:59 20                   The first one is: Well, there's always an  
03:59 21 IP address. You can't hide that. That's from  
03:59 22 Dr. Jones.

03:59 23                   And then on cross-examination, he  
03:59 24 admitted: Well, there are different ways you can hide  
03:59 25 that IP address. It's just that Microsoft doesn't do

03:59 1 it. There are ways you can hide the IP address so that  
04:00 2 you don't know which computer is talking to which other  
04:00 3 computer.

04:00 4           And the first one was from the book he  
04:00 5 used with his own class at the University of Tennessee.  
04:00 6 It says: The identify of the original source and  
04:00 7 destination are hidden in a VPN, and only addresses of  
04:00 8 the outer routers are visible.

04:00 9           So that's one way of hiding those actual  
04:00 10 true addresses of the sender and receiver. You use  
04:00 11 what's called -- what they're calling a tunnel.

04:00 12           Dr. Short's own demonstration showed you  
04:00 13 that, too. This is, remember, the slide he used to show  
04:00 14 what he called a typical VPN, and here you have what he  
04:00 15 called a private source address and a private  
04:00 16 destination and a message: Cut our prices today.

04:00 17           And what happened is that private or true  
04:00 18 address got put into an encrypted wrapper right there,  
04:00 19 and only an outer address was visible. Not the true  
04:00 20 private address. That was over here in the encrypted  
04:00 21 packet.

04:01 22           So what any hacker could see was not  
04:01 23 what's in this yellow box but the fake address is on the  
04:01 24 outside, just like the book that Dr. Jones used at his  
04:01 25 class at the University of Tennessee. Exactly the same



04:01 1 approach.

04:01 2           The true IP addresses were scrambled.

04:01 3 That's one way you could have hidden it. Also,

04:01 4 Microsoft doesn't do that.

04:01 5           The patent tells you another way you can  
04:01 6 hide it. He says you can -- the true destination  
04:01 7 address is concealed, and he describes that in Column 3.  
04:01 8 But we don't do that either. It's not concealed. It's  
04:01 9 plainly visible.

04:01 10           Now, they also talk about those degrees of  
04:01 11 anonymity. Remember that cross-examination?

04:01 12           And the patent doesn't talk about degrees  
04:01 13 of anonymity. It says: Can you tell whether computer  
04:01 14 one is talking to computer two, and if the answer is  
04:01 15 yes, there's no anonymity.

04:01 16           And Dr. Jones was forced to admit to that.  
04:01 17 Anonymity means you can't determine the identity of the  
04:01 18 computers that are talking to each other.

04:01 19           He also agreed that the CIA wouldn't be  
04:02 20 too happy with something like our product, which has the  
04:02 21 IP addresses visible, which is just common sense. And  
04:02 22 you've heard over and over again how they're trying to  
04:02 23 make this something that would be anonymous to the CIA  
04:02 24 and their agents sitting in remote places around the  
04:02 25 world.

04:02 1           Our products are being used by people in  
04:02 2 coffee shops. It's not for the CIA. That's the reason  
04:02 3 it's not anonymous in the same way their patents are  
04:02 4 talking about. Their patents were designed for a  
04:02 5 totally different purpose than the Microsoft products  
04:02 6 are being used for that are being accused.

04:02 7           But even more than that, Dr. Jones  
04:02 8 admitted the reason why the CIA wouldn't be happy. From  
04:02 9 an IP address, which is plainly visible in our product,  
04:02 10 you can learn the information about where that machine  
04:02 11 is and what's going on. It's not anonymous at all. He  
04:02 12 conceded that.

04:02 13           The next argument was SIP addresses, that  
04:02 14 the SIP addresses are concealed. And he's right.  
04:02 15 That's true. But those SIP addresses correspond to  
04:02 16 people, not machines. And he agreed that you had to be  
04:03 17 anonymous as to the machines.

04:03 18           And, in fact, that's what the patent says.  
04:03 19 Column 1, the very first column of the patent where it's  
04:03 20 talking about anonymity, it doesn't say you want to  
04:03 21 prevent the person from being identified, although you  
04:03 22 probably want that, too. It's the machine. And the SIP  
04:03 23 address has nothing to do with that.

04:03 24           Under their theory, you could conceal my  
04:03 25 name but put my address out on the internet, and that

04:03 1 would be anonymous. Doesn't sound very anonymous to me.  
04:03 2 They can find me. And they can do that with an IP  
04:03 3 address, too, which is exactly what Dr. Jones admitted.

04:03 4 So on VPN, there's no VPN. That's a  
04:03 5 requirement for all claims. No infringement of any  
04:03 6 claim if VPN is not there, and it's not.

04:03 7 The second issue on '135 is the website.  
04:03 8 Here it's admitted that there's no website. So now  
04:03 9 we're just talking about whether this OC server is  
04:03 10 equivalent to a website.

04:03 11 Now, this testimony was absolutely  
04:03 12 un rebutted from Dr. Johnson. He showed you all of the  
04:04 13 things that are important about a website and all of the  
04:04 14 things that are important about OCS, and they just  
04:04 15 simply don't overlap.

04:04 16 Now, you he heard counsel for VirnetX say  
04:04 17 that Dr. Johnson had to admit that he was wrong. He  
04:04 18 didn't admit he was wrong. He was marking out X's no  
04:04 19 matter what Dr. Johnson said. He disagreed with them on  
04:04 20 the stand and said, I disagree with you, and he still  
04:04 21 put an X to the testimony. That's words, not facts.

04:04 22 Now, here's what Dr. Jones did say, and  
04:04 23 it's important. He said: Well, I think they're  
04:04 24 equivalent, because of this function-way-result test.  
04:04 25 And that was in the instructions that Judge Davis just

04:04 1 gave you.

04:04 2 But when you read his testimony,  
04:04 3 basically, he's saying any VPN is equivalent. Well, we  
04:04 4 know that can't be true, because they didn't invent  
04:04 5 VPNs.

04:04 6 He says: Well, the function is, you use  
04:04 7 computers and a VPN to present information to clients,  
04:04 8 and the clients are authorized. And then he was forced  
04:04 9 to admit that every VPN does that.

04:05 10 Well, what was the way on  
04:05 11 function-way-result? Well, you use computers and a VPN  
04:05 12 to present information.

04:05 13 So if function and way are the same now,  
04:05 14 what's result? Well, you communicate with computers and  
04:05 15 a VPN and only clients that are registered.

04:05 16 All right. So it's all the same.

04:05 17 And then I asked him over and over again,  
04:05 18 every VPN does that, doesn't it? So, basically, you're  
04:05 19 saying every VPN is covered.

04:05 20 And he said: Well, yes, any VPN meets  
04:05 21 that requirement. That's typical on VPNs; typical of  
04:05 22 VPNs; typical of VPNs.

04:05 23 So what he's saying is, he wants them to  
04:05 24 get paid for anything that's a VPN. But they've  
04:05 25 admitted they didn't invent VPN. So that's not

04:05 1 supported here.

04:05 2           So on the '135, two requirements are  
04:05 3 missing. Even if only one is missing, there's no  
04:05 4 infringement.

04:05 5           The '180 patent, two missing: VPN, we've  
04:05 6 already talked about most of that, and no secure  
04:05 7 computer address, both requirements of the claims.

04:06 8           The PeerNet software, exactly the same  
04:06 9 issue. They can see exactly the same thing. On the  
04:06 10 PeerNet software, you have a one true address, not a  
04:06 11 separate address, and a one true address over here, and  
04:06 12 the hacker can see that. And there's no dispute about  
04:06 13 those facts.

04:06 14           So what do they say? They say: Well, you  
04:06 15 can't see the groups. That's what the claim says. And  
04:06 16 look at what the patent says, if the patent says we're  
04:06 17 concerned about groups. It says, no, we're concerned  
04:06 18 about anonymity between whether computer one is in  
04:06 19 communication with computer two.

04:06 20           And the same holds true with the OC issue.  
04:06 21 Remember when Mr. Cawley, in closing argument, said,  
04:06 22 let's add all these other computers at the other side of  
04:06 23 the slide on OC?

04:06 24           That's not what the claim is talking  
04:06 25 about. The claim is saying computer one talking to

04:06 1 computer two. Computer one was the computer on the  
04:06 2 left; computer two is the OC server. And the hacker can  
04:06 3 plainly see that, plain as day.

04:07 4 The second issue is no computer has a  
04:07 5 secure network address. Judge Davis' instruction is  
04:07 6 that an address requires authentication for access. So  
04:07 7 let's look.

04:07 8 This computer -- you remember this  
04:07 9 demonstration from the testimony -- has one address, and  
04:07 10 it's not secure because anybody can send spam e-mail or  
04:07 11 anything else into that address even when a Windows  
04:07 12 Meeting Space session is in play.

04:07 13 So the application might be secure, you  
04:07 14 have to log in for an application, but the address is  
04:07 15 not. And that's what the claim requires: A secure  
04:07 16 address.

04:07 17 Mr. Cawley says: Well, you could have a  
04:07 18 communication line coming in, and he shows you the  
04:07 19 patent.

04:07 20 Remember the address, though, was  
04:07 21 different. One was .com, and one was .scom. Here it  
04:07 22 was talking about a single address, and it's not secure,  
04:07 23 because any spam coming into that e-mail can come right  
04:07 24 in.

04:07 25 So that's the first issue: Does

04:07 1 Microsoft's software use the VirnetX's patents? The  
04:08 2 answer to that is no. We don't have the anonymity  
04:08 3 that's required because we're using it for different  
04:08 4 purposes. It's not a secure computer network address.  
04:08 5 And it's not a website or an equivalent to it.

04:08 6           The second: Was VirnetX first. This is  
04:08 7 issue -- part of the issue of validity. We showed you  
04:08 8 extensive evidence.

04:08 9           But even they knew they were in trouble  
04:08 10 from the very beginning. This is a presentation given  
04:08 11 to the CEO, Dr. Beyster, of SAIC that Mr. Munger had  
04:08 12 presented and prepared.

04:08 13           He said: Wow, there's a lot of companies  
04:08 14 addressing the issue that we're talking about. The race  
04:08 15 is on. They were in a race, and they knew it, and  
04:08 16 that's the same issue cited here. Who won the race?

04:08 17           Was VirnetX first when it filed its patent  
04:08 18 in 2000, or were others first? And the answer is others  
04:08 19 were first.

04:08 20           Mr. Munger may have had this realization  
04:08 21 in the late 1990s when he was working on Global Hawk,  
04:09 22 and he may have thought that he could try to solve that  
04:09 23 problem. The problem is that others who were working in  
04:09 24 this space before had had that same realization many,  
04:09 25 many years before, and they had the same solutions many

04:09 1 years before. That's why he wasn't first.

04:09 2 SAIC's date is over here in 2000.

04:09 3 PPTP, invented by Mr. Pall, was four years  
04:09 4 earlier in '96.

04:09 5 AutoDial, also in '96, four years earlier.

04:09 6 DVPN from TIS, that was in 1998, two years  
04:09 7 earlier.

04:09 8 Aventail, one year earlier.

04:09 9 They didn't win the race, and yet that's  
04:09 10 exactly the issue the Court is asking you to decide, who  
04:09 11 was first?

04:09 12 Now, you might say: Why is it -- why is  
04:09 13 all of this relevant? Why didn't the Patent Office find  
04:09 14 it? We showed you that earlier. The Patent Office did  
04:09 15 not consider this material, and there's no dispute about  
04:09 16 that, none at all.

04:09 17 So when counsel for VirnetX says the  
04:09 18 presumption of validity applies because the Patent  
04:10 19 Office is presumed to have done its job well, it did its  
04:10 20 job well with the information they had, but they didn't  
04:10 21 have any of this information that you're seeing.

04:10 22 In the video and all the witnesses agreed,  
04:10 23 this is your task. This is your job to decide. You  
04:10 24 can't defer to the Patent Office and say they must have  
04:10 25 decided this is okay, because they didn't have the same



04:10 1 information.

04:10 2           And when you hear counsel for VirnetX say  
04:10 3 over and over again with every witness, there's a  
04:10 4 presumption of validity, that's a suggestion that you  
04:10 5 really shouldn't have to look at this too hard.

04:10 6           Doesn't reduce how hard you have to look  
04:10 7 at it at all, because the Patent Office has not looked  
04:10 8 at this at all. You will be the first, and you'll be  
04:10 9 the only to decide this question.

04:10 10           Aventail. Aventail, we know they lost the  
04:10 11 race, and we know that Mr. Munger and Dr. Short knew  
04:10 12 they lost the race, because SAIC, their own employer,  
04:10 13 chose Aventail over Mr. Munger's technology. They had a  
04:11 14 choice as to what to use with ANX, and they said let's  
04:11 15 go with Aventail. It's better. It works. And they  
04:11 16 invested in Aventail as we talked about earlier. So  
04:11 17 they lost the race to Aventail very clearly.

04:11 18           Aventail: Secure, authenticated access to  
04:11 19 a customer's critical software application, exactly how  
04:11 20 they described their invention to you here over and over  
04:11 21 again. It's automatic. It's being used by a number of  
04:11 22 Fortune 100 companies. It works. It's automatic. It's  
04:11 23 easy. All of the things that they claim to have  
04:11 24 invented were done by Aventail earlier and better.

04:11 25           Large virtual private networks. You heard

04:11 1 that -- you heard them argue that Aventail is not a  
04:11 2 private network. Well, large virtual private network.  
04:11 3 Everybody else in the world is calling what they're  
04:11 4 doing a VPN. Only VirnetX.

04:11 5           You heard Dr. Wicker transparently and  
04:11 6 automatic. There's no debate that they do exactly what  
04:12 7 Mr. Munger and Dr. Short claim, but they did it earlier.

04:12 8           So what does Dr. Jones argue? He argued  
04:12 9 to you today: But it's not a network. Well, how can it  
04:12 10 not be a network when over and over again, not only  
04:12 11 Aventail is saying it's a VPN, a virtual private  
04:12 12 network, but everybody else is calling it a network,  
04:12 13 too, including SAIC.

04:12 14           Mr. Munger's own employer says: Well, VPN  
04:12 15 system providers, and they list Aventail as the very  
04:12 16 first one. So the only people not calling Aventail a  
04:12 17 network, a VPN, is VirnetX in front of you. But their  
04:12 18 employers and everybody else acknowledges that's exactly  
04:12 19 what it is. And that's Exhibit 382, one of the  
04:12 20 Plaintiff's exhibits.

04:12 21           The next piece of prior art is the PPTP,  
04:12 22 what Mr. Pall invented in 1996 with AutoDial, way  
04:12 23 before, four years before, and improved on even twice  
04:12 24 before the work that Mr. Munger and Dr. Short did.

04:13 25           Recognized by everyone as a break-through

04:13 1 four years earlier. A new protocol secure remote access  
04:13 2 across the internet, a great virtual private network or  
04:13 3 VPN. Four years earlier.

04:13 4 Automatic. Automatic. Easy. Easy.  
04:13 5 Easy. You heard that testimony over and over again.

04:13 6 So what's the first point that you hear  
04:13 7 raised? Well, it only reconnects. That means it's --  
04:13 8 the second time you call them up, it does it  
04:13 9 automatically.

04:13 10 And you heard the arguments, well, why  
04:13 11 didn't they show you the first time that they connected  
04:13 12 them? And without arguing about the demonstration, did  
04:13 13 you see Mr. Munger or Dr. Short show you how they  
04:13 14 connected the first time on their demonstration? No.  
04:13 15 No. But it was one click for each, exactly the same  
04:13 16 setup, exactly the same, but four years earlier for PPTP  
04:13 17 with AutoDial.

04:13 18 So what does Mr. Jones say? He says  
04:14 19 there's not a determination step. And, in fact,  
04:14 20 Professor Wicker explained to you in detail why there's  
04:14 21 a determination step.

04:14 22 And you heard Dr. Jones today on the stand  
04:14 23 admit that what happens is that the system looks up at  
04:14 24 the address book and says, is there an entry? And if  
04:14 25 there's an entry, it determines that it should use PPTP.

04:14 1 PPTP is actually in the phone book entry.  
04:14 2 You heard him admit that this morning. That's exactly  
04:14 3 where the determination step happens. If it's in the  
04:14 4 phone book, it says use PPTP. If it's not in the phone  
04:14 5 book, it goes off and forms a different path. Dr. Jones  
04:14 6 admitted that this morning in this courtroom.

04:14 7 Now, you heard them talk about the false  
04:14 8 step demonstration that was given with eBay and  
04:14 9 this-is-not-a-secure-website.com. Well, that doesn't  
04:14 10 work either, because -- Dr. Wicker explained, because  
04:14 11 the only reason that it happened that way in this  
04:14 12 demonstration is they picked a bogus name in  
04:14 13 thisisnotasecurewebsite.com.

04:15 14 And as to eBay, which is not a bogus name,  
04:15 15 it wasn't connected to the internet, so it couldn't find  
04:15 16 it.

04:15 17 So those demonstration examples that they  
04:15 18 did on cross-examination weren't applicable, and he  
04:15 19 explained that in detail.

04:15 20 And this is the phone book entry that I  
04:15 21 was talking about earlier where it says -- it's sort of  
04:15 22 hard to see here, but it says: PPTP. That's what  
04:15 23 Dr. Jones had to admit on cross-examination today, that  
04:15 24 if that is there, the phone book entry, that's  
04:15 25 determining.

04:15 1                   Now, one of the things you heard in  
04:15 2 cross-examination was, well, wait a minute. How can  
04:15 3 PPTP be private and anonymous if Office Communicator  
04:15 4 isn't? Because you can still see some IP addresses.  
04:15 5 And there's no doubt you can see IP addresses, but you  
04:15 6 can't see the private IP addresses that Dr. Short  
04:15 7 admitted were there.

04:15 8                   And so let's take Office Communicator  
04:15 9 first. That true source sending to that true  
04:15 10 destination has one and only one IP address, and that's  
04:16 11 visible plainly in what that hacker can see.

04:16 12                   On PPTP, what that's -- what's visible are  
04:16 13 the IP addresses of these two boxes, not the real  
04:16 14 source, not the real destination. Mr. Pall explained  
04:16 15 that. Dr. Wicker explained that. The addresses of the  
04:16 16 true source and true destination are in this encrypted  
04:16 17 packet. The hacker cannot see it. That's why it's  
04:16 18 different.

04:16 19                   And PPTP, it's anonymous because they're  
04:16 20 encrypted. And Office Communicator, what they're  
04:16 21 accusing of infringement, they're plain to see by  
04:16 22 anybody out there, like Dr. Jones admitted.

04:16 23                   The last piece of prior art I want to talk  
04:16 24 to about is DVPN or Dynamic VPN. That was a product  
04:16 25 developed by Trusted Information Systems and

04:16 1 demonstrated at DARPA, well before any of the work that  
04:16 2 they -- that Mr. Munger and Dr. Short ever talked about.  
04:16 3 So they lost that race, too.

04:16 4           You heard from Mr. Saydjari, 17 years with  
04:17 5 the Department of Defense. He's the man who's actually  
04:17 6 responsible for cyber security in the United States.  
04:17 7 He's the one who was actually responsible for trying to  
04:17 8 maintain our security and deciding which technologies  
04:17 9 would do that best.

04:17 10           He represents reality. He doesn't have  
04:17 11 any dog in this fight. And he came here to say what  
04:17 12 actually happened at that conference in March of 1998.

04:17 13           And what happened? It was a successful  
04:17 14 demonstration. In fact, unqualified success. The  
04:17 15 documents -- not just people's recollection, but the  
04:17 16 contemporaneous documents were also very, very clear and  
04:17 17 undeniable.

04:17 18           Automated VPN. Automatically activate the  
04:17 19 VPN. Exactly what Mr. Munger and Dr. Short claimed they  
04:17 20 invented, VPN did before. That's automatic activation.

04:18 21           And was it easy? Yes. Mr. Saydjari said  
04:18 22 that was a requirement. Remember he said we want to do  
04:18 23 this with coalition forces when we're sitting over in  
04:18 24 Iraq someplace, and we have to deal with the British  
04:18 25 forces and the German forces and the Belgium forces and

04:18 1 other forces. We have to be able to communicate  
04:18 2 securely with everybody. That's what this is for. It's  
04:18 3 real world, real facts, real life. So it had to be  
04:18 4 easy.

04:18 5 Did it work? You bet. Absolutely  
04:18 6 critical, great success in that way. Demonstrated it a  
04:18 7 year before -- two years before the relevant time period  
04:18 8 of Mr. Munger and Dr. Short.

04:18 9 Now, did DARPA fund the SAIC and  
04:18 10 Mr. Munger's VPN invention? Because, remember,  
04:18 11 Mr. Munger submitted a proposal directly to Mr. Saydjari  
04:18 12 saying: Please fund my technology instead of others.

04:18 13 And Mr. Saydjari didn't -- as I say,  
04:18 14 didn't have a dog in that fight. He's going to decide  
04:18 15 what's better and what works. That's his job. And he  
04:19 16 said: No, we didn't fund it.

04:19 17 Why? It was a duplicate of what we had  
04:19 18 already created with DVPN technology. They lost the  
04:19 19 race with DVPN, too.

04:19 20 Now, the cross-examination of Dr. Wicker  
04:19 21 on DVPN was interesting. Over and over and over and  
04:19 22 over again, the VirnetX lawyer said: Well, do you know  
04:19 23 with absolute certainty what happened 12 years ago?

04:19 24 And Professor Wicker said: Well, I wasn't  
04:19 25 there, so I guess I don't know with absolutely certainty

04:19 1 almost anything, but I think it's clear and convincing.

04:19 2 That, of course, is the standard that

04:19 3 Judge Davis just instructed you on.

04:19 4 Again, well, is it -- are you absolutely  
04:19 5 certain?

04:19 6 Well, no, but I think it's clear.

04:19 7 Judge Davis' instructions told you proof  
04:19 8 to an absolute certainty is not required. But over and  
04:19 9 over and over again, VirnetX's counsel was trying to  
04:19 10 suggest that that is the standard; that if Professor  
04:19 11 Wicker is not absolutely certain, you shouldn't rely on  
04:20 12 him. But that's exactly the wrong statement.

04:20 13 So was VirnetX first? No. They lost the  
04:20 14 race to Aventail; they lost it to DVPN; and they lost it  
04:20 15 to Mr. Pall, four years late, on PPTP.

04:20 16 Obviousness. Mr. Wicker testified at  
04:20 17 length about obviousness, told you why it was obvious  
04:20 18 and told you why all the people who were looking at this  
04:20 19 in detail sitting in the Engineering Internet Task Force  
04:20 20 would know why this is obvious.

04:20 21 Now, Dr. Jones spoke about obviousness for  
04:20 22 about to two minutes, maybe a minute and a half. And  
04:20 23 always said, well, you can't use hindsight, and  
04:20 24 Dr. Wicker didn't. He showed you at the time why  
04:20 25 everything they're claiming was known, because we had a



04:20 1 lot of very smart people working on this problem for a  
04:20 2 long time, and they were working together to make that  
04:20 3 work.

04:20 4           The objective considerations that are in  
04:21 5 that long list that Judge Davis says he would leave to  
04:21 6 you to read when he was reading the instructions,  
04:21 7 remember Dr. Wicker went quite through and showed how  
04:21 8 those considerations showed absolute obviousness. Their  
04:21 9 expert, Dr. Jones, didn't respond to that at all. At  
04:21 10 all. Didn't even mention it.

04:21 11           Now, you've heard many, many times this  
04:21 12 presumption of validity. But the presumption can be  
04:21 13 rebutted. You, the finder of fact, can find the patent  
04:21 14 to be invalid. That's from the Court and also from the  
04:21 15 video.

04:21 16           It's important that you understand your  
04:21 17 role in the process. You will be the first people to  
04:21 18 decide this question. And any suggestion that you  
04:21 19 should look at this with less rigor or with less  
04:21 20 scrutiny because of the presumption of validity is  
04:21 21 asking you not to do your job as jurors.

04:21 22           And that's wrong. The presumption of  
04:21 23 validity does not change the fact that jurors have to  
04:21 24 look at this evidence that the Patent Office didn't see.

04:22 25           So was it obvious? Yes.

04:22 1 Willfulness: Objectively high likelihood  
04:22 2 that the actions infringed. Well, what evidence do we  
04:22 3 have on this?

04:22 4 First, SAIC -- VirnetX relies on the  
04:22 5 letter from Pam Bumann in May of 2006. Talked to you  
04:22 6 about RFC 3263. Well, that's the one that Mr. Larsen  
04:22 7 admitted was wrong.

04:22 8 How are we supposed to know objectively  
04:22 9 that we infringe when they can't even get it written in  
04:22 10 the letter? They say you infringe because of X, and X  
04:22 11 is false. It's not objectively true even under their  
04:22 12 theory.

04:22 13 Do they correct that? Do they send us any  
04:22 14 information? No.

04:22 15 How can it be objectively true when their  
04:22 16 own inventor, Dr. Larson, said: No, I haven't changed  
04:22 17 my mind. My patents offer, as he put it, no protection  
04:22 18 against what Microsoft is doing.

04:22 19 How can -- objectively, we're supposed to  
04:22 20 know we infringe when their own inventor and Mr. Larsen  
04:23 21 don't?

04:23 22 So also on willfulness, does Microsoft  
04:23 23 just say: Forget it; we didn't want to talk to you;  
04:23 24 we're not interested; we don't care; go away; file a  
04:23 25 lawsuit; we're big; we're powerful? No.

04:23 1                   They said: Let's have a meeting and  
04:23 2 discuss it, but please provide us the information that  
04:23 3 supports your claim.

04:23 4                   Everybody in this courtroom has admitted  
04:23 5 that's a reasonable thing to do.

04:23 6                   Did SAIC and VirnetX give us any  
04:23 7 information to back up the claim which later turned out  
04:23 8 to be false? No.

04:23 9                   Did they do anything to set up a meeting?  
04:23 10 No.

04:23 11                   Mr. Larsen, do you know whether Ms. Bumann  
04:23 12 set up a meeting?

04:23 13                   Can't speak for her.

04:23 14                   He sure didn't. There's absolutely  
04:23 15 nothing suggesting that any such meeting occurred. And  
04:23 16 this Bumann member even said that she didn't get the  
04:23 17 letter. That was her reason, that was her explanation  
04:24 18 for why she didn't even send the letter.

04:24 19                   So patent review policies. You heard this  
04:24 20 in closing argument just a minute ago. That  
04:24 21 Microsoft -- you should be shocked. VirnetX's lawyers  
04:24 22 asked you if you were shocked that Microsoft doesn't go  
04:24 23 look at patents.

04:24 24                   Well, Microsoft explained why. If you're  
04:24 25 writing a song and you're creating it yourself, you

04:24 1 don't need to go look at patents. We want people to  
04:24 2 innovate.

04:24 3 And he said: Well, and if somebody shows  
04:24 4 us that we're -- that we might be using their  
04:24 5 technology, we go out to them and license it.

04:24 6 That's not the voice of a willful  
04:24 7 infringer. That's somebody who's reasonably respecting  
04:24 8 intellectual property.

04:24 9 But now let's look -- put the shoe on the  
04:24 10 other foot.

04:24 11 Mr. Munger, well, wait a minute. When  
04:24 12 you're going out to work on Gabriel, do you look at  
04:24 13 other people's patents?

04:24 14 Mr. Munger, well, he wasn't shocked when  
04:24 15 he learned about it, because he doesn't do it either.  
04:24 16 VirnetX has no policy saying you should go look at  
04:24 17 anybody's patents.

04:24 18 Dr. Larson, he says, well, why didn't you  
04:24 19 do an analysis of other people's patents.

04:24 20 He says: It doesn't even make sense to  
04:24 21 me.

04:25 22 So if VirnetX's lawyer is suggesting you  
04:25 23 should be shocked about it, their own people say it's  
04:25 24 standard.

04:25 25 Last issue: The Patent Office.

04:25 1 Say, Well, Microsoft got a notice from the  
04:25 2 Patent Office about Mr. Munger's patent. True. But did  
04:25 3 they go to the Microsoft? No. It went to a law firm.  
04:25 4 No evidence that anybody at Microsoft ever learned about  
04:25 5 it.

04:25 6 And the Patent Office issued the patent  
04:25 7 over it, as I showed you earlier.

04:25 8 Now, damages. Defendants never like to  
04:25 9 talk about damages, but I have to. Our view is the  
04:25 10 damages are zero. The damages are zero, because there's  
04:25 11 no infringement, and the patents are invalid.

04:25 12 Well, now I'm going to assume for a minute  
04:25 13 that you disagree with me, and let's talk about what  
04:25 14 those damages should be.

04:25 15 The Court tells you they can't be remote  
04:25 16 or speculative. Those were the instructions you just  
04:25 17 got. And this is the real evidence they relied upon.

04:25 18 They said: Well, these are the  
04:25 19 benchmarks. Remember Mr. Reed said: These are the key  
04:25 20 licenses you look at, and he pointed to these high  
04:25 21 rates.

04:26 22 What he didn't point out was there was  
04:26 23 absolutely zero dollars under any one of them. Their  
04:26 24 benchmarks for the value of this technology and not -- a  
04:26 25 dime wasn't paid under those royalties.

04:26 1 Hypothetical negotiation, what everybody  
04:26 2 talked about would have occurred in 2003. They're  
04:26 3 saying that at that negotiation, Microsoft would have  
04:26 4 said: Here's \$242 million.

04:26 5 Well, what would have happened? What had  
04:26 6 happened already is that SAIC would be coming into that  
04:26 7 negotiation being told by the CIA that their technology  
04:26 8 is in the living dead category. Their own company  
04:26 9 hadn't pulled the plug because the product's not worth  
04:26 10 investing in.

04:26 11 They go to 32 venture capitalists, and  
04:26 12 everybody else in the world who says: Sorry, your  
04:26 13 technology is worth nothing.

04:26 14 SafeNet terminates and doesn't pay them a  
04:26 15 dime.

04:26 16 And what Mr. Reed and VirnetX is saying  
04:26 17 is, just a couple of months later, SAIC would have been  
04:26 18 so confident about the strength of its technology that  
04:27 19 they would have held out to \$242 million. That was his  
04:27 20 testimony.

04:27 21 And you remember when Mr. Sayles was  
04:27 22 asking him questions, he said: Well, if Microsoft had  
04:27 23 offered at that hypothetical negotiation 10 million,  
04:27 24 they would have gotten up and left?

04:27 25 Absolutely would have.

04:27 1 15 million?

04:27 2 Without a question, they would have gotten  
04:27 3 up in a huff and walked out of the room.

04:27 4 Well, there's two problems with that. One  
04:27 5 is, he admitted that part of the deal of a hypothetical  
04:27 6 negotiation is you can't walk away.

04:27 7 The other problem is it violates common  
04:27 8 sense. Here you have a company that's spent years  
04:27 9 trying to get someone to give them millions, 2 million,  
04:27 10 \$3 million, 7, being told no everywhere they went, and  
04:27 11 all of a sudden, Microsoft would offer them 5, \$10  
04:27 12 million, and they would throw a fit and leave? It just  
04:27 13 doesn't make sense.

04:27 14 It also is inconsistent with all the  
04:27 15 evidence in the case about the entire value of the  
04:28 16 company, not just these patents, the entire value of the  
04:28 17 company, which consistently across the range is between  
04:28 18 the 15-million-dollar range.

04:28 19 And yet all around the hypothetical  
04:28 20 negotiation time, before and after the patent issues,  
04:28 21 and yet they said: You really ought to say now it's  
04:28 22 worth \$242 million.

04:28 23 The reason this bar is so high and these  
04:28 24 bars are so low is that these bars reflect their best  
04:28 25 estimate of the value of the entire company. This bar

04:28 1 represents what Microsoft contributed, and they're  
04:28 2 trying to take that.

04:28 3 Now, you heard this morning about CSMG, a  
04:28 4 company that said: Hey, if your technology really  
04:28 5 works, there's a huge opportunity out there. It might  
04:28 6 be worth \$200 million.

04:28 7 It didn't say the technology was good. It  
04:28 8 didn't say the technology was actually worth that. It  
04:28 9 said, if the technology sells like hot cakes, then you  
04:28 10 could make that amount of money. That's what that  
04:28 11 document says.

04:28 12 So in terms of the actual verdict form,  
04:29 13 we, obviously, have a different view as to how we would  
04:29 14 ask you to fill it out. We believe that in the question  
04:29 15 of infringement, the answer should be no. Website, VPN,  
04:29 16 secure network address.

04:29 17 Willfulness? No, they failed to meet  
04:29 18 their burden of proof. We asked them for a meeting, and  
04:29 19 they didn't even show up. We asked them to give us some  
04:29 20 information to back up the claim that turned out to be  
04:29 21 false. They didn't give it.

04:29 22 Invalidity? Yes. They lost the race to  
04:29 23 three different companies, all of which provided fast,  
04:29 24 easy, automatic ways of connecting VPN years before  
04:29 25 Mr. Munger and Dr. Short.



04:29 1 Damages? Zero.

04:29 2 Remember this slogan? This was the log-in  
04:29 3 box that was on the Gabriel prototype, that Mr. Munger  
04:29 4 had to put in, that Dr. Short had to put in, everybody  
04:29 5 had -- when they were going to put in to work on Gabriel  
04:29 6 at all, the number, the password they had to put in was  
04:30 7 Microsoft for money in 2009, question mark.

04:30 8 Now, that's tells you more than almost  
04:30 9 anything I could say about what this case is actually  
04:30 10 about. That's what this case is about.

04:30 11 And you heard, well -- Mr. Munger said:  
04:30 12 Well, that was just in there for a couple of weeks.  
04:30 13 Well, it turns out that's not true.

04:30 14 Dr. Larson, who testified by video this  
04:30 15 morning, said: Well, he's the one who actually put it  
04:30 16 in there.

04:30 17 And where did he get it? He says: I  
04:30 18 copied it from one of my other passwords that I use as a  
04:30 19 standard password for other developers.

04:30 20 So all of -- all of VirnetX was saying  
04:30 21 this lawsuit, Gabriel, everything is just about whether  
04:30 22 we can get money out of Microsoft. Microsoft and money,  
04:30 23 now that we're in 2010, we suggest the answer to that  
04:30 24 question should be no.

04:30 25 Now, this is my last opportunity to speak

04:30 1 to you. Many times in trials, there's cheering and  
04:30 2 applause when that happens. But I do -- and Mr. Cawley  
04:30 3 will have a few minutes to respond to what I'm saying,  
04:31 4 and I won't be able to answer it.

04:31 5 But I want to ask you to please listen to  
04:31 6 see if he answers these questions. Not talk about  
04:31 7 Global Hawk, Purple Hearts, or scud missiles, but the  
04:31 8 questions that are in the case and see if he answers  
04:31 9 these questions.

04:31 10 First, why did everybody refuse to buy or  
04:31 11 invest in the VirnetX technology if it really worked, if  
04:31 12 it really did what they say it does?

04:31 13 If it was really worth \$242 million, why  
04:31 14 did 32 venture capitalists, every company, every  
04:31 15 government agency, SAIC, the CIA, In-Q-Tel, SafeNet,  
04:31 16 everybody, why did everybody with motivation to invest  
04:31 17 or buy it, to use it if it worked, say no?

04:31 18 Ask for an answer to that question that  
04:31 19 makes sense to you.

04:31 20 Would the CIA use software that doesn't  
04:31 21 provide anonymity? Their own expert, Dr. Jones, said  
04:31 22 no. They told you over and over again that's what they  
04:31 23 were trying to do: Create software for the CIA.

04:31 24 Well, that's not what Microsoft is  
04:32 25 creating. We're creating it for normal people using it

04:32 1 for normal things.

04:32 2           What was first? Was VirnetX before  
04:32 3 Aventail? Before VPN, but before DVPN? You heard no  
04:32 4 denial from Dr. Jones. Dr. Jones testified on the stand  
04:32 5 today -- he didn't deny that Aventail, VPN, or PPTP were  
04:32 6 all fast, automatic, easy. And I pointed that out to  
04:32 7 him on cross-examination, and he didn't deny that.

04:32 8           How can VirnetX demand 20 times, 20 times  
04:32 9 what SAIC and the missing Kendall Larsen thought the  
04:32 10 entire company was worth? Does that make sense? Does  
04:32 11 that make any sense at all? That's just way, way too  
04:32 12 high. And we all in the courtroom know that. Twenty  
04:32 13 times clearly shows that they're trying to get the value  
04:32 14 Microsoft contributes, not that they contributed.

04:33 15           And last, where is Kendall Larsen, if he's  
04:33 16 the President, the CEO, Chairman of the Board, founder,  
04:33 17 the largest stockholder, and he said some things that  
04:33 18 are critical to this case that show there's no  
04:33 19 infringement and no validity?

04:33 20           He's the one that stands to make the most  
04:33 21 out of this lawsuit, and he didn't have the guts to come  
04:33 22 and stand before you and ask that and defend that. And  
04:33 23 that tells you a lot about what this case is about.

04:33 24           I thank you very much for your attention  
04:33 25 and respectfully ask that you enter a verdict for

04:33 1 Microsoft.

04:33 2 THE COURT: Thank you, Mr. Powers.

04:33 3 All right. Rebuttal, Mr. Cawley.

04:33 4 MR. CAWLEY: Thank you, Your Honor.

04:33 5 Ladies of the Jury, what I want to do in  
04:33 6 the last 10 minutes, what I said I would do, Mr. --

04:34 7 Microsoft's lawyer had had some questions he thinks I  
04:34 8 should spend 10 minutes answering.

04:34 9 And I think we will touch on some of  
04:34 10 those, but I think it's more important at the very end  
04:34 11 of at least the lawyer part of the trial that we focus  
04:34 12 on the questions that Judge Davis is going to ask you.  
04:34 13 His questions, I'd suggest, are the important ones and  
04:34 14 the ones you'll need to really wrestle with in deciding  
04:34 15 the case.

04:34 16 First of all, let's talk about Kendall  
04:34 17 Larsen. Why isn't he here? Well, there's several  
04:34 18 reasons. First of all, Mr. Larsen is not an inventor of  
04:34 19 these patents. At the time Mr. Munger and Dr. Short  
04:34 20 came up with their invention, they didn't even know  
04:34 21 Kendall Larsen.

04:34 22 Kendall Larsen did meet them later. He  
04:34 23 believes in the invention. He helped them start a  
04:34 24 company and helped them raise money and invested quite a  
04:34 25 bit of money in himself for -- in it himself. I don't

04:34 1 see why there's anything wrong with him getting a return  
04:34 2 on that investment when he's the one that helped  
04:34 3 Mr. Munger and Dr. Short be able to come here and  
04:35 4 enforce their rights against Microsoft's infringement.

04:35 5 And remember, anyway, isn't this just a  
04:35 6 red herring? Mr. Larsen's deposition got taken. He was  
04:35 7 on videotape. You saw that played this morning.  
04:35 8 Microsoft had an opportunity to ask him any questions  
04:35 9 they wanted and to play for you any of his testimony  
04:35 10 that they thought was relevant.

04:35 11 They talked about Magenic. Remember how  
04:35 12 strange and mysterious it was that Mr. Larsen wasn't  
04:35 13 here to explain why if he thought that Microsoft was  
04:35 14 already doing what the patent said; he was hiring this  
04:35 15 company Magenic to put the invention in the Microsoft  
04:35 16 products?

04:35 17 Mr. Munger explained all that, and that's  
04:35 18 not the way it happened at all. What he told you is  
04:35 19 that he and Mr. Larsen had decided that it would be a  
04:35 20 good idea to show that their invention could be used  
04:35 21 with the Microsoft products, but they didn't know  
04:35 22 Microsoft was already using their invention.

04:36 23 That's how Mr. Munger explained to you, in  
04:36 24 2005, someone he was working on that said, Come in here  
04:36 25 and look at this computer screen. It looks as though

04:36 1 Microsoft is already doing what we're trying to do with  
04:36 2 the invention.

04:36 3 Dr. Vic Larson, you saw him this morning.  
04:36 4 His deposition was taken in this case. As much as we  
04:36 5 would have loved to have brought the co-inventor here to  
04:36 6 testify to you live, we have to cut back somewhere due  
04:36 7 to time constraints.

04:36 8 His deposition was taken. Microsoft had  
04:36 9 an opportunity to ask him any questions they wanted and  
04:36 10 play for you any of the testimony that they thought was  
04:36 11 relevant.

04:36 12 SAIC and Pam Bumann, same thing. Her  
04:36 13 deposition was taken. They could have played any part  
04:36 14 of that deposition they wanted to.

04:36 15 So let's talk about the first question  
04:36 16 that Judge Davis is going to ask you. Is there  
04:36 17 infringement? Once again, you heard about this  
04:36 18 question, is it anonymous?

04:37 19 But remember that slide -- I won't take  
04:37 20 the time to put it up again -- where Microsoft tried to  
04:37 21 show you the envelope and said the hacker or spy could  
04:37 22 see the address on the envelope?

04:37 23 But I'll be darned if they didn't do again  
04:37 24 what Dr. Johnson did you in the first place: They only  
04:37 25 showed you half of the story. They showed you that you

04:37 1 could see that address that goes across the internet and  
04:37 2 you could see the destination of the server computer,  
04:37 3 but you can't see the address of the person that it's  
04:37 4 intended to reach. That's why it's anonymous.

04:37 5           You didn't even hear them address  
04:37 6 anonymity in PeerNet where you remember the document  
04:37 7 said it is beyond suspicion that when Microsoft's group  
04:37 8 sends a message and you can't tell which group member it  
04:37 9 is, that is anonymity beyond suspicion.

04:37 10           And they say again, well, website. We  
04:37 11 don't really meet the website limitation of the claims.  
04:38 12 But remember, Dr. Jones testified to you and explained  
04:38 13 while how a website is not substantially different from  
04:38 14 what Microsoft does, he explained how it's not different  
04:38 15 and explained to you the function and way and result  
04:38 16 test that shows under the Doctrine of Equivalents that  
04:38 17 there is still infringement.

04:38 18           And despite what Microsoft's lawyer  
04:38 19 attempted to tell you, Dr. Johnson sat on the stand and  
04:38 20 admitted to you under Mr. Caldwell's questioning that he  
04:38 21 had been wrong when he told you that it was  
04:38 22 substantially different, when he told you that it wasn't  
04:38 23 at all the same.

04:38 24           Second question: Is Microsoft's  
04:38 25 infringement willful?

04:38 1 Well, where was the witness who came to  
04:39 2 court and explained why Microsoft believed, when it got  
04:39 3 that letter in 2006, that it didn't infringe?

04:39 4 Where was the witness who explained how  
04:39 5 Microsoft studied that patent and reached a good-faith  
04:39 6 conclusion that it didn't infringe? You never heard  
04:39 7 that testimony because Microsoft has given you no  
04:39 8 excuses for why it continued to infringe the patent from  
04:39 9 2006 until now.

04:39 10 And as far as -- there was some -- some  
04:39 11 confusion you just heard, remember, about the shock of  
04:39 12 what Microsoft told its employees. It wasn't  
04:39 13 necessarily shocking that they don't go out and do a  
04:39 14 bunch of research. But what that Microsoft developer  
04:39 15 told you is they are instructed not to read patents.  
04:39 16 And I suggest to you that's a very different thing.

04:40 17 On the third question: Are the issues of  
04:40 18 the patents invalid? On the Windows NT demonstration  
04:40 19 that you were shown, if it's easy to set up a PPTP  
04:40 20 connection the first time, why didn't they show you  
04:40 21 that? Dr. Short showed you that but Mr. Pall didn't,  
04:40 22 and he didn't because of the complexity of setting up  
04:40 23 that system for the first time.

04:40 24 And what about the BIOS software? It was  
04:40 25 repeated again to you just now. Oh, all that software



04:40 1 was from 1996. The BIOS software was from 2000. Some  
04:40 2 of the software running on his computer was running  
04:40 3 Windows 2000. We heard that this morning.

04:40 4 And the attempt to communicate to eBay,  
04:40 5 which I asked Mr. Pall to do, well, they pointed out to  
04:40 6 you, and maybe quite correctly, they couldn't  
04:40 7 communicate with eBay because they didn't hook their  
04:40 8 demonstration up to the internet.

04:41 9 Why is that; do you think? Dr. Short did.  
04:41 10 We know that the Court provides internet connection in  
04:41 11 this courtroom. You saw Dr. Short using it. Why  
04:41 12 wouldn't Microsoft give its demonstration to you using a  
04:41 13 realistic internet connection?

04:41 14 DVPN. Mr. Sterne testified by deposition,  
04:41 15 but he said he didn't know what was in that  
04:41 16 demonstration. Mr. Kendrick, the same thing. The only  
04:41 17 person you've heard from who was at that demonstration  
04:41 18 was Mr. Saydjari, and he testified to you he wasn't sure  
04:41 19 what was demonstrated and he didn't think they used a  
04:41 20 DNS trigger as the patent called for.

04:41 21 And Aventail, the evidence is undisputed  
04:41 22 that Aventail is point-to-point and that that is not a  
04:41 23 VPN by Judge Davis' definition.

04:41 24 The documents you saw in which people in  
04:42 25 2002 or so described Aventail as being a network, as

04:42 1 being a VPN connection, they didn't have Judge Davis'  
04:42 2 definition about what that phrase means in this case.

04:42 3 And finally, how much is a reasonable  
04:42 4 royalty? Consider these facts: There was a recession  
04:42 5 in 2001. It mostly affected tech companies.

04:42 6 Mr. Munger explained to you how at the  
04:42 7 time he came up with this invention, most people were  
04:42 8 using slow dial-up connections and not the rapid  
04:42 9 connections that they have now.

04:42 10 In short, although the seed of his  
04:42 11 invention had been planted, the tree had not yet grown  
04:42 12 because the need had not yet developed in the way that  
04:42 13 it would in the next few years.

04:42 14 But Mr. Munger never told you that he  
04:42 15 couldn't raise money because of 9/11. He told you that  
04:43 16 he was distracted by working at the FBI headquarters for  
04:43 17 a year.

04:43 18 And finally, there was this strange  
04:43 19 discussion about the timing is not right because that  
04:43 20 they -- they couldn't get money in 2001 and Microsoft  
04:43 21 didn't start using it in 2003.

04:43 22 The timing is perfect. The whole point of  
04:43 23 it is that although Mr. Munger and Dr. Short kept on  
04:43 24 comin' and kept on trying, by the time there was a major  
04:43 25 demand for their invention, Microsoft was already using

04:43 1 it.

04:43 2           And once the largest software company in  
04:43 3 the world starts using your invention, you, as a tiny  
04:43 4 company, are going to have very little opportunity to go  
04:43 5 out there and compete with them unless they're made to  
04:43 6 respect your patent rights.

04:43 7           And finally, did we suggest to you that  
04:43 8 the negotiators with Microsoft in this hypothetical  
04:44 9 negotiation in 2003 would have held out for \$242  
04:44 10 million? Not what anyone said at all.

04:44 11           What Mr. Reed suggested to you is that  
04:44 12 Microsoft and the owners of the patent would have agreed  
04:44 13 to a royalty of one-third of a penny for the sales that  
04:44 14 Microsoft would make in the future.

04:44 15           What he also testified is, if you go back  
04:44 16 and do the arithmetic, which, of course, no one knew at  
04:44 17 that time, but today, because of the enormous amount of  
04:44 18 money that Microsoft has made from using this invention,  
04:44 19 that number would come to a total of \$242 million.

04:44 20           THE COURT: Mr. Cawley, your time's  
04:44 21 expired.

04:44 22           MR. CAWLEY: Thank you.

04:44 23           Ladies of the Jury, I appreciate your  
04:44 24 attention. This is now your time to write the last  
04:44 25 chapter of this story, and we look forward to your

04:44 1 answer.

04:44 2 THE COURT: Thank you, Mr. Cawley.

04:45 3 All right, Ladies of the Jury. It's  
04:45 4 almost 5:45. We're about to send you to deliberate. As  
04:45 5 you'll recall, a week ago we started. You've heard the  
04:45 6 opening statements, all the evidence, the Court's  
04:45 7 charge, the closing arguments of counsel. So now is the  
04:45 8 time that you can go to the jury room and begin your  
04:45 9 deliberations.

04:45 10 I have a few instructions to give you in  
04:45 11 that regard.

04:45 12 First of all, only deliberate if all eight  
04:45 13 of you are in the room. If someone has to leave the  
04:45 14 room for a moment, please stop deliberating. And the  
04:45 15 reason for that is important. Everyone needs to hear  
04:45 16 everything that everyone else has to say. So follow  
04:45 17 that instruction during your deliberations.

04:45 18 If you need to communicate with me, again,  
04:45 19 send a note. If you wish to recess this evening and  
04:45 20 resume tomorrow, please send me a note before you do so  
04:45 21 advising me of your plans and outlining what you intend  
04:46 22 to do.

04:46 23 Then I will send you a note back  
04:46 24 confirming that that is acceptable, which I'm sure it  
04:46 25 will be.

04:46 1                   Again, if you do recess tonight, please  
04:46 2 follow my instructions. Do not discuss the case with  
04:46 3 anyone else. Do not discuss the case among yourselves  
04:46 4 unless you're all together and make no independent  
04:46 5 investigation.

04:46 6                   On behalf of all the parties and the  
04:46 7 Court, I want to thank you immensely for your sacrifice  
04:46 8 of time, energy and attention here this week hearing  
04:46 9 this case. And you are now released to the jury room to  
04:46 10 begin your deliberations.

04:46 11                   COURT SECURITY OFFICER: All rise for the  
04:46 12 jury.

04:47 13                   (Jury out.)

04:47 14                   THE COURT: Please be seated.

04:47 15                   All right. Is there anything further from  
04:47 16 the Plaintiff?

04:47 17                   MR. CAWLEY: I don't think so, Your Honor.

04:47 18                   THE COURT: Okay. From the Defendant?

04:47 19                   MR. POWERS: No, Your Honor.

04:47 20                   THE COURT: All right. Thank you.

04:47 21                   Let me just congratulate both sides for a  
04:47 22 very well tried case from both sides, and we'll be in  
04:47 23 recess awaiting the jury's verdict.

04:47 24                   COURT SECURITY OFFICER: All rise.

04:47 25                   (Jury deliberations.)

04:47 1 (Jury out.)

05:00 2 COURT SECURITY OFFICER: All rise.

05:00 3 THE COURT: Please be seated.

05:00 4 COURTROOM DEPUTY: Judge, I have them here

05:00 5 somewhere.

05:00 6 THE COURT: Excuse me?

05:00 7 COURTROOM DEPUTY: Your notes, did I put

05:00 8 them on the bench?

05:00 9 THE COURT: Yeah, I've got it here.

05:01 10 All right. I have a note from the jury

05:01 11 that just states, We've selected a fore -- foreman.

05:01 12 I don't know how they did that, but...

05:01 13 We will be leaving tonight at 6:30 p.m.

05:01 14 and reside -- resume -- I guess it says reside. I guess

05:02 15 that means resume tomorrow at 9:00 a.m. Thank you.

05:02 16 Signed Laura Warr, Jury Foreperson.

05:02 17 So I'm going to send a note back to them

05:02 18 that just says, That will be fine. Remember my

05:02 19 instructions. Wait until everyone is in the jury room

05:02 20 before you begin in the morning. Have a nice evening.

05:02 21 Any objections?

05:02 22 MR. CAWLEY: No objection from Plaintiff,

05:02 23 Your Honor.

05:02 24 MR. BOBROW: No objection, Your Honor.

05:02 25 THE COURT: All right. Now, I'm going to

05:02 1 -- I'll send this note back in, but they do plan to  
05:02 2 deliberate for another 30 minutes, and so they will be  
05:02 3 leaving around 6:30.

05:02 4           So I'm going to ask around 6:30, if you're  
05:02 5 here, an attorney or anybody in the audience, either be  
05:02 6 gone home by then or be in the courtroom by then so that  
05:02 7 the jury can exit without encountering anyone.

05:02 8           And the same thing in the morning.  
05:02 9 They're going to start back at 9:00, so they'll probably  
05:02 10 be here by -- you know, start arriving at a quarter  
05:02 11 till. So I'll say if you wish to be here in the  
05:02 12 morning, arrive and come to the courtroom before 8:45 or  
05:03 13 come after 9:10 to just allow the jury unfettered  
05:03 14 access.

05:03 15           So I will be here until 6:30, but we won't  
05:03 16 resume unless the jury has another note between now and  
05:03 17 then.

05:03 18           MR. CAWLEY: Will someone let us know when  
05:03 19 they've left?

05:03 20           THE COURT: We will. We'll let you know  
05:03 21 when they leave.

05:03 22           MR. BOBROW: Thank you.

05:03 23           THE COURT: Very well. Be in recess.

05:03 24           COURT SECURITY OFFICER: All rise.

05:03 25           (Jury deliberations continued.)

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CERTIFICATION

I HEREBY CERTIFY that the foregoing is a true and correct transcript from the stenographic notes of the proceedings in the above-entitled matter to the best of my ability.

/s/\_\_\_\_\_  
SUSAN SIMMONS, CSR  
Official Court Reporter  
State of Texas No.: 267  
Expiration Date: 12/31/10

\_\_\_\_\_  
Date

/s/\_\_\_\_\_  
JUDITH WERLINGER, CSR  
Deputy Official Court Reporter  
State of Texas No.: 731  
Expiration Date: 12/31/10

\_\_\_\_\_  
Date



# EXHIBIT G

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Reexamination of: )  
 Edmund Munger, et al. )  
 )  
 U.S. Patent No.: 7,188,180 )  
 Filed: November 7, 2003 ) Examiner:  
 Issued: March 6, 2007 ) Andrew L. Nalven  
 )  
 For: METHOD FOR ESTABLISHING ) Group Art Unit: 3992  
 SECURE COMMUNICATION LINK )  
 BETWEEN COMPUTERS OF )  
 VIRTUAL PRIVATE NETWORK )  
 )  
 Reexamination Proceeding )  
 Control No.: 95/001,270 )  
 Filed: December 8, 2009 )

CERTIFICATE OF SERVICE

WE HEREBY CERTIFY that the Declaration of Jason Nieh, Ph.D., Pursuant to 37 C.F.R. § 1.132, filed with United States Patent and Trademark Office on April 19, 2010, was served this 19th day of April, 2010 on Requester by causing a true copy of same to be deposited as first-class mail for delivery to:

William N. Hughet  
Rothwell, Figg, Ernst & Manbeck, P.C.  
1425 K Street N.W.  
Suite 800  
Washington, D.C. 20005

Respectfully submitted,  
McDERMOTT WILL & EMERY LLP

/Toby H. Kusmer/  
Toby H. Kusmer, P.C., Reg. No. 26,418  
Matthew E. Leno, Reg. No. 41,149  
Hasan M. Rashid, Reg. No. 62,390  
McDermott Will & Emery LLP  
Attorneys for Patent Owner  
**Please recognize our Customer No. 23630 as  
our correspondence address.**

28 State Street  
Boston, MA 02109-1775  
Telephone: (617) 535-4000  
Facsimile: (617)535-3800  
tkusmer@mwe.com,  
mleno@mwe.com  
hrashid@mwe.com  
**Date: April 19, 2010**

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 )  
 Reexamination Proceeding )  
 Control No.: 95/001,270 )  
 Filed: December 8, 2009 )

**Declaration of Jason Nieh, Ph.D., Pursuant to 37 C.F.R. § 1.132**

Pursuant to 37 C.F.R. § 1.132, I declare that the following statements are true to the best of my knowledge, information, and belief, formed after reasonable inquiry under the circumstances.

**Background**

1. I have over 15 years of experience with operating systems and distributed systems. More specifically, my experience includes remote access, computer networking, and computer security. Examples of my experience are evidenced by my publication of papers in top-tier networking and security conferences, service on programming committees for networking and security conferences, awards for research work, and receipt of research grants in the field of networking and security. My qualifications, including a description of all of this information, may be found in my curriculum vitae, which is attached hereto as Exhibit A.

2. I earned a Bachelor of Science degree from the Massachusetts Institute of Technology in Electrical Engineering in 1989. I earned a Masters of Science degree from Stanford University in Electrical Engineering in 1990. I also received my Ph.D. in Electrical Engineering from Stanford University in 1999.

3. I joined Columbia University as a faculty member in 1999, where I am now a tenured Associate Professor in the Department of Computer Science. I am also currently the director of the Network Computer Laboratory at Columbia University.

4. My research interests include mobile computing, operating systems, distributed systems, thin-client computing, web and multimedia systems, and performance evaluation. I have

supervised a number of Ph.D. students who worked on and completed dissertations in the area of networking and security. I also teach courses in advanced operating systems and mobile computing, both of which involve computer networking and security.

5. I have also served as an expert in various litigations in the fields of computer networking and security, which include virtual private networking.

### **Resources I have Consulted**

6. I have been retained by the Patent Owner, VirnetX, Inc., to offer my opinion of the patentability of claims 1, 10, 12-15, 17, 26, 28-31, and 33 of U.S. Patent No. 7,188,180 (“the ‘180 Patent”) in view of the Office Action dated January 19, 2010 (“the Office Action”) received by the Patent Owner in the reexamination of the ‘180 Patent.

7. In preparing this declaration, I have reviewed the ‘180 Patent. I have also reviewed the Office Action. I have also reviewed the Request for *Inter Partes* Reexamination of Patent (“the Request”) to the extent it is adopted by the Office Action. I have also reviewed Appendices A-H to the Request to the extent that they are adopted in the Office Action. Lastly, I have reviewed the references upon which the rejections in the Office Action are based, namely Aventail Connect v3.1/v2.6 Administrator’s Guide (“Aventail”); Microsoft Windows NT Server, Virtual Private Networking: An Overview (“VPN Overview”); IETF RFC 1035 (“RFC 1035”); Kosiur, “Building and Managing Virtual Private Networks” (“Kosiur”); Kaufman, “Implementing IPsec” (“Kaufman”); James M. Galvin, “Public Key Distribution with Secure DNS” (“Galvin”); “Gauntlet® Firewall for Windows NT Administrator’s Guide Version 5.0 (“Gauntlet”); “Microsoft Windows NT Technical Support Hands-on, Self-Paced Training for Supporting Version 4.0” (“Hands-On”); “Microsoft Windows NT Server, Whitepaper: Installing, Configuring, and Using PPTP with Microsoft Clients and Servers” (“Installing NT”); and “Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources” (“Microsoft VPN”).

8. A detailed explanation of the basis for my opinions is set forth in the remainder of this declaration.

### **Detailed Basis for My Opinion**

#### Secure Domain Name and Secure Domain Name Service

9. As I stated above, I have read the ‘180 Patent and understand independent claims 1, 17, and 33 recite a secure domain name and a secure domain name service.

10. As I read the Office Action and the Request, those documents rely on the erroneous premise that a secure domain name is a domain name that just happens to correspond to a secure computer. Alternatively, the Request and Office Action rely on the faulty position that a secure domain name corresponds to an address that simply requires authorization. These assertions are in clear contradiction of the specification to the ‘180 Patent, which takes pains to explain that a secure domain name is different from a domain name that just happens to be associated with a secure computer or just happens to be associated with an address requiring authorization, as shown in the ‘180 Patent at column 51, lines 18-32. To illustrate, in various implementations,

the '180 Patent describes that a secure domain name is a "a non-standard domain name." Examples of such non-standard domain names are described in Claim 11: .scom, .snet, .sorg, .sedu, .smil, and .sgov. Dependent claim 2 also differentiates between a secure domain name and a non-secure domain name in reciting the step of "automatically generating a secure domain name corresponding to a non-secure domain name." To further illustrate, the '180 Patent describes, at column 51, lines 28-32, that "a query [with a secure domain name] to a standard domain name service (DNS) will return a message indicating that the universal resource locator (URL) is unknown." Thus, the inventors demonstrated that the secure domain name recited in claims 1, 17, and 33 of the '180 Patent cannot be properly read to be a domain name that just happens to be associated with a secure computer or just happens to be associated with an address requiring authorization. As seen from the previous sentences, a secure domain name is different from a domain name that just happens to be associated with a secure computer or secure computer network address. For example, as pointed above, the domain name that just happens to correspond to a secure computer or a domain name that just happens to correspond to an address requiring authentication can be resolved, for example, by a conventional domain name service; whereas, as noted above, a secure domain name cannot be resolved by a conventional domain name service, for example.

11. Furthermore, even if the recitation "secure domain name" is defined according to the Request to mean a domain name corresponding to a secure computer or a domain name corresponding to an address requiring authorization for access, various of the cited documents still fail to describe or suggest this feature. Specifically, the relied upon portions of the cited documents describe domain names of computers that do not require authorization for access. Instead, the computers (*e.g.*, a VPN tunnel server or a PPTP server) of the cited documents are for securing a connection between a client computer and a target computer. To this end, the computers (*e.g.*, a VPN tunnel server or a PPTP server) themselves do not have a secure computer network address because they do not require authorization for access or authorization for a client computer to communicate with them. Any client computer can, without authorization, communicate with one of these alleged computers (*e.g.* a VPN tunnel server or a PPTP server); it is the target computer that may require authorization for access. Therefore, neither the domain name of the alleged computers (*e.g.*, a VPN tunnel server or a PPTP server) nor their corresponding computer network address is secure – even if this term is defined according to the Request. As such, these cited documents do not teach a secure computer network address or, correspondingly, a secure domain name.

12. Similarly, the Request and Office Action rely on the faulty position that a secure domain name service is nothing more than a conventional DNS server that happens to resolve domain names of secure computers. Alternatively, the Request and Office Action also rely on the faulty position that a secure domain name service is nothing more than a conventional DNS server that happens to resolve domain names of computers that are used to establish a secure connection, such as a VPN tunnel server or a PPTP server. Again, these arguments are belied by the '180 Patent itself. The specification of the '180 Patent, including column 51, lines 29-45 and column 52, lines 4-26, clearly teaches that the claimed secure domain name service of claims 1, 17, and 33 is unlike a conventional domain name service, which the inventors understood as including both DNS and DNS with public key security according to column 40, lines 6-17 of the '180 Patent. To illustrate, the '180 Patent explicitly states that a secure domain name service can resolve addresses for a secure domain name; whereas, a conventional domain name service

cannot resolve addresses for a secure domain name: in an embodiment described at column 51, lines 18-45, the '180 Patent states that "[b]ecause the secure top-level domain name is a non-standard domain name, a query to a standard domain name service (DNS) will return a message indicating that the universal resource locator (URL) is unknown." A secure domain name service is not a domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be associated with a secure domain name. A secure domain name service of the '180 Patent, instead, recognizes that a query message is requesting a secure computer network address and performs its services accordingly. Furthermore, in various implementations, the '180 Patent describes a secure domain name service as providing additional functionalities not available with a conventional domain name service, as described above in the '180 Patent at column 52, lines 4-26. The '180 Patent, at column 40, lines 6-17, even describes the drawbacks of the conventional scheme of a traditional DNS and public key security:

One conventional scheme that provides secure virtual private networks over the Internet provides the DNS server with the public keys of the machines that the DNS server has the addresses for. This allows hosts to retrieve automatically the public keys of a host that the host is to communicate with so that the host can set up a VPN without having the user enter the public key of the destination host. One implementation of this standard is presently being developed as part of the FreeS/WAN project (RFC 2535).

The conventional scheme suffers from certain drawbacks. For example, any user can perform a DNS request. Moreover, DNS requests resolve to the same value for all users.

Thus, it is my belief that the secure domain name service recited in claims 1, 17, and 33 of the '180 Patent is different from a conventional domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name.

13. Given my statements above, I do not believe that the references cited in the Office Action teach or disclose the secure domain name and secure domain name service recited in claims 1, 17, and 33.

#### The Aventail Reference

14. After reviewing the Aventail reference, I understand Aventail to disclose a system and architecture for transmitting data between two computers using the SOCKS protocol. The system according to Aventail routes certain, predefined network traffic from a WinSock (Windows sockets) application to an extranet (SOCKS) server, possibly through successive servers. Upon receipt of the network traffic, the SOCKS server is disclosed to transmit the network traffic to the Internet or external network. Aventail's disclosure is limited to connections created at the socket layer of the network architecture.

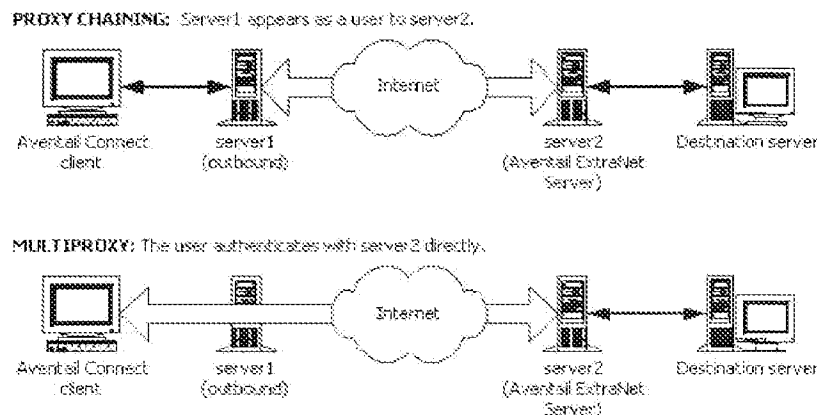
15. I note that pages 9-12 of Aventail discuss the basics of the operation of Aventail Connect, the software necessary to implement the system disclosed in Aventail. According to page 9 of Aventail, a component of the Aventail Connect software described in the reference resides between WinSock and the underlying TCP/IP stack. Accordingly, the Aventail Connect

software is disclosed to intercept all connection requests from the user, and determines whether each request matches local, preset criteria for redirection to a SOCKS server.

16. According to page 12 of Aventail, if redirection is appropriate, then Aventail Connect creates a false DNS entry to return to the requesting application. Aventail discloses that Aventail Connect then forwards the destination hostname identified in the DNS request to the extranet SOCK server over a SOCKS connection.

17. Although Aventail is generally silent on the operation of the SOCKS server, I understand from page 12 that the SOCKS server performs the hostname resolution. Once the hostname is resolved, the user can transmit data over a SOCKS connection to the SOCKS server. The SOCKS server, then, separately relays that transmitted data to the target.

18. Page 12 of the Request, adopted by the Examiner in the Office Action, also cites the “Proxy Chaining” and “MultiProxy” modes disclosed in Aventail at pages 68-73. I have reproduced below a figure taken from page 72 of Aventail depicting these two modes.



19. In the “Proxy Chaining” mode, Aventail discloses that a user can communicate with a target via a number of proxies such that each proxy server acts as a client to the next downstream proxy server. As shown above, in this mode, the user does not communicate directly with the proxy servers other than the one immediately downstream from it.

20. In the “MultiProxy” mode, Aventail discloses that the user, via Aventail Connect, connects through each successive proxy server directly.

21. Regardless of whether one of these modes is enabled, as shown in the figure, an external SOCKS server is necessary and the operation of Aventail Connect, for the purposes of my opinion, does not materially differ based on whether one of these modes is enabled.

22. The Office Action at page 6 asserts that a hostname (*e.g.*, the alleged secure domain name) is secure because this traffic is routed through a SOCKS server and utilizes authentication methods and in some cases encryption. It thus interprets a secure domain name to be a domain name associated with a secure computer. This is incorrect for the reasons I stated in ¶¶ 9-12.

23. The Office Action at page 7 also suggests that a DNS server that can resolve addresses of secure computers corresponds to a secure domain name service. Aventail has not been shown

to teach anything more than a conventional DNS. As I stated in ¶¶ 9-12, however, a secure domain name service cannot be properly read to be a conventional domain name service. A secure domain name service is not a domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name.

24. The Request at page 15 also asserts that Aventail discloses two look-up services, alleged to be described on pages 8 and 12 of that reference. On page 8, Aventail discloses the traditional protocol for a computer to connect to a remote host. On page 12, Aventail discloses “forward[ing] the host-name to the extranet (SOCKS) server [where] the SOCKS server performs the hostname resolution.” Here, Aventail has not been shown to disclose anything other than a traditional DNS. As I stated in ¶¶ 9-12, however, a secure domain name service is unlike a conventional domain name service. A secure domain name service is not a domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name. As such, Aventail fails to teach a secure domain name and a secure domain name service, as recited in claims 1, 17, and 33.

25. Aventail also has not been shown to teach sending an access request message to a secure computer network address using a virtual private network communication link, as recited in claims 1, 17, and 33. The links created by the systems and methods disclosed in Aventail differ from the virtual private network communication link recited in claims 1, 17, and 33. First, Aventail has not been shown to demonstrate that computers connected via the Aventail system are able to communicate with each other as though they were on the same network. Aventail discloses establishing point-to-point SOCKS connections between a client computer and a SOCKS server. The SOCKS server then relays data received to the intended target. Aventail does not disclose a virtual private network, as recited in claims 1, 17, and 33, where data can be addressed to one or more different computers across the network, regardless of the location of the computer.

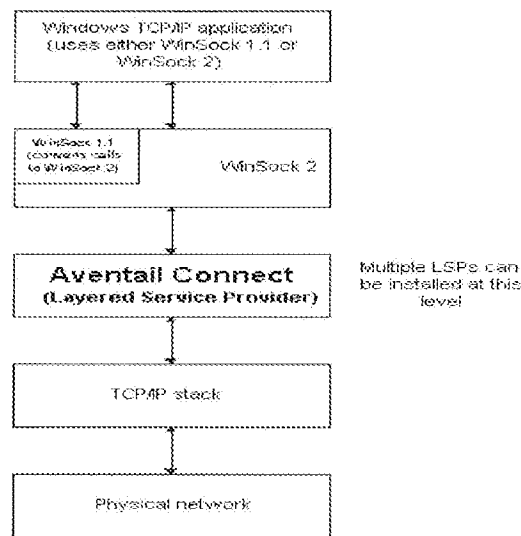
26. For example, suppose two computers, A and B, reside on a public network. Further, suppose two computers, X and Y, reside on a private network. If A establishes a VPN connection with X and Y’s network to address data to X, and B separately establishes a VPN connection with X and Y’s network to address data to Y, then A would nevertheless be able to address data to B, X, and Y without additional set up. This is true because A, B, X, and Y would all be a part of the same virtual private network.

27. In contrast, suppose, according to Aventail, which only discloses communications at the socket layer, A establishes a SOCKS connection with a SOCKS server for relaying data to X, and B separately establishes a SOCKS connection with the SOCKS server for relaying data to Y. In this situation, not only would A be unable to address data to Y without establishing a separate SOCKS connection (*i.e.* a VPN according to the Office Action), but A would be unable to address data to B over a secure connection. This is one example of how the cited portions of Aventail fail to disclose a virtual private network.

28. Second, according to Aventail, Aventail Connect’s fundamental operation is incompatible with users transmitting data that is sensitive to network information. As stated



above, Aventail discloses that Aventail Connect operates between the WinSock and TCP/IP layers, as depicted on page 9:



Because Aventail discloses that Aventail Connect operates between these layers, it can intercept DNS requests. Aventail discloses that Aventail Connect intercepts certain DNS requests, and returns a false DNS response to the user if the requested hostname matches a hostname on a user-defined list. Accordingly, Aventail discloses that the user will receive false network information from Aventail Connect for these hostnames. If the client computer hopes to transfer to the target data that is sensitive to network information, Aventail Connect's falsification of the network information would prevent the correct transfer of data. Thus, Aventail has not been shown to disclose a VPN, as recited in claims 1, 17, and 33.

29. Third, Aventail has not been shown to disclose a VPN, as recited in claims 1, 17, and 33, because computers connected according to Aventail do not communicate directly with each other. Aventail discloses a system where a client on a public network transmits data to a SOCKS server via a singular, point-to-point SOCKS connection at the socket layer of the network architecture. The SOCKS server then relays that data to a target computer on a private network on which the SOCKS server also resides. All communications between the client and target stop and start at the intermediate SOCKS server. The client cannot open a connection with the target itself. Therefore, one skilled in the art would not have considered the client and target to be virtually on the same private network. Instead, the client computer and target computer are deliberately separated by the intermediate SOCKS server.

#### The VPN Overview and RFC 1035 References

30. According to its abstract, VPN Overview provides an overview of VPNs, describing their basic requirements, and some of key technologies that permit private networking over public networks. For example, referring to FIG. 2 of VPN Overview, which I have reproduced below, a VPN is shown to connect a remote user to a corporate Intranet.

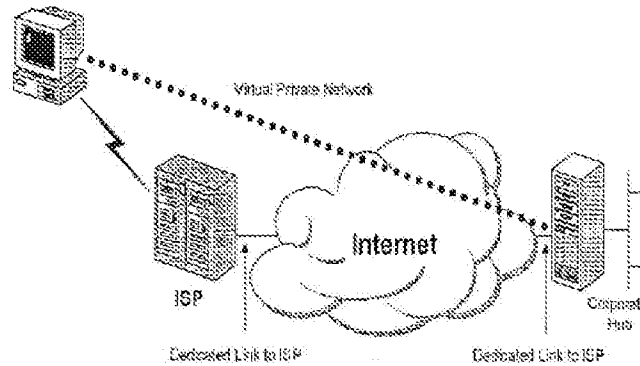


Figure 2: Using a VPN to connect a remote client to a private LAN

To this end, according to page 8 of VPN Overview, a user calls a local ISP and using the connection to the local ISP, the VPN software creates a virtual private network between the dial-up user and the corporate VPN server across the Internet.

31. VPN Overview provides no indication that the client is sending a domain name to the Front End Processor (“FEP”) to establish a connection; instead, the indication is that the client is establishing a dial-up connection to the FEP. At page 22, VPN Overview states “[i]n the Internet example, the client computer places a dial-up call to a tunneling-enabled NAS at the ISP.” Even assuming for the sake of argument that the alleged domain name is sent from the client to the FEP, the VPN Overview provides no evidence that the alleged domain name is a secure domain name in the context of this application. As I stated in ¶¶ 9-12, a secure domain name, as recited in claims 1, 17, and 33 of the ‘180 Patent, is not a domain name that just happens to be associated with a computer used to establish a secure connection. The Request also alleges that VPN Overview describes a secure domain name because the domain name for the VPN tunnel server happens to correspond to a network address allegedly requiring authentication. As I stated in ¶¶ 9-12, however, a secure domain name is not a domain name that so happens to correspond to a network address for a server involved in securing communications.

32. The domain name of the VPN tunnel server is also not a secure domain name, even if this recitation is incorrectly defined according to the Request. The Request asserts that a secure domain name corresponds to a secure computer network address. However, the address of the VPN tunnel server is not a secure computer network address, for the reasons I stated in ¶ 11. Assuming for the sake of argument that the Request correctly interprets a secure computer network address to be associated with a computer which requires authorization for access, then, without authorization for access, a client computer cannot communicate with a secure computer network address. In VPN Overview, however, a client computer may communicate with a VPN tunnel server without pre-authorization to access the hosts protected by the VPN tunnel server. Thus, because the VPN tunnel server of the reference does not require authorization for access, it is not associated with a secure computer network address, and therefore also cannot be associated with a secure domain name.

33. VPN Overview also has not been shown to teach a secure domain name service. VPN Overview, on page 26, describes that redundancy and load balancing is accomplished using round-robin DNS to split requests among a number of VPN tunnel servers that share a common

security perimeter. The round-robin DNS, however, is no different from a conventional DNS. As I stated in ¶¶ 9-12, however, a secure domain name service is not a conventional DNS. Specifically, a secure domain name service is not a domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name.

34. The proposed combination of VPN Overview and RFC 1035 has not been shown to describe or suggest a secure domain name and a secure domain name service as recited in claims 1, 17, and 33. RFC 1035, at page 4, describes user programs that interact with the domain name space through resolvers; the format of user queries and user responses is specific to the host and its operating system. User queries will typically be operating system calls, and the resolver and its cache will be part of the host operating system. Resolvers answer user queries with information they acquire via queries to foreign name servers and the local cache.

35. Even assuming for the sake of the argument that this description supports the allegation that the user query corresponds to a domain name and the resolver corresponds to a domain name service, RFC 1035 still fails to describe or suggest a secure domain name and a secure domain name service, as I outlined in ¶¶ 9-12 above. RFC 1035 is not seen to show anything other than a conventional DNS.

36. The Request also points to no evidence that distinguishes the alleged DNS of RFC 1035 from a conventional DNS. Instead, the Request merely states that RFC 1035, on page 22, discloses that the domain name is sent to a domain name service for resolution and then passed back the IP address. As stated above in ¶¶ 9-12, a secure domain name service is unlike a conventional DNS. Specifically, a secure domain name service is not a domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name. As such, the proposed addition of subject matter from RFC 1035 fails to remedy the shortcomings of VPN Overview to describe or suggest a secure domain name or secure domain name service, as recited in claims 1, 17, and 33.

37. Furthermore, the proposed combination of the VPN Overview and RFC 1035 also fails to describe or suggest a secure domain name or a secure domain name service even if these recitations are incorrectly defined as suggested by the Request. The Request, at pages 21-22, asserts that the secure domain name corresponds to a secure computer network address, and a secure domain name service corresponds to a lookup service that returns a secure network address for the requested secure domain name. The proposed combination of the VPN Overview and RFC 1035, in fact, does not teach these features.

38. The proposed combination of the VPN Overview and RFC 1035, at best, shows a DNS server that can allegedly receive the domain name of the VPN tunnel server and can allegedly resolve and return the IP address for the domain name of the VPN tunnel server. As noted above, the issue is that the purpose of the VPN tunnel server is to secure a connection to resources behind the VPN tunnel server. To this end, for the reasons I stated in ¶ 11, the VPN tunnel server itself is not secure – that is, it does not require authorization for access. Therefore, neither the domain name of the VPN tunnel server nor its corresponding computer network address is secure – even if this term is defined as proposed by the Request.

39. As such, even under the Request's incorrect claim interpretation, the proposed combination of the VPN Overview and RFC 1035 has not been shown to describe or suggest a secure domain name or a secure domain name service, as recited in claims 1, 17, and 33.

#### The Kosiur Reference

40. Kosiur has not been shown to describe or suggest a secure domain name or a secure domain name service, as recited in claims 1, 17, and 33. At pages 295-96, Kosiur describes protecting external access to a company's intranet by establishing two corporate DNS servers: one external to the firewall and one internal. The external corporate DNS includes a list of hosts that the company permits the public to access, such as, for example, the company's e-mail gateway, public web site, and anonymous FTP server. The internal corporate DNS includes a list of hosts that only the company's internal network users are permitted to access. When an internal host attempts to access an external host, the internal DNS server forwards the DNS request to the external DNS server. In the reverse, however, if an external host attempts to access an internal host, then the external host must connect to the internal DNS server through a VPN.

41. Although Kosiur describes a domain name, it does not describe a secure domain name, as recited in claims 1, 17, and 33. The Request asserts that Kosiur discloses "domain name usage with VPN enabled servers and computers." These domain names, the Request asserts, are "secure" because the domain names correspond to a network address that requires authentication. This is incorrect. Such a reading of a claim is contrary to its meaning and reads out a critical aspect of the invention. For the reasons I stated in ¶¶ 9-12, a secure domain name is not a domain name that just happens to correspond to a network address that requires authentication.

42. Kosiur has also not been shown to disclose a secure domain name service, as recited in claims 1, 17, and 33. The Request alleges that a secure domain name service is a look-up request to a domain name service to resolve a domain name identifying VPN resources. Kosiur describes an internal DNS and an external DNS for resolving addresses of internal hosts and external hosts respectively. Kosiur has not been shown to disclose that either the internal or external DNS is different from a conventional DNS. Further, the Request provides no evidence that the DNS disclosed by Kosiur is different from a conventional DNS. The Request, at page 28 simply states that "Kosiur discloses at pages 293-296 that domain name resolution occurs at DNS servers. The DNS servers pass back the corresponding network address." Thus, Kosiur has not been shown to disclose anything other than a conventional DNS, and, as I stated in ¶¶ 9-12, a secure domain name service is not a conventional domain name service. Specifically, a secure domain name service is not a domain name service that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name.

43. As such, Kosiur has not been shown to teach a secure domain name or a secure domain name service, as recited in claims 1, 17, and 33.

The Kaufman Reference

44. At page 2, Kaufman discloses the use of IPsec to secure communications through the Internet using authentication and encryption. At page 128, Kaufman also describes a domain name service being an integral part of the Internet and of any normal IP network. At page 243, the domain name service is described as a protocol used to support hierarchical resolution of host names to IP addresses (and vice versa) in the Internet. Kaufman also describes that a layer 2 tunneling protocol allows a host to establish a virtual presence on a corporate network over a remote connection. Because the tunnel is at layer 2 and terminates on a home gateway, the remote host can receive an IP address internal to its home network. The Request alleges that an IPsec connection request over the Internet for a secured resource can use, for example, a DNS server to resolve the request. Even assuming, *arguendo*, this assertion is correct, it falls short of describing a secure domain name or a secure domain name service, as recited in claims 1, 17, and 33.

45. Kaufman has not been shown to teach or disclose a secure domain name, as recited in claims 1, 17, and 33. Similar to previous assertions, the Request suggests that Kaufman describes a secure domain name simply because it describes a domain name corresponding to a network address involving security (*e.g.* a computer protected by a home network). As I stated in ¶¶ 9-12, however, a secure domain name cannot be properly read to be a domain name that just happens to be associated with a computer network address requiring authentication because this interpretation is inconsistent with the meaning adopted by the inventors of the '180 Patent.

46. Kaufman also has not been shown to describe or suggest a secure domain name service, as recited in claims 1, 17, and 33. The Request, at page 32, alleges that a “‘secure domain name service’ includes any lookup service that resolves a secure domain name.” Assuming, for the sake of argument, that Kaufman discloses a secure domain name, Kaufman has not been shown to disclose a secure domain name service because it has only been shown to disclose a conventional DNS. As I provided in ¶¶ 9-12, a secure domain name service is unlike a conventional DNS. Specifically, a secure domain name service is not a conventional DNS that resolves a domain name query that, unbeknownst to the secure domain name service, happens to be requesting resolution of a secure domain name.

47. The Request also seems to allege that Kaufman’s disclosure of DNS Security (“DNSSEC”) is a secure domain name service. To the extent Kaufman even discloses DNSSEC, that protocol merely teaches protecting the integrity of the traditional DNS resolution process. This “conventional scheme” of protecting the integrity of DNS resolution is also explicitly disclosed in column 40, lines 6-14 of the specification of the '180 Patent as being conventional:

One conventional scheme that provides secure virtual private networks over the Internet provides the DNS server with the public keys of the machines that the DNS server has the addresses for. This allows hosts to retrieve automatically the public keys of a host that the host is to communicate with so that the host can set up a VPN without having the user enter the public key of the destination host. One implementation of this standard is presently being developed as part of the FreeS/WAN project (RFC 2535).

As I noted above, the inventors had explicitly contemplated this “conventional scheme” of performing DNS resolution, and nevertheless claimed a secure domain name service as being something different. The addition of security to protect the integrity of a traditional DNS look-up does not teach a secure domain name service for the same reasons as I identified in ¶¶ 9-12.

48. Kaufman has not been shown to describe or suggest a secure domain name or a secure domain name service as recited in claims 1, 17, and 33.

#### The Kaufman and Galvin References

49. I incorporate here my statements made immediately above in ¶¶ 42-46 regarding Kaufman.

50. According to page 38 of the Request, Galvin is cited to teach “a second type of ‘secure domain name service’ that includes digitally signed resource records.” Galvin at §§ 1 and 3.2 discloses using a public key in the DNS resolution process to protect the integrity of the process. This “conventional scheme” protecting the integrity of DNS resolution is also explicitly disclosed in column 40, lines 6-14 of the specification of the ‘180 Patent:

One conventional scheme that provides secure virtual private networks over the Internet provides the DNS server with the public keys of the machines that the DNS server has the addresses for. This allows hosts to retrieve automatically the public keys of a host that the host is to communicate with so that the host can set up a VPN without having the user enter the public key of the destination host. One implementation of this standard is presently being developed as part of the FreeS/WAN project (RFC 2535).

Thus, the inventors had explicitly contemplated this “conventional scheme” of performing DNS resolution, and nevertheless claimed a secure domain name service as being something different.

51. This aspect of Galvin does not teach the secure domain name service recited in claims 1, 17, and 33. The Request assumes that a “secure domain name service” is a conventional domain name service which issues a public key to ensure that the service is trustworthy. As I stated above, however, in ¶¶ 9-12, disclosure of a conventional domain name service does not disclose a secure domain name service. The addition of a public key to ensure the integrity of a DNS look-up does not teach a secure domain name service. As such, Galvin fails to remedy the shortcomings of Kaufman to describe or suggest a secure domain name service as recited in claims 1, 17, and 33.

#### The Gauntlet Reference

52. According to Gauntlet at page 1-1, “[a] firewall is a single point of defense that protects one side from the other. In networking situations, this usually means protecting a company’s private network from other networks to which it is connected.” Gauntlet teaches a system that prohibits all network traffic through the firewall unless it is “expressly permitted.”

53. The disclosed firewall operates as follows, as described on pages 1-6 to 1-8. The firewall necessarily must see the network traffic communicating with the protected side of the wall, *i.e.*, the private network. After receiving a packet, the firewall checks the source and destination address of the packet against its user-defined rules, and then checks the type of request sought. If the requested service is supported and authorized, the appropriate program is called and the request is processed.

54. According to pages 5-1 to 5-2, when determining if access should be permitted or denied, the firewall checks the IP address provided in the packet request against the user-provided rules. The rules can be defined by hostname or by IP address. Because the received packet identifies sources and destinations by IP addresses, if the rule is defined by hostname, additional steps are taken to convert an IP address identified in the packet to a hostname. In other words, “the proxy must use DNS to map the source or destination address (in the packet) into a host name” – the proxy performs a reverse DNS lookup.

55. According to chapter 18 of Gauntlet, the Gauntlet firewall also offers Point-to-Point Tunneling Protocol (“PPTP”) services to permit clients on an untrusted network to establish connection to a PPTP server on the protected network. To allow PPTP connections, however, the administrator of the firewall “must advertise the IP address of the PPTP server” and users “must connect directly to the server IP address.” To “advertise” an IP address, as used in Gauntlet, merely requires that the IP address be accessible to the public.

56. The Request alleges that, since PPTP connections can be identified using domain names, where a domain name corresponds to a PPTP enabled server, its domain name is a secure domain name. As I stated in ¶¶ 9-12, a secure domain name cannot be properly read to be a domain name that just happens to be associated with a server which is used to establish PPTP connections between a client and a target.

57. Similarly, to the extent that Gauntlet describes a conventional DNS, a secure domain name service cannot be properly read to be a conventional DNS. The Request alleges that, since PPTP connections can be identified using domain names, where a domain name corresponds to a PPTP enabled server, its domain name is a secure domain name, and the resolution of that domain name into a network address occurs at a secure domain name service. First, Gauntlet discloses at 18-1 that the administrator of the firewall “must advertise the IP address of the PPTP server” and users “must connect directly to the server IP address.” Gauntlet has not been shown to disclose a DNS resolution for a hostname for a PPTP server. Second, to the extent that Gauntlet describes a DNS, it describes a conventional DNS and not a secure DNS. As noted at the outset of Section I.C., a secure domain name service differs from a conventional DNS, as I demonstrated in ¶¶ 9-12.

58. The Request also alleges that the use of a PPTP service, offered by the Gauntlet firewall software, requires the use of a PPTP server whose network address is a secure computer network address. The Gauntlet firewall offers PPTP services to permit clients on an untrusted network to establish connection to a PPTP server on the protected network. The network address of a PPTP server, however, is not a secure computer network address because it does not require authorization for access, as I stated above in ¶ 11. That is, a client can communicate with the PPTP server without authorization.

The Hands-On and Installing NT References

59. Installing NT is a white paper on the PPTP network protocol. According to pages 20-22, Installing NT discloses the creation of a phonebook entry to dial a PPTP server. The Request refers to Figure 12 in that reference to disclose a domain name for a PPTP server; the Figure is reproduced below:

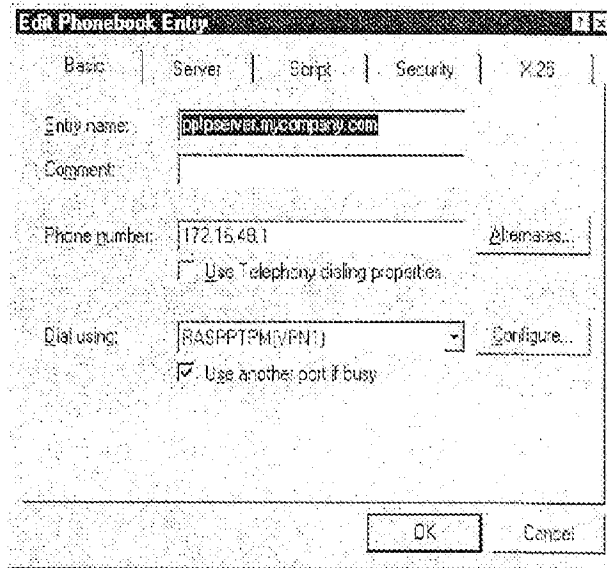


Figure 12 - Example Phonebook entry for PPTP server and a VPN device

The Request, at pages 47-48, refers to this figure to state that “PPTP connections can be identified using domain names” by indicating that the “Entry name” in the Figure is the domain name. This is incorrect. The “Entry name” is simply an arbitrary name to identify the Phonebook entry. It does not *correspond* to a domain name of a PPTP server that would be resolved to via a “traditional DNS server” to the network address of the PPTP server, as asserted on page 48 of the Request.

60. Hands-On is a technical and training manual for Microsoft Windows NT. The Request describes Hands-On as disclosing PPTP, traditional DNS according to RFC 1035, and an AutoDial feature, which I describe below.

61. The Request alleges that Installing NT teaches that a name for a PPTP server is a “secure domain name.” The Request, at page 47, asserts that a PPTP server’s network address is a secure network address and that identifying the PPTP server with a domain name teaches a “secure domain name.” To the contrary, such an arbitrary identification is not a secure domain name. As I demonstrated above in ¶¶ 9-12, a secure domain name cannot be properly read to be a domain name that just happens to be associated with a server which is used to establish PPTP connections between a client and a target. Neither the Office Action nor the Request demonstrate any aspect of Installing NT that teaches or discloses anything other than a domain name that just happens to be associated with a PPTP server.

62. Hands-On similarly has not been shown to describe this feature. Notably, the Request does not rely on this reference to show this feature. Nevertheless, for the reasons I stated in ¶¶ 9-



12, to the extent that Hands-On discloses domain names, such a disclosure does not teach or disclose a secure domain name, as recited in claims 1,17, and 33.

63. The Request also alleges that Hands-On discloses a secure domain name service. The Request asserts that Hands-On discloses two “lookup services” that allegedly disclose the secure domain name service recited in claims 1, 17, and 33. The first one is a “traditional DNS server.” According to the Request, sending a query message to a traditional DNS to resolve the domain name of the PPTP server disclosed in Installing NT (and described above) renders the traditional DNS a secure domain name service. As I stated previously at ¶¶ 9-12, a conventional DNS is not transformed into a secure domain name service by merely resolving a query, that, unbeknownst to the secure domain name service, is requesting the address of a PPTP server.

64. The second “look-up service” disclosed in Hands-On also does not disclose the secure domain name service of claims 1, 17, and 33. This “alternative ‘lookup service’” is called AutoDial. According to Hands-On at 462, AutoDial “maps and maintains network addresses to phonebook entries” such that, when an application or command requests access to an IP address, the client computer will match that network address to the phonebook entry and dial the phone number associated with that network address. Although an AutoDial database can include IP addresses and Internet host names, these addresses are each associated with a phonebook entry, which provides a phone number to be dialed for connecting with said IP addresses and Internet host names. Thus, AutoDial is not disclosed to resolve domain names to IP addresses, much less to resolve a secure domain name into a secure computer network address. Nevertheless, even assuming for the sake of argument that AutoDial were shown to teach a conventional DNS, a conventional DNS does not teach a secure domain name service, as I described in ¶¶ 9-12 above.

65. The Request also alleges that, because a PPTP server, which enables a PPTP connection between a client and a target, may be referenced by a domain name, its domain name is a “secure domain name” and its network address is a “secure computer network address.” The network address for a PPTP server is not a secure network address because a client can communicate with the PPTP server without authorization, as I stated above in ¶ 11.

#### The Microsoft VPN Reference

66. Microsoft VPN is a compilation of various Microsoft documents. As identified by the Request at page 52, Microsoft VPN discloses PPTP connections for remote users to access a corporate network. Microsoft VPN discloses at page 32, creating an IP address or host name of a corporate office “VPN” server. Microsoft VPN also discloses a conventional DNS structure at pages 64-66. Microsoft VPN, however, has not been shown to teach or disclose a secure domain name or a secure domain name service, as recited in claims 1, 17, and 33.

67. The Request asserts that the hostname associated with a PPTP server, which is used to establish PPTP connections between a client and a target computer is a secure domain name. This is incorrect. A secure domain name cannot be properly read to be a domain name that just happens to be associated with a server which is used to establish PPTP connections between a client and target, as I stated above in ¶¶ 9-12.

Control No.: 95/001,270  
Declaration of Jason Nieh, Ph.D.


68. The Request, at page 54, also alleges that, since Microsoft VPN discloses a conventional DNS, which resolves domain names, a DNS request for the IP address for a PPTP server renders the traditional DNS a secure domain name service. A conventional DNS is not transformed into a secure domain name service merely by resolving a request for the IP address of a server which is used to establish PPTP connections. As I stated in ¶¶ 9-12, above, disclosure of a conventional DNS does not disclose a secure domain name service, as recited in claims 1, 17, and 33.

69. The Request, at page 54, also alleges that the network address of a PPTP server, which enables a PPTP connection between a client and a target, is a “secure computer network address.” The network address for a PPTP server is not a secure network address because a client can communicate with the PPTP server without authorization, as I stated above in ¶ 11. Further, because it does not have a secure computer network address, its domain name cannot be secure domain name.

#### **Truth and Accuracy of Statements**

70. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that willful false statements or the like may jeopardize the validity of the application or any patent issuing thereon.

Signed at New York, New York this 19 th day of April, 2010.

  
\_\_\_\_\_  
Jason Nieh, Ph.D.

BST99 1647647-6.077580.0090

# EXHIBIT A

# Jason Nieh - Curriculum Vitae

Columbia University  
Department of Computer Science  
1214 Amsterdam Ave. MC0401  
New York, NY 10027-7003

Office: (212) 939-7160  
Fax: (212) 666-0140  
nieh@cs.columbia.edu  
<http://www.cs.columbia.edu/~nieh>

## RESEARCH INTERESTS

Mobile computing, operating systems, distributed systems, thin-client computing, web and multimedia systems, and performance evaluation.

## EDUCATION

Ph.D. Electrical Engineering, **Stanford University**, Stanford, CA, June 1999. Dissertation: "The Design, Implementation, and Evaluation of SMART: A Scheduler for Multimedia Applications", advisor Monica S. Lam.

M.S. Electrical Engineering, **Stanford University**, Stanford, CA, June 1990.

B.S. Electrical Engineering, **Massachusetts Institute of Technology**, Cambridge, MA, June 1989. Dissertation: "Using Special-Purpose Computing to Examine Chaotic Behavior in Nonlinear Mappings", advisor Gerald J. Sussman.

## HONORS

*IBM Faculty Award*, 2004, 2006, 2008.

*LISA Best Student Paper Award*, 2005.

*Sigma Xi Young Investigator Award*, 2004. Awarded biennially to one individual for scientific achievement in the physical sciences and engineering. First computer scientist to receive this national award.

*ACM MobiCom Best Student Paper Award*, 2004.

*Distinguished Faculty Teaching Award, Columbia Engineering School Alumni Association*, 2004. Awarded to the top two instructors in the School of Engineering and Applied Science at Columbia University.

*IBM Shared University Research (SUR) Award*, 2000, 2004.

*IBM Performance Modeling and Analysis PIC Best Paper Award*, 2004.

*Department of Energy Early Career Principal Investigator Award*, 2003.

*National Science Foundation Faculty Early Career Development (CAREER) Award*, 2001.

*Sun Microsystems SAM Award*, 1994.

*GE Foundation Fellowship*, 1989.

*California Microelectronics Fellowship*, 1989 (declined).

*AT&T Engineering Scholarship*, 1986-1989.

*Member, Eta Kappa Nu*, 1988.

*Member, Sigma Xi*, 1988.

*Member, Tau Beta Pi*, 1988.

## PROFESSIONAL EXPERIENCE

Associate Professor of Computer Science, **Columbia University**, New York, NY, 2003 - present.

Director, Network Computing Laboratory, **Columbia University**, New York, NY, 2000 - present.

Founder, **Guitar Notes, Inc.**, New York, NY, 1996 - present.

Expert Witness, *01 Communique Laboratory v. Citrix Systems*, **Goodwin Procter**, Boston, MA, 2006 - 2008.

Chief Scientist, **DeskTone**, Chelmsford, MA, 2006 - 2007.

1<sup>st</sup> Scholar in Residence, **VMware**, Palo Alto, CA, 2006 - 2007.

Consultant, *Rothschild Trust v. Citrix Systems*, **Goodwin Procter**, Boston, MA, 2006.  
Technical Advisor, *Microsoft Consent Decree*, **States of NY, OH, IL, KY, LA, MD, MI, NC, and WI**, 2003 - 2006.  
Expert Witness, *Cox v. Microsoft*, **Milberg Weiss Bershad and Schulman**, New York, NY, 2005 - 2006.  
Assistant Professor of Computer Science, **Columbia University**, New York, NY, 1999 - 2003.  
Chairman of Technology Office and Director, **TrueMetrix**, New York, NY, 1999 - 2000.  
Technical Consultant, **Vertex Management**, Redwood Shores, CA, 1996 - 1997.  
Academic Consultant, **Sun Microsystems Laboratories**, Mountain View, CA, 1993 - 1998.  
Research Assistant, Dept. of Electrical Engineering, **Stanford University**, Stanford, CA, 1990 - 1998.  
Summer Institute in Parallel Computing, **Argonne National Laboratories**, Argonne, IL, 1991.  
Undergraduate Researcher, **Massachusetts Institute of Technology**, Cambridge, MA, 1987 - 1989.  
Summer Intern, **AT&T Bell Laboratories**, Lincroft, Middletown, and Murray Hill, NJ, 1986 - 1988.

**RESEARCH SUPPORT** (all co-principal investigators at Columbia University unless otherwise noted)

1. Principal Investigator, "TC:Small: Exploiting Software Elasticity for Automatic Software Self-Healing", Trustworthy Computing Program, **National Science Foundation**, CNS-0914845, \$450,000, Sept. 1, 2009 - Aug. 31, 2012, with Angelos D. Keromytis.
2. Co-Principal Investigator, "CSR: Medium: Guanyin: a Thousand hands with a Thousand eyes for Distributed Software Checking", Computer Systems Research Program, **National Science Foundation**, CNS-0905246, \$1,102,000, Sept. 1, 2009 - Aug. 31, 2013, with Junfeng Yang and Gail E. Kaiser.
3. Principal Investigator, "Google Desktop Meets DejaView: Display-Centric Desktop Search", Google Research Award, **Google**, \$70,000, Sept. 1, 2009 - Aug. 31, 2010, with Luis Gravano.
4. Principal Investigator, "Android G1 Dev Phone Equipment Grant", **Google**, \$23,940, Sept. 2009.
5. Principal Investigator, "DejaView / Android Development", Center for Advanced Technology in Telecommunications (CATT), **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$20,000, Sept. 1, 2009 - Feb. 28, 2010.
6. Principal Investigator, "GOALI Supplement to CSR-VSM: Autonomic Mechanisms for Reducing System Downtime due to Maintenance and Upgrades", Grant Opportunities for Academic Liaison with Industry Program, **National Science Foundation**, CNS-0950434, \$66,675, Sept. 1, 2009 - Aug. 31, 2010.
7. Principal Investigator, "CIFellow: Michael Hines", Subaward through Computing Community Consortium and Computing Research Association, **National Science Foundation**, CNS-0937060, \$140,000, Sept. 1, 2009 - Aug. 31, 2010.
8. Principal Investigator, "An Open Standard for Advanced Display and Application Remoting", IBM Faculty Award, **IBM Research**, \$20,000, July 1, 2008 - June 30, 2009.
9. Principal Investigator, "Remote 3D Gaming Research", **Deutsche Telekom AG, Laboratories**, \$70,930, Sept. 1, 2007 - Aug. 31, 2008.
10. Principal Investigator, "Virtualization Mechanisms for Security", Center for Advanced Technology in Telecommunications (CATT), **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$38,559, July 1, 2007 - June 30, 2008.
11. Principal Investigator, "Virtualization Curriculum Equipment Grant", **VMware**, \$40,000, Sept. 2007.
12. Co-Principal Investigator, "CSR-VSM: Autonomic Mechanisms for Reducing System Downtime due to Maintenance and Upgrades", Computer Systems Research Program, **National Science Foundation**, CNS-0717544, \$350,000, Aug. 1, 2007 - July 31, 2009, with Gail E. Kaiser.

13. Co-Principal Investigator, "Autonomic Recovery of Enterprise-Wide Systems After Attack or Failure with Forward Correction", Multidisciplinary University Research Initiative (MURI), **Air Force Office of Scientific Research (AFOSR)**, USAF/AFRL FA9550-07-1-0527, \$4,826,940, May 1, 2007 - Apr. 30, 2012, with Anup K. Ghosh (George Mason University), Sushil Jajodia, (George Mason University), Angelos D. Keromytis, Salvatore J. Stolfo, and Peng Liu (Pennsylvania State University).
14. Principal Investigator, "Thin-Client Computing Research", **Advanced Micro Devices**, \$50,000, Jan. 1, 2007 - Dec. 31, 2007.
15. Principal Investigator, "Secure Isolation Mechanisms for Untrusted Network Applications", Center for Advanced Technology in Telecommunications (CATT), **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$10,000, July 1, 2006 - June 30, 2007.
16. Co-Principal Investigator, "Security Escorts For Not-Yet Trusted Software", Small Business Technology Transfer Research Program (STTR), **Office of the Secretary of Defense**, O064-SP2-1001, \$99,981, Aug. 15, 2006 - May 15, 2007, with Charles Earl (Stottler Henke Associates).
17. Principal Investigator, "Virtualization Mechanisms for Security", Center for Advanced Technology in Telecommunications (CATT), **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$38,559, July 1, 2006 - June 30, 2007.
18. Principal Investigator, "An Application Streaming Service for Ubiquitous Computing Access", IBM Faculty Award, **IBM Research**, \$20,000, July 1, 2006 - June 30, 2007.
19. Principal Investigator, "BPC Supplement to ITR: Secure Remote Computing Services", Broadening Participation in Computing Program, **National Science Foundation**, CNS-0543869, \$133,565, Sept. 15, 2005 - Sept. 14, 2007.
20. Principal Investigator, "US-Japan Cyber Trust Supplement to ITR: Secure Remote Computing Services", Cyber Trust Program, **National Science Foundation**, CNS-0535343, \$77,280, July 1, 2005 - June 30, 2007.
21. Principal Investigator, "Secure Isolation Mechanisms for Untrusted Network Applications", Center for Advanced Technology in Telecommunications (CATT), **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$12,500, July 1, 2005 - June 30, 2006.
22. Principal Investigator, "Sun Ray Software Performance", Collaborative Research Program, **Sun Microsystems**, \$45,142, Feb. 2005.
23. Principal Investigator, "ITR: Secure Remote Computing Services", Information Technology Research (ITR) for National Priorities Program, **National Science Foundation**, CNS-0426623, \$1,200,000, Sept. 15, 2004 - Aug. 31, 2009, with Gail E. Kaiser and Angelos D. Keromytis.
24. Principal Investigator, "Secure Isolation Mechanisms for Untrusted Network Applications", Center for Advanced Technology in Telecommunications (CATT), **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$12,500, July 1, 2004 - June 30, 2005.
25. Principal Investigator, "Secure Isolation and Transparent Migration of Legacy Applications", IBM Faculty Award, **IBM Research**, \$40,000, July 1, 2004 - June 30, 2005.
26. Principal Investigator, "Secure Isolation and Migration of Linux Applications", Center for Advanced Technology (CAT) in Information Management, **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$70,000, Apr. 19, 2004 - June 30, 2004.
27. Principal Investigator, "Linux Virtualization Phase I", IBM Shared University Research (SUR) Award, **IBM Research**, \$503,027, Mar. 2004.
28. Principal Investigator, "Migration Mechanisms for Large-Scale Parallel Applications", Early Career Principal Investigator Program in Applied Mathematics, Collaboratory Research, Computer Science, and High-Performance Networks, Office of Science, **US Department of Energy**, \$299,589, Aug. 15, 2003 - Aug. 14, 2007.
29. Principal Investigator, "Sun Microsystems Equipment Grant", Collaborative Research Program, **Sun Microsystems**, \$6,195, July 2003.
30. Principal Investigator, "Network Virtualization Mechanisms for Mobile Communication", Networking Research Program, **National Science Foundation**, ANI-0240525, \$249,999, June 1, 2003 - May 31, 2007.

31. Principal Investigator, "Apple Computer Powerbook Award", Apple Developer Connection and Hardware Seed Program, **Apple Computer**, \$7,433, May 2003.
32. Principal Investigator, "ITR: An Experimental Study of Thin-Client Computing Architectures", Information Technology Research (ITR) Program, **National Science Foundation**, CCR-0219943, \$250,000, Sept. 1, 2002 - July 31, 2007.
33. Senior Personnel, "Pervasive Pixels", CISE Research Infrastructure Program, **National Science Foundation**, EIA-0202063, \$1,485,098, Sept. 1, 2002 - Aug. 31, 2007, with Henning Schulzrinne, Steven K. Feiner, Gail E. Kaiser, John R. Kender, Kathleen R. McKeown, Peter K. Allen, Angelos D. Keromytis, Shree K. Nayar, William Noble, Steven M. Nowick, and Kenneth A. Ross.
34. Principal Investigator, "Migration Mechanisms for Autonomic Computing", Center for Advanced Technology (CAT) in Information Management, **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$70,000, July 1, 2002 - June 30, 2003.
35. Principal Investigator, "Inferring Mean Client Response Time at the Web Server", Center for Advanced Technology (CAT) in Information Management, **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$25,000, Apr. 1, 2002 - June 30, 2002.
36. Co-Principal Investigator, "The Columbia Hot Spot Rescue Service", Advanced Networking Infrastructure and Research (ANIR) Special Projects in Networking Program, **National Science Foundation**, ANI-0117738, \$1,399,999, Sept. 15, 2001 - Aug. 30, 2006, with Edward G. Coffman, Predrag R. Jelenkovic, Dan Rubenstein, and Henning Schulzrinne.
37. Principal Investigator, "Scalability Issues in Linux", Collaborative Research Program, **IBM Linux Technology Center**, \$33,029, July 1, 2001 - June 30, 2002.
38. Principal Investigator, "Thin-Client Benchmarking", **National Semiconductor**, \$25,000, July 1, 2001 - June 30, 2002.
39. Principal Investigator, "Server-Based Computing Technologies for Application Service Providers", Center for Advanced Technology (CAT) in Information Management, **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$75,000, July 1, 2001 - June 30, 2002.
40. Principal Investigator, "Scalable Linux Cluster Utilities", Center for Advanced Technology (CAT) in Information Management, **New York State Office of Science, Technology, and Academic Research (NYSTAR)**, \$50,000, Apr. 16, 2001 - June 30, 2001.
41. Principal Investigator, "CAREER: Delivering Computational Services over the Internet", Faculty Early Career Development (CAREER) Award, Operating Systems and Compilers Program, **National Science Foundation**, CCR-0093047, \$250,000, Feb. 15, 2001 - Feb. 28, 2007.
42. Principal Investigator, "Scalable Linux Cluster Computer Utilities", IBM Shared University Research (SUR) Award, **IBM Research**, \$128,162, Dec. 2000.
43. Co-Principal Investigator, "Adaptive Internet Interactive Team Video", Experimental Systems Program, **National Science Foundation**, EIA-0071954, \$1,590,000, Sept. 15, 2000 - Sept. 30, 2004, with John R. Kender and Gail E. Kaiser.
44. Principal Investigator, "Columbia University Computer Utility", Collaborative Research Program, **Sun Microsystems**, \$51,178, Sept. 1, 2000 - Oct. 31, 2001.
45. Principal Investigator, "Lucent Grant in Science and Engineering", University Program, **Lucent Technologies**, \$20,000, July 2000.
46. Principal Investigator, "Sun Microsystems Equipment Grant", Collaborative Research Program, **Sun Microsystems**, \$83,562, Dec. 1999.
47. Co-Principal Investigator, "Microsoft Research and Education Grant", Microsoft University Program, **Microsoft Research**, \$1,208,163, July 1, 1999 - June 30, 2001, with Kathleen R. McKeown, Luis Gravano, John R. Kender, Andrew Kosoresow, Shree K. Nayar, and Henning Schulzrinne.

## PUBLICATIONS

Most of these papers are available online at <http://www.ncl.cs.columbia.edu/publications>.

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1. Albert M. Lai, Justin B. Starren, David R. Kaufman, Eneida A. Mendonca, Walter Palmas, Jason Nieh, and Steven Shea, "The Remote Patient Education in a Telemedicine Environment Architecture (REPETE)", *Telemedicine and e-Health*, 14(5), May 2008, pp. 355-361.
2. Albert Lai and Jason Nieh, "On the Performance of Wide-Area Thin-Client Computing", *ACM Transactions on Computer Systems (TOCS)*, 24(2), May 2006, pp. 175-209.
3. David P. Olshefski, Jason Nieh, and Dakshi Agarwal, "Using Certes to Infer Client Response Times at the Web Server", *ACM Transactions on Computer Systems (TOCS)*, 22(1), Feb. 2004, pp. 49-93. (2004 Best Paper, Performance Modeling and Analysis PIC, IBM Research; nominated for the 2004 Pat Goldberg Memorial Best Paper Awards in Computer Science, Electrical Engineering and Mathematics)
4. Jason Nieh and Monica S. Lam, "A SMART Scheduler for Multimedia Applications", *ACM Transactions on Computer Systems (TOCS)*, 21(2), May 2003, pp. 117-163.
5. Jason Nieh, S. Jae Yang, and Naomi Novik, "Measuring Thin-Client Performance Using Slow-Motion Benchmarking", *ACM Transactions on Computer Systems (TOCS)*, 21(1), Feb. 2003, pp. 87-115.

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6. Shaya Potter and Jason Nieh, "Apiary: Easy-to-use Desktop Application Fault Containment on Commodity Operating Systems", *Proceedings of the 2010 USENIX Annual Technical Conference (USENIX 2010)*, Boston, MA, June 23-25, 2010. (17% accepted, 24/141)
7. Oren Laadan, Nicolas Viennot, and Jason Nieh, "Transparent, Lightweight Application Execution Replay on Commodity Multiprocessor Operating Systems", *Proceedings of the ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS 2010)*, New York, NY, June 14-18, 2010. (16% accepted, 29/184)
8. Haoqiang Zheng and Jason Nieh, "RSIO: Automatic User Interaction Detection and Scheduling", *Proceedings of the ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS 2010)*, New York, NY, June 14-18, 2010. (16% accepted, 29/184)
9. Oren Laadan, Dan Phung, and Jason Nieh, "Operating System Virtualization: Practice and Experience", *Proceedings of the 3rd Annual Haifa Experimental Systems Conference (SYSTOR 2010)*, Haifa, Israel, May 24-26, 2010. (58% accepted, 18/31)
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21. Oren Laadan, Ricardo Baratto, Shaya Potter, Dan Phung, and Jason Nieh, "DejaView: A Personal Virtual Computer Recorder", *Proceedings of the 21st ACM Symposium on Operating Systems Principles (SOSP 2007)*, Stevenson, WA, Oct. 14-17, 2007, pp. 279-292. (19% accepted, 25/130)
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23. Stelios Sidiroglou, Oren Laadan, Angelos D. Keromytis, and Jason Nieh, "Using Rescue Points to Navigate Software Recovery (Short Paper)", *Proceedings of the 2007 IEEE Symposium on Security and Privacy (SP 2007)*, Oakland, CA, May 20-23, 2007, pp. 273-280. (short paper, 12% accepted, 28/243, 8 short papers, 20 full papers)
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116. Jason Nieh, Monica S. Lam, and J. Duane Northcutt, "A Practical Unified Approach to Processor Scheduling", Project Technical Report SML-94-0488, Sun Microsystems Laboratories, Dec. 1994.
117. Jason Nieh and Marc Levoy, "Volume Rendering on Scalable Shared-Memory MIMD Architectures", Technical Report CSL-TR-92-537, Computer Systems Laboratory, Stanford University, Aug. 1992.
118. Brian LaMacchia and Jason Nieh, "The Standard Map Machine", AI Memo 1165, AI Laboratory, Massachusetts Institute of Technology, Sept. 1989.
119. Jason Nieh, "Using Special-Purpose Computing to Examine Chaotic Behavior in Nonlinear Mappings", AI Technical Report 1139, AI Laboratory, Massachusetts Institute of Technology, Sept. 1989.
120. Jason Nieh, "DMI Mode 3 Throughput Analysis", Technical Memorandum, AT&T Information Systems, Dec. 1987.
121. Jason Nieh, "Delay and Throughput", Memorandum for File, AT&T Information Systems, Oct. 1986.

#### **SELECTED INVITED TALKS**

*Distinguished Lecture, School of Computing and Information Sciences, Florida International University, Miami, FL, Feb. 2009.*

*Keynote Speaker, VMAP Summit, VMworld 2008*, Las Vegas, NV, Sept. 2008.

*Invited External Speaker, IBM System Software Day, IBM Watson Research Center*, Yorktown Heights, NY, Sept. 2008.

*Bell Laboratories, Alcatel-Lucent*, Murray Hill, NJ, Nov. 2007.

*Keynote Panel, VMworld 2006*, Los Angeles, CA, Nov. 2006.

*ITL Colloquium, National Institute of Standards and Technology (NIST)*, Washington, DC, June 2005.

*DARPA ISAT Meeting*, Washington, DC, June 2005.

*CERCS Colloquium, Georgia Institute of Technology*, Atlanta, GA, May 2005.

*Invited Talk, 2005 USENIX Annual Technical Conference*, Anaheim, CA, Apr. 2005.

*DCS Colloquium, Rutgers University*, Rutgers, NJ, Feb. 2005.

*Young Investigator Lecture, 2004 Sigma Xi Annual Meeting*, Montreal, Quebec Canada, Nov. 2004.

*URCS Seminar, University of Rochester*, Rochester, NY, Nov. 2004.

*Systems Design and Implementation / Laboratory for Computer Systems (SDI/LCS) Seminar, Carnegie Mellon University*, Pittsburgh, PA, Oct. 2004.

*OS-PIC, IBM Watson Research Center*, Yorktown Heights, NY, Oct. 2003.

*MIT Workshop on Streaming Systems*, Dedham, MA, Aug. 2003.

*Hewlett-Packard Laboratories*, Palo Alto, CA, June 2002.

*Panasonic Information and Networking Technologies Laboratory*, Princeton, NJ, May 2001.

*OS-PIC, IBM Watson Research Center*, Yorktown Heights, NY, April 2001.

*Telcordia*, Morristown, NJ, Nov. 2000.

*OS-PIC, IBM Watson Research Center*, Yorktown Heights, NY, May 2000.

*Digital Equipment Systems Research Center*, Palo Alto, CA, May 1998.

*Division of Engineering and Applied Sciences, Harvard University*, Cambridge, MA, May 1998.

*Dept. of Computer Science, Yale University*, New Haven, CT, Apr. 1998.

*Dept. of Computer Science, Brown University*, Providence, RI, Apr. 1998.

*Dept. of Computer Science, University of Illinois at Urbana-Champaign*, Urbana, IL, Apr. 1998.

*Dept. of Computer and Information Science, University of Pennsylvania*, Philadelphia, PA, Apr. 1998.

*Dept. of Computer Science, University of Toronto*, Toronto, Ontario, Canada, Apr. 1998.

*Dept. of Computer Science, New York University*, New York, NY, Mar. 1998.

*Dept. of Computer Science, Northwestern University*, Evanston, IL, Mar. 1998.

*Hewlett-Packard Laboratories*, Palo Alto, CA, June 1997.

*Computer Forum Annual Meeting, Stanford University*, Stanford, CA, Mar. 1997.

*Computer Science Colloquium, University of California at Santa Barbara*, Santa Barbara, CA, Mar. 1997.

*IEEE RTSS Workshop on Resource Allocation Problems in Multimedia Systems*, Washington, DC, Dec. 1996.

*Distributed Systems Seminar, Stanford University*, Stanford, CA, Apr. 1994.

*Sun Microsystems Laboratories*, Mountain View, CA, Oct. 1993.

*Hewlett-Packard Laboratories*, Palo Alto, CA, Oct. 1992.

*Scientific Visualization Seminar, NASA Ames Research Center*, Mountain View, CA, Sept. 1992.

## PROFESSIONAL ACTIVITIES

### EDITORIAL BOARDS

- Member, Editorial Board, *IEEE Internet Computing*, 2008 - present.
- Guest Editor, Special Issue on Virtual Machines, *IEEE Pervasive Computing*, Oct.-Dec. 2009.
- Member, Editorial Board, *Computer Networks Journal (COMNET)*, 2006 - 2008.

### CONFERENCE PROGRAM COMMITTEES

- Member, Program Committee, *30th Annual IEEE Conference on Computer Communications (Infocom 2011)*, Shanghai, China, Apr. 10-15, 2011.
- Member, Program Committee, *16th International Conference on Mobile Computing and Networking (MobiCom 2010)*, Chicago, IL, Sept. 20-24, 2010.
- Member, Program Committee, *International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS 2010)*, New York, NY, June 14-18, 2010.
- Member, Program Committee, *3rd Annual Haifa Experimental Systems Conference (SYSTOR 2010)*, Haifa, Israel, May 24-26, 2010.
- Member, Program Committee, *29th Annual IEEE Conference on Computer Communications (Infocom 2010)*, San Diego, CA, Mar. 15-19, 2010.
- Member, Program Committee, *8th USENIX Conference on File and Storage Technologies (FAST 2010)*, San Jose, CA, Feb. 23-26, 2010.
- Member, Program Committee, *2nd Workshop on Hot Topics in Software Upgrades (HotSWUp 2009)*, Orlando, FL, Oct. 2009.
- Member, Program Committee, *1st Workshop on Networking, Systems, and Applications for Mobile Handhelds (MobiHeld 2009)*, Barcelona, Spain, Aug. 17, 2009.
- Member, Program Committee, *2nd Workshop on Mobile Computing and Virtualization (MobiVirt 2009)*, Kraków, Poland, June 22, 2009.
- Co-Chair, Program Committee, *Joint International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS / Performance 2009)*, Seattle, WA, June 15-19, 2009.
- Member, Program Committee, *28th Annual IEEE Conference on Computer Communications (Infocom 2009)*, Rio de Janeiro, Brazil, Apr. 19-25, 2009.
- Member, Program Committee, *2009 ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (VEE 2009)*, Washington, DC, Mar. 11-13, 2009.
- Co-Chair, Program Committee, *1st ACM Workshop on Virtual Machine Security (VMSec 2008)*, Fairfax, VA, Oct. 31, 2008.
- Member, Program Committee, *5th Annual International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services (MobiQuitous 2008)*, Dublin, Ireland, July 21-25, 2008.
- Member, Program Committee, *1st Workshop on Mobile Computing and Virtualization (MobiVirt 2008)*, Breckenridge, CO, June 17, 2008.
- Member, Program Committee, *International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS 2008)*, Annapolis, MD, June 2-6, 2008.
- Member, Program Committee, *27th Annual IEEE Conference on Computer Communications (Infocom 2008)*, Phoenix, AZ, Apr. 13-18, 2008.
- Member, Program Committee, *VMworld 2007*, San Francisco, Sept. 11-13, 2007.
- Member, Program Committee, *13th International Conference on Mobile Computing and Networking (MobiCom 2007)*, Montreal, Quebec, Canada, Sept. 9-14, 2007.



Member, Program Committee, *2007 USENIX Annual Technical Conference (USENIX 2007)*, Santa Clara, CA, June 17-22, 2007.

Member, Program Committee, *International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS 2007)*, San Diego, CA, June 12-16, 2007.

Member, Program Committee, *2007 ACM/USENIX International Conference on Mobile Systems, Applications, and Services (MobiSys 2007)*, Puerto Rico, June 11-14, 2007.

Vice Chair, Program Committee, *16th International World Wide Web Conference (WWW2007)*, Banff, Alberta, Canada, May 8-12, 2007.

Member, Program Committee, *12th International Conference on Mobile Computing and Networking (MobiCom 2006)*, Los Angeles, CA, Sept. 24-29, 2006.

Member, Program Committee, *2006 IEEE International Conference on Cluster Computing (Cluster 2006)*, Barcelona, Spain, Sept. 25-27, 2006.

Member, Program Committee, *2006 USENIX Annual Technical Conference (USENIX 2006)*, Boston, MA, May 30-June 3, 2006.

Deputy Vice Chair, Program Committee, *15th International World Wide Web Conference (WWW2006)*, Edinburgh, UK, May 22-26, 2006.

Member, Program Committee, *International Conference on E-business and Telecommunication Networks (ICETE 2005)*, Reading, UK, Oct. 3-7, 2005.

Member, Program Committee, *International Work Conference on Next Generation Web Services Practices (NWeSP 2005)*, Seoul, Korea, Aug. 23-26, 2005.

Member, Program Committee, *IASTED International Conference on Web Technologies, Applications and Services (WTAS 2005)*, Calgary, Canada, July 4-6, 2005.

Member, Program Committee, *International Conference on Communications, Circuits and Systems (ICCCAS 2005)*, Hong Kong, China, May 27-30, 2005.

Member, Program Committee, *2005 USENIX Annual Technical Conference (USENIX 2005)*, Anaheim, CA, Apr. 10-15, 2005.

Member and WiPs Chair, Program Committee, *6th Symposium on Operating System Design and Implementation (OSDI 2004)*, San Francisco, CA, Dec. 6-8, 2004.

Member, Program Committee, *Multimedia Interactive Protocols and Systems (MIPS 2004)*, Grenoble, France, Nov. 16-19, 2004.

Member, Program Committee, *2nd International Conference on Service Oriented Computing (ICSOC 2004)*, New York, NY, Nov. 15-19, 2004.

Co-Chair, Program Committee, *1st ACM Workshop on Operating System and Architectural Support for the On Demand IT Infrastructure (OASIS 2004)*, Boston, MA, Oct. 9, 2004.

Member, Program Committee, *33rd International Conference on Parallel Processing (ICPP 2004)*, Montreal, Canada, Aug. 13-19, 2004.

Member, Program Committee, *International Conference on Communications, Circuits and Systems (ICCCAS 2004)*, Chengdu, China, June 27-29, 2004.

Member, Program Committee, *Joint International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS / PERFORMANCE 2004)*, New York, NY, June 12-16, 2004.

Deputy Vice Chair, Program Committee, *13th International World Wide Web Conference (WWW2004)*, New York, New York, May 17-22, 2004.

Member, Program Committee, *Multimedia Interactive Protocols and Systems (MIPS 2003)*, Napoli, Italy, Nov. 18-21, 2003.

Member, Program Committee, *13th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2003)*, Monterey, CA, June 1-3, 2003.

Member, Program Committee, *12th International World Wide Web Conference (WWW2003)*, Budapest, Hungary, May 20-24, 2003.

Member, Program Committee, *Joint International Workshop on Interactive Distributed Multimedia Systems / Protocols for Multimedia Systems (IDMS / PROMS 2002)*, Coimbra, Portugal, Nov. 26-29, 2002.

Member, Program Committee, *16th International Conference on Supercomputing (ICS 2002)*, New York, NY, June 22-26, 2002.

Member, Program Committee, *1st Workshop on Self-Healing, Adaptive and Self-MANaged Systems (SHAMAN 2002)*, New York, NY, June 23, 2002.

Member, Program Committee, *2002 USENIX Annual Technical Conference (USENIX 2002)*, Monterey, CA, June 9-14, 2002.

Member, Program Committee, *12th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2002)*, Miami Beach, FL, May 12-14, 2002.

Member, Program Committee, *8th International Workshop on Interactive Distributed Multimedia Systems (IDMS 2001)*, Lancaster, UK, Sept. 4-7, 2001.

Co-Chair, Program Committee, *11th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2001)*, New York, NY, June 25-26, 2001.

Member, Program Committee, *1st New York Metro Area Networking Workshop (NYMAN 2001)*, Hawthorne, NY, Mar. 12, 2001.

Member, Program Committee, *10th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2000)*, Chapel Hill, NC, June 26-28, 2000.

Member, Program Committee, *9th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 1999)*, Basking Ridge, NJ, June 23-25, 1999.

#### **CONFERENCE STEERING AND ORGANIZING COMMITTEES**

Member, Steering Committee, *15th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2005)*, Skamania, WA, June 12-14, 2005.

Local Organization Co-Chair, Organizing Committee, *2nd International Conference on Service Oriented Computing (ICSOC 2004)*, New York, NY, Nov. 15-19, 2004.

Co-Chair, Organizing Committee, *1st ACM Workshop on Operating System and Architectural Support for the On Demand IT Infrastructure (OASIS 2004)*, Boston, MA, Oct. 9, 2004.

Member, Steering Committee, *14th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2004)*, Cork, Ireland, June 16-18, 2004.

Publicity Chair, Organizing Committee, *Joint International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS / PERFORMANCE 2004)*, New York, NY, June 12-16, 2004.

Member, Steering Committee, *13th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2003)*, Monterey, CA, June 1-3, 2003.

University Liaison, Organizing Committee, *16th International Conference on Supercomputing (ICS 2002)*, New York, NY, June 22-26, 2002.

Member, Steering Committee, *12th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2002)*, Miami Beach, FL, May 12-14, 2002.

Co-Chair, Organizing Committee, *11th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV 2001)*, New York, NY, June 25-26, 2001.

#### **JOURNAL AND CONFERENCE REFEREEING** (in addition to conference program committees)

*ACM Computing Surveys.*

*ACM Computer Communication Journal.*

*ACM Multimedia Conference.*

*ACM Multimedia Systems Journal.*  
*ACM SIGGRAPH.*  
*ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI).*  
*ACM Symposium on Operating Systems Principles (SOSP).*  
*ACM Symposium on Parallelism in Algorithms and Architectures (SPAA).*  
*ACM Transactions on Computer Systems (TOCS).*  
*ACM Transactions on Multimedia Computing, Communication, and Applications (TOMCCAP).*  
*ACM Transactions on Internet Technology (TOIT).*  
*The Computer Journal.*  
*International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS).*  
*IEEE GLOBECOM Technical Conference.*  
*IEEE International Parallel and Distributed Processing Symposium (IPDPS).*  
*IEEE Internet Computing.*  
*IEEE Journal of Selected Areas in Communications.*  
*IEEE Multimedia.*  
*IEEE Transactions on Computers.*  
*IEEE Transactions on Circuits and Systems for Video Technology.*  
*IEEE Transactions on Mobile Computing.*  
*IEEE Transactions on Multimedia.*  
*IEEE Transactions on Parallel and Distributed Systems.*  
*IEEE/ACM Transactions on Networking.*  
*IEEE Transactions on Knowledge and Data Engineering.*  
*IEEE Transactions on Software Engineering.*  
*IEEE Wireless Communications and Networking Conference (WCNC).*  
*International Conference on Dependable Systems and Networks (DSN).*  
*International Workshop on Volume Visualization.*  
*Journal of Parallel and Distributed Computing.*  
*The Journal of Systems and Software.*  
*Software Practice and Experience.*  
*USENIX Annual Technical Conference.*  
*USENIX Annual Technical Conference, FREENIX Track.*  
*USENIX Conference on File and Storage Technologies (FAST).*  
*USENIX Symposium on Networked Systems Design and Implementation (NSDI).*  
*USENIX Security Symposium.*

#### **FUNDING AGENCIES**

Participant, *NSF Cyber Trust PI Workshop*, New Haven, CT, 2008.  
Participant, *NSF CISE PI Workshop*, Urbana, IL, 2005.  
Participant, *NSF Cyber Trust PI Workshop*, Newport Beach, CA, 2005.  
Participant, *DARPA ISAT "Law of Large Numbers System Design" Study Group*, 2005.  
Grant Review Panelist, *National Science Foundation*, Arlington, VA, 2000 - 2005, 2009.

Participant, *NSF CISE PI Workshop*, Las Cruces, NM, 1999.

#### **STANDARDIZATION COMMITTEES**

Member, Net2Display Task Group, *Video Electronics Standards Association (VESA)*, 2005 - 2009.

Member, DPVL Task Group, *Video Electronics Standards Association (VESA)*, 2005 - 2006.

#### **OUTREACH ACTIVITIES**

Member, *VMAP Advisory Board*, VMware, 2009 - present.

Member, Executive Advisory Committee, *Harlem Children Society*, 2007 - present.

Mentor, Computing Innovation Fellows Project, 2009 - 2010.

Advisor, Online Membership Services Strategy, *Association for Computing Machinery*, 2007 - 2008.

Invitee, Infoscape Charrette, *Lincoln Center for the Performing Arts*, 2007.

Board Member, Membership Services Board, *Association for Computing Machinery*, 2004 - 2007.

Managing Group Member, Security and Infrastructure Standing Committee, *Financial Services Technology Consortium (FSTC)*, 2006 - 2007.

Examiner, Graduate Record Examinations (GRE) Computer Science Test, *Educational Testing Service*, 2004 - 2005.

Judge, New York City Science and Engineering Fair (NYCSEF), *New York Academy of Sciences*, 2004.

Mentor, Harlem Children Society Internship Program, *Harlem Children Society*, 2006.

Mentor, Science Research Training Program, *New York Academy of Sciences*, 2001 - 2003, 2006.

Faculty Mentor, Summer Research Program for Historically Underrepresented Groups, *Leadership Alliance*, 2000.

#### **PROFESSIONAL SOCIETIES**

Member, Association for Computing Machinery (ACM).

Senior Member, Institute of Electrical and Electronic Engineers (IEEE).

Member, New York Academy of Sciences.

Member, USENIX Association.

## UNIVERSITY ACTIVITIES

(all activities at Columbia University unless otherwise noted)

### DOCTORAL DISSERTATIONS SUPERVISED

1. Nicolas Viennot, Sept. 2010 - present.
2. Jeremy Andrus, Sept. 2010 - present.
3. Dan Phung, June 2004 - present.
4. Oren Laadan, Sept. 2003 - present (SEAS Presidential Fellow 2003-2007).
5. Dinesh Subhraveti, Sept. 2001 - present.
6. Alexander Sherman, "Guaranteeing Performance through Fairness in Peer-to-Peer File Sharing and Streaming Systems", Ph.D. Computer Science, defended Oct. 2009.
7. Shaya Potter, "Virtualization Mechanisms for Mobility, Security, and System Administration", Ph.D. Computer Science, May 2010, currently Postdoctoral Scholar, IBM T.J. Watson Research Center.
8. Haoqiang Zheng, "CPU Scheduling with Automatic Interactivity and Dependency Detection", Ph.D. Computer Science, defended July 2009, currently Senior Staff Engineer, VMware.
9. Ricardo Baratto, "THINC: A Virtual and Remote Display Architecture for Desktop Computing", Ph.D. Computer Science, defended Oct. 2007 (with distinction), currently Senior Software Engineer, Calista Technologies.
10. Albert M. Lai, "A Remote Training Approach for Teaching Seniors to Use a Telehealth System", Ph.D. Biomedical Informatics, Feb. 2007 (with distinction, co-advised with Justin Starren), currently Assistant Professor, Department of Biomedical Informatics, Ohio State University.
11. David P. Olshefski, "Measuring and Managing the Remote Client Perceived Response Time for Web Transactions using Server-side Techniques", Ph.D. Computer Science, Oct. 2006 (with distinction), currently Research Staff Member, IBM T.J. Watson Research Center.
12. Gong Su, "MOVE: Mobility with Persistent Network Connections", Ph.D. Computer Science, Oct. 2004, currently Research Staff Member, IBM T.J. Watson Research Center.
13. Erez Zadok, "FiST: A System for File System Code Generation", Ph.D. Computer Science, May 2001, currently Associate Professor, Department of Computer Science, Stony Brook University.

### OTHER DOCTORAL DISSERTATION COMMITTEES

1. Rean Griffith, "Evaluating Software Systems via Runtime Fault-Injection and Reliability, Availability and Serviceability (RAS) Metrics and Models", Ph.D. Computer Science, Oct. 2008.
2. Stelios Sidiroglou, "Software Self-Healing Using Error Virtualization", Ph.D. Computer Science, May 2008.
3. Jacob Gorm Hansen, "Virtual Machine Mobility with Self-Migration", Ph.D. Computer Science, University of Copenhagen, Feb. 2008.
4. Hanhua Feng, "Scheduling: From Optimality to Configurability", Ph.D. Computer Science, Feb. 2008.
5. Sangho Shin, "Towards the Quality of Service for VoIP traffic in IEEE 802.11 Wireless Networks", Ph.D. Computer Science, Feb. 2008.
6. Aniruddha Bohra, "System Architectures Based on Functionality Offloading", Ph.D. Computer Science, Rutgers University, Jan. 2008.
7. Hoon Chang, "Incorporating Physical Layer Capture in the Modeling, Analysis and Design of Wireless Access Mechanisms", Ph.D. Computer Science, May 2007.
8. Xiaotao Wu, "Ubiquitous Programmable Internet Telephony End System Services", Ph.D. Computer Science, May 2007.
9. Weibin Zhao, "Towards Autonomic Computing: Service Discovery and Web Hotspot Service", Ph.D. Computer Science, May 2006.
10. Daniel Villela, "Resource Management in Large-Scale Services: Models and Algorithms", Ph.D. Electrical Engineering, Feb. 2006.

11. Yong Wang, "Resource Constrained Video Coding/Adaptation", Ph.D. Electrical Engineering, Feb. 2006.
12. Giuseppe Valetto, "Orchestrating the Dynamic Adaptation of Distributed Software with Workflow Technology", Ph.D. Computer Science, May 2004.
13. Lisa Amini, "Models and Algorithms for Resource Management in Distributed Computing Cooperatives", Ph.D. Computer Science, Feb. 2004.
14. Jonathan Lennox, "Services for Internet Telephony", Ph.D. Computer Science, Feb. 2004.
15. Raymond Liao, "Utility-Based Adaptation, Dynamic Provisioning and Incentive Engineering Techniques for Internet and its Wireless Extensions", Ph.D. Electrical Engineering, May 2003.
16. Sushil da Silva, "Netscript: A Language System for Active Networks", Ph.D. Computer Science, May 2003.
17. Maria Papadopouli, "Resource Sharing in Mobile Wireless Networks", Ph.D. Computer Science, Oct. 2002.
18. Denes Molnar, "Classical Transport Theory and Its Applications in Heavy-ion Physics", Ph.D. Physics, July 2002.
19. Apostolos Dailianas, "MarketNet: A Survivable, Market-Based Architecture for Large-Scale Information Systems", Ph.D. Computer Science, Jan. 2001.
20. Steve Dossick, "A Virtual Environment Framework for Software Engineering", Ph.D. Computer Science, Nov. 2000.

#### **OTHER DOCTORAL EXAM COMMITTEES**

1. Omer Boyaci, "Multimedia Tools for Application Sharing, Measuring Capture-to-display Latency, and User Created Services", Mar. 2010 (Thesis Proposal Committee).
2. Omer Boyaci, "Multimedia Collaboration and Application Sharing", June 2008 (Candidacy Exam Committee).
3. Stelios Sidiroglou, "Error Virtualization: A Technique for Autonomic Software Self-Healing", Dec. 2006 (Thesis Proposal Committee).
4. Hanhua Feng, "Optimal Stochastic Scheduling", Dec. 2006 (Thesis Proposal Committee).
5. Hoon Chang, "Analytical Model and Fairness Scheduling of CSMA/CA in Physical Layer Capturing", May 2006 (Thesis Proposal Committee).
6. Michael Locasto, "A Virtual CPU Framework for Self-Healing Software", Dec. 2005 (Thesis Proposal Committee).
7. Stelios Sidiroglou, "Common Mode Attacks", Nov. 2005 (Candidacy Exam Committee).
8. Rean Griffith, "Design and Implementation of Self-healing Systems", Nov. 2004 (Candidacy Exam Committee).
9. Daniel Villela, "Resource Management for Services in Federated Systems", Apr. 2004 (Thesis Proposal Committee).
10. Weibin Zhao, "Advanced Service Discovery and Web Hotspot Rescue", May 2003 (Thesis Proposal Committee).
11. Lisa Amini, "Algorithms and Protocols for Content Internetworking", Jan. 2002 (Thesis Proposal Committee).
12. Xiaotao Wu, "Telecommunication Services", Nov. 2001 (Candidacy Exam Committee).
13. Lisa Amini, "Distributed Content Services Framework", Dec. 2000 (Candidacy Exam Committee).
14. Eleazar Eskin, "Probabilistic Approaches of Anomaly Detection Applied to Intrusion Detection", May 2000 (Candidacy Exam Committee).
15. Giuseppe Valetto, "Formalisms and Mechanisms for Specifying and Supporting Coordination in Distributed Systems", Apr. 2000 (Candidacy Exam Committee).
16. Jonathan Lennox, "Advanced Services for Internet Telephony" Feb. 2000 (Thesis Proposal Committee).
17. Weibin Zhao, "Internet Quality of Service", Dec. 1999 (Candidacy Exam Committee).
18. Alexander Konstantinou, "Computational Models of Change Propagation", Dec. 1999 (Candidacy Exam Committee).
19. Ping Pan, "On Scalable Internet Resource Reservation", Apr. 1999 (Candidacy Exam Committee).

#### **MASTERS DISSERTATIONS SUPERVISED**

1. Lei Zhang, "Implementing A Windows Remote Display Architecture", M.S. Computer Science, Feb. 2006.

2. Bogdan Caprita, "Grouped Distributed Queues: Distributed Queue, Proportional Share Multiprocessor Scheduling", M.S. Computer Science, May 2005.
3. V. Guruprasad, "Canonical Simplification and Automation of the Internet", M.S. Computer Science, May 2005.
4. Wong Chun Chan, "Group Ratio Round-Robin: An O(1) Proportional Share Scheduler", M.S. Computer Science, June 2004.
5. Erik Hogstedt, "Implementing ALM: an Application-level Multicast Protocol for Group Work and Group Study", M.S. Media Technology, Royal Institute of Technology, Stockholm, Sweden, June 2002.

#### **OTHER MASTERS DISSERTATION COMMITTEES**

1. Stephen Boyd, "Practical Randomization Techniques For Combatting Code-Injection Attacks", M.S. Computer Science, May 2004.

#### **MASTERS PROJECT STUDENTS SUPERVISED**

1. Carlos Perez, M.S. Computer Science, expected May 2010 (published in *ASPLOS 2009*).
2. Jau-Yuan Chen, M.S. Computer Science, Feb. 2010.
3. Christoffer Dall, M.S. Computer Science, Feb. 2010.
4. Sinan Xiao, M.S. Computer Science, Feb. 2010.
5. Xintong Zhou, M.S. Computer Science, Feb. 2010.
6. Daniel Benamy, M.S. Computer Science, May 2009.
7. Andreas Nilsson, M.S. Computer Science, May 2009.
8. Adrian Frei, M.S. Computer Science, Feb. 2009.
9. Ke Jin, M.S. Computer Science, Feb. 2009.
10. Shariar Kazi, M.S. Computer Science, Feb. 2009.
11. Taek Joo Kim, M.S. Computer Science, Feb. 2009.
12. John Morales, M.S. Computer Science, Feb. 2009.
13. Shrinivas Nidadavolu, M.S. Computer Science, Feb. 2009.
14. Nicolas Viennot, M.S. Computer Science, Feb. 2009 (published in *ASPLOS 2009*).
15. Ken Lee, M.S. Computer Science, May 2008.
16. Divya Arora, M.S. Computer Science, Feb. 2008.
17. Jayesh Kataria, M.S. Computer Science, Feb. 2008.
18. Amortya Ray, M.S. Computer Science, Feb. 2008.
19. Dhruva Shetty, M.S. Computer Science, Feb. 2008.
20. Tarandeep Singh, M.S. Computer Science, Feb. 2008.
21. Young Jin Yoon, M.S. Computer Science, Feb. 2008.
22. Joon Seong Ahn, M.S. Computer Science, Oct. 2007.
23. Ilho Ye, M.S. Computer Science, Feb. 2007.
24. Nabahwaya Bashir-Bello, M.S. Computer Science, Feb. 2006.
25. Joeng Kim, M.S. Computer Science, Feb. 2006 (published in *WWW2006, SCC 2006*).
26. Pinxing Ye, M.S. Computer Science, Feb. 2006.
27. Sarita Bafna, M.S. Computer Science, May 2005.
28. Jonah Benton, M.S. Computer Science, May 2005.
29. Bhaygyashree Bohra, M.S. Computer Science, May 2005 (published in *WWW2004*).
30. Pavan-Kumar Josyula-Venkata, M.S. Computer Science, May 2005.

31. Leonard Kim, M.S. Computer Science, May 2005 (published in *SOSP 2005*).
32. Vijayarka Nandikonda, M.S. Computer Science, May 2005 (published in *WWW2004*).
33. Madhuri Shinde, M.S. Computer Science, May 2005.
34. Abhishek Surana, M.S. Computer Science, May 2005 (published in *WWW2004*).
35. Suchita Varshneya, M.S. Computer Science, May 2005 (published in *WWW2004*).
36. Raghu Arur, M.S. Computer Science, May 2004.
37. Paul Henley, M.S. Computer Science, May 2004.
38. Yong Gao, M.S. Computer Science, May 2003.
39. Shilpa Krishnappa, M.S. Computer Science, May 2003 (published in *WWW2003*).
40. Aparna Mohla, M.S. Computer Science, May 2003 (published in *WWW2003*).
41. Mahdi Sajjadpour, M.S. Electrical Engineering, May 2003 (published in *WWW2003*).
42. Nikhil Tiwari, M.S. Computer Science, May 2003 (published in *USENIX 2002*).
43. S. Jae Yang, M.S. Computer Science, in progress (published in *NOSSDAV 2000, PC Magazine 2001, USENIX 2001, PC Magazine 2002, USENIX 2002, TOCS 2003, WWW2003*).
44. Ravi Gadhia, M.S. Computer Science, Feb. 2003.
45. Jianqin Qu, M.S. Computer Science, May 2002.
46. Fei Li, M.S. Computer Science, Jan. 2002 (published in *DCC 2002, ICC 2002*).
47. Albert Lai, M.S. Computer Science, May 2001 (published in *SIGMETRICS 2002, TOCS 2006*).
48. Chris Vaill, M.S. Computer Science, May 2001 (published in *USENIX 2001, SIGCSE 2005, OSR 2006*).
49. Hua Zhong, M.S. Computer Science, May 2001 (published in *USENIX 2001*).
50. Rahul Joshi, M.S. Computer Science, Feb. 2001.
51. Yuan Liu, M.S. Computer Science, Oct. 2000.
52. Johan M. Andersen, M.S. Computer Science, May 2000 (published in *USENIX 2001*).
53. Sung Hyun Cho, M.S. Computer Science, May 2000.
54. Du Hee Lee, M.S. Computer Science, May 2000.
55. Naomi Novik, M.S. Computer Science, May 2000 (published in *USENIX 2001, TOCS 2003*).
56. Ari Steinfeld, M.S. Computer Science, May 2000.
57. Yue Hai Tan, M.S. Computer Science, Feb. 2000.

#### **UNDERGRADUATE DISSERTATIONS SUPERVISED**

1. Matthew Selsky, "Creating Secure Partitions for Virtualized Migration Environments", B.S. Computer Science, May 2005.

#### **UNDERGRADUATE PROJECT STUDENTS SUPERVISED**

1. David Alpert, B.S. Computer Science, May 2009.
2. Jordan Rupperecht, B.S. Computer Science, May 2009.
3. Arjun Roy, B.S. Computer Science, May 2009.
4. Andrew Shu, B.S. Computer Science, May 2009.
5. Matt Schulkind, B.S. Computer Science, May 2006.
6. Bok-Lyn Wong, B.S. Computer Science, Feb. 2006.
7. Bogdan Caprita, B.S. Computer Engineering and B.S. Applied Mathematics, Feb. 2005 (Computing Research Association's Outstanding Undergraduate Award 2004/2005 Finalist, 2005 Theodore R. Bashkow Award, published in *ANCS 2005, USENIX 2005*).



8. Yuly Finkelberg, B.S. Computer Science, May 2005.
9. Irina Likhtina, B.S. Computer Science, May 2005.
10. Robert Tobkes, B.S. Computer Science, May 2005.
11. Tony Capra, B.A. Computer Science, May 2004.
12. Dave Coulthart, B.S. Computer Science, May 2004.
13. Hubert Lin, B.S. Computer Science, May 2004.
14. Dong Lou, B.S. Computer Science, May 2004.
15. Jen Wang, B.S. Computer Science, May 2004.
16. Gerardo Flores, B.S. Computer Science, May 2003.
17. Leonard Kim, B.S. Computer Science, May 2003.
18. Sung Y. Cho, B.S. Computer Science, May 2002.
19. Erik Czernikowski, B.S. Computer Science, May 2002.
20. Aner Fust, B.S. Computer Science, May 2002.
21. Michael Kalnicki, B.S. Computer Science, May 2002.
22. Eugene Kim, B.S. Computer Science, May 2002.
23. Iliia Malkovitch, B.S. Computer Science, May 2002.
24. Steven Osman, B.S. Computer Science, May 2002 (published in *OSDI 2002*).
25. Francesco Tamburrino, B.S. Electrical Engineering, Feb. 2002.
26. Paolo de Dios, B.S. Computer Science, May 2001.
27. Carla Goldberg, B.A. Computer Science, May 2001.
28. Sara Schumacher, B.A. Computer Science, Feb. 2001.
29. Ozgur Can Leonard, B.S. Computer Science, May 2000 (published in *Dr. Dobb's Journal 2000*).

#### **UNIVERSITY SERVICE**

*Member, SEAS Faculty Advisory Committee for Entrepreneurship, 2007 - present.*

*Faculty Advisor, Society for Entrepreneurship and Technological Innovation at Columbia University (SETI), 2008 - 2009.*

*Member, SEAS Nominating Committee, 2005 - 2007.*

*Member, Senate Committee on Athletic Eligibility, 2001 - 2008. Served on provost-appointed committee responsible for general policy on athletic eligibility and ruling on student appeals to be able to participate despite falling short of the Columbia standard for degree progress.*

*Member, Faculty Focus Group on Child Care, Office of Planning and Institutional Research, 2005.*

*Faculty Volunteer, Urban New York, Office of Student Activities, 2003 - 2007, 2010.*

*Member, RASCAL Project Advisory Committee, 1999 - 2001. Served on advisory committee responsible for providing guidance and feedback on the design of the electronic research administration system (RASCAL), now in use by the Office of Projects and Grants, <https://www.rascal.columbia.edu>.*

*Undergraduate Associate Advisor, Massachusetts Institute of Technology, 1987 - 1988.*

#### **DEPARTMENTAL SERVICE** (Dept. of Computer Science unless otherwise noted)

*Member and Chair, Visibility Committee, 2009 - present (Chair, 2009).*

*Member, Academic Committee, 2003 - 2006, 2008 - present.*

*USENIX Campus Liaison, USENIX Association, 2004 - present.*

*Faculty Organizer and Speaker, Professional Preparation Seminar Series, 2008 - 2009.*

*Co-Chair, Faculty Retreat, 2008.*

*Lab Demonstrations, Undergraduate and MS Research Project Fair, 2008.*  
*Member and Chair, Strategic Planning Committee, 2005 - 2008 (Chair, 2007 - 2008).*  
*Speaker, ACM Luncheon and Research Series, 2008.*  
*Member, Faculty Recruiting Committee, 2003 - 2008.*  
*Member and Chair, Facilities Committee, 1999 - 2006 (Chair, 2002 - 2003).*  
*Faculty Advisor, Columbia Mainframe Computing Group, 2005 - 2006.*  
*Member, Bill Campbell Visit Organizing Committee, 2005.*  
*Member, Faculty Retreat Organizing Committee, 2005.*  
*Department Representative, NSF CISE Workshop, 1999, 2005.*  
*Member, Academic Honesty Task Force, 2004 - 2005.*  
*Editor-in-Chief, 25th Anniversary of the Department of Computer Science Newsletter, 2004 - 2005.*  
*Operating Systems Comprehensive Examiner, 1999 - 2004.*  
*Speaker Host, 25th Anniversary Distinguished Lecture Series, 2004.*  
*Lab Demonstrations, 25th Anniversary of the Department of Computer Science, 2004.*  
*Speaker, 25th Anniversary of the Department of Computer Science, 2004.*  
*Columbia College Academic Advisor (Seniors), 2003 - 2004.*  
*Lab Demonstrations, ACM Computer Science Research Fair, 2003.*  
*Ph.D. Funding Survey, Ph.D. Committee, 2003.*  
*Chair, CRF Director Search Committee, 2003.*  
*Columbia College Academic Advisor (Juniors), 2002 - 2003.*  
*Departmental Infrastructure and Systems Area Speaker, External Review, 2003.*  
*Research Demonstration, CAP Computer Science Research Fair, 2002.*  
*Speaker, ACM Computer Science Research Fair, 2002.*  
*Speaker, Faculty Research Colloquia, 2002.*  
*Faculty Assistant Manager, 2000 - 2002.*  
*Columbia College Academic Advisor (Freshman and Sophomores), 2001 - 2002.*  
*Member, Ph.D. Admissions Committee, 1999 - 2002.*  
*Speaker, ACM Computer Science Research Fair, 2001.*  
*Speaker, Faculty Research Colloquia, 2001.*  
*M.S. Academic Advisor, 1999 - 2001.*  
*Department Faculty Representative, SEAS Engineering Council, 2001.*  
*Speaker, ACM Computer Science Research Fair, 2000.*  
*SEAS New Graduate Student Orientation, 2000.*  
*Computer Science Colloquium Chair, 1999 - 2000. Faculty comments: "This seems to have been the most interesting set of colloquia since I've been at Columbia." (Feb. 2000). "I keep having to change plans because you've organized such a terrific colloquium series." (Feb. 2000). "Just fyi, that was one of the best colloquia I've ever been to in my life!" (Dec. 1999).*  
*SEAS Alumni Faculty-Student Dinners, 1999.*  
*Graduate Admissions Committee, Dept. of Electrical Engineering, Stanford University, 1996.*  
*Graduate Mentor, Dept. of Electrical Engineering, Stanford University, 1993 - 1995.*

## CURRICULUM AND TEACHING

(all activities at Columbia University unless otherwise noted)

### NEW CURRICULUM DEVELOPMENT

**COMS E6998 Mobile Computing with iPhone and Android**, 2008 - present. Developed and taught a new course on smartphone mobile computing that explores the technologies and convergence of computing, telephony, and sensors in the physical world. Course has also been profiled in:

Elizabeth Woyke, "iPhone and Android Apps 101", *Forbes.com*, New York, NY, Nov. 2008.

**COMS E6998 Virtual Machines**, 2007 - 2008. Co-developed and taught a new advanced graduate course on virtual machines.

**COMS E6998 Topics in Computer Systems**, 2005 - 2006. Developed and taught a new advanced graduate course on topics in computer systems which focuses on a different technical area of interest each semester.

**COMS W4118 Operating Systems**, 1999 - 2004. Developed and taught a new advanced undergraduate / graduate course in operating systems, which integrates operating system concepts with real-world operating system design and implementation. First course in the world to employ novel virtual machine technology to provide hands-on operating system design and implementation instruction in a real commercial operating system for both on-campus and distance learning students. Approach has been emulated at several other universities, including Calvin College, Clarkson University, John Hopkins University, SUNY Stony Brook, Swarthmore College, University of Illinois, University of Rochester, University of Virginia, University of Washington, Worcester Polytechnic Institute, etc. "The best CS class of my college career, both in terms of how much I learned and how valuable the information turned out to be in the real world. Writing new system calls, device drivers, schedulers... Mention to an interviewer that you know how to do this and they drool..." *Slashdot*, Dec. 2000. Course has also been profiled in:

"Software Doubles as Insurance Policy for Columbia University", *College Planning and Management*, Apr. 2001.

Charles Babcock, "VMware Welcomes Guest OSes", *Inter@ctive Week*, 7(17), Ziff-Davis Media, New York, NY, May 1, 2000, p. 86.

Mara Velasco Sweet, "Columbia Students Gain Valuable Experience in Operating System Design Using VMware", *VMware Customer Success Stories*, VMware, Palo Alto, CA, Oct. 1999.

**COMS E6118 Advanced Operating Systems**, 2000 - 2004. Developed and taught a new advanced graduate course in operating systems. New classroom and lab course materials were developed on recent research developments in operating systems. Course also develops research skills by emphasizing classroom discussion, student presentation skills, and in-depth programming projects.

**COMS W3157 Advanced Programming**, 2001. Helped formulate and develop an undergraduate advanced programming course with an emphasis on systems programming principles and tools.

**COMS W3139 Data Structures and Algorithms in Java**, 1999. Developed and taught a new undergraduate course in data structures and algorithms using Java. Previous versions of the course were taught in C, but a department decision to move the core undergraduate computer science curriculum to Java created a critical need for this course. New Java-based course materials were developed and have been subsequently been used by other faculty for this course.

### TEACHING EXPERIENCE

**COMS W3998 Projects in Computer Science**, Fall 2000 - present. Enrollment 2 (Fall 2000), 1 (Spring 2001), 1 (Fall 2001), 2 (Spring 2002), 1 (Fall 2002), 2 (Spring 2003), 2 (Fall 2003), 3 (Spring 2004), 2 (Fall 2004), 1 (Fall 2005).

**COMS W4901 Projects in Computer Science**, Summer 1999 - present. Enrollment 1 (Summer 1999), 3 (Spring 2000), 2 (Summer 2000), 3 (Spring 2001), 1 (Fall 2001), 2 (Spring 2002), 3 (Spring 2003), 2 (Fall 2003), 2 (Fall 2005), 1 (Fall 2006), 4 (Fall 2008), 3 (Spring 2009).

**COMS E6901 Projects in Computer Science**, Spring 1999 - present. Enrollment 1 (Spring 1999), 8 (Fall 1999), 7 (Spring 2000), 2 (Summer 2000), 4 (Fall 2000), 4 (Spring 2001), 6 (Fall 2001), 6 (Spring 2002), 10 (Fall 2002), 5 (Spring 2003), 11 (Fall 2003), 2 (Spring 2004), 6 (Fall 2004), 6 (Spring 2005), 1 (Fall 2005), 3 (Spring 2006), 7 (Fall 2006), 2 (Spring 2007), 2 (Fall 2007), 6 (Spring 2008), 5 (Fall 2008) 4 (Spring 2009), 1 (Summer 2009), 1 (Fall 2009), 2 (Spring 2010).

**COMS E6118 Advanced Operating Systems**, Spring 2010. Enrollment 5 (2 CVN).

**COMS W4118 Operating Systems**, Fall 2009. Enrollment 65 (7 CVN), instructor rating 4.1/5.0.

**COMS E6998 Mobile Computing with iPhone and Android**, Summer 2009. Enrollment 4 (CVN pre-taped).

**COMS W4118 Operating Systems**, Summer 2009. Enrollment 8 (CVN pre-taped).

**COMS E6998 Mobile Computing with iPhone and Android**, Spring 2009. Enrollment 70 (14 CVN), instructor rating 3.9/5.0.

**COMS W4118 Operating Systems**, Fall 2008. Enrollment 74 (13 CVN), instructor rating 4.5/5.0.

**COMS E6998 Virtual Machines**, Spring 2008. Enrollment 24 (6 CVN), instructor rating 4.8/5.0.

**COMS W4118 Operating Systems**, Fall 2007. Enrollment 42, instructor rating 4.1/5.0.

**COMS E6998 Topics in Computer Systems**, Spring 2006. Enrollment 7, instructor rating 5.0/5.0.

**COMS E6118 Advanced Operating Systems**, Fall 2005. Enrollment 13, instructor rating 4.4/5.0.

**COMS W4118 Operating Systems**, Fall 2004. Enrollment 100 (16 CVN), instructor rating 4.3/5.0.

**COMS W4118 Operating Systems**, Summer 2004. Enrollment 4 (CVN pre-taped).

**COMS E6118 Advanced Operating Systems**, Spring 2004. Enrollment 22, instructor rating 4.3/5.0.

**COMS W4118 Operating Systems**, Fall 2003. Enrollment 83 (10 CVN), instructor rating 4.2/5.0.

**COMS W4118 Operating Systems**, Summer 2003. Enrollment 2 (CVN pre-taped).

**COMS W4118 Operating Systems**, Spring 2003. Enrollment 75 (5 CVN), instructor rating 4.2/5.0.

**G22.3813 Advanced Laboratory in Computer Science**, New York University, Spring 2003. Enrollment 1.

**COMS W4118 Operating Systems**, Fall 2002. Enrollment 84 (14 CVN), instructor rating 4.2/5.0.

**COMS W4118 Operating Systems**, Summer 2002. Enrollment 7 (CVN pre-taped).

**COMS E6118 Advanced Operating Systems**, Spring 2002. Enrollment 17, instructor rating 4.4/5.0.

**COMS W4118 Operating Systems**, Spring 2002. Enrollment 6 (CVN pre-taped).

**COMS W4118 Operating Systems**, Fall 2001. Enrollment 102 (16 CVN), instructor rating 4.1/5.0.

**COMS W4118 Operating Systems**, Summer 2001. Enrollment 8 (CVN pre-taped).

**COMS E6118 Advanced Operating Systems**, Spring 2001. Enrollment 5, instructor rating 4.4/5.0.

**COMS W4118 Operating Systems**, Fall 2000. Enrollment 127 (19 CVN), instructor rating 3.8/5.0.

**COMS E6118 Advanced Operating Systems**, Spring 2000. Enrollment 23, instructor rating 3.9/5.0.

**COMS W4118 Operating Systems**, Fall 1999. Enrollment 119 (11 CVN), instructor rating 3.8/5.0.

**COMS E6901 Operating Systems and Networking Reading Seminar**, Fall 1999.

**COMS W3139 Data Structures and Algorithms in Java**, Spring 1999. Enrollment 52, instructor rating 4.2/5.0. (nominated for Columbia Great Teacher Award)

**Intermediate Guitar**, Christian Guitarist Conference, Apr. 1996, 1997, 1998.

#### **SELECTED STUDENT COURSE EVALUATION COMMENTS**

“Great teaching and organization, the best CS course.” (Fall 2009)

“I got to learn the most out of any course in my 2 years at Columbia.” (Fall 2009)

“A true master of the subject matter; excellent classroom delivery; and unafraid to innovate around the homework assignments (Android, Git, VMs, etc).” (Fall 2009)

“I had Jason Nieh for both Operating Systems and this course. He is a great lecturer that really knows how to motivate students to learn.” (Spring 2009)

"I love the concept of the class and I believe it's vital for students to continue broadening their skill sets to encompass more than just your usual CS topics. There was a lot of self-exploration but I felt that Professor Nieh did an excellent job keeping everyone engaged for the entire semester. That surely isn't easy." (Spring 2009)

"I'm so glad I took this course. It was so much fun...amazing course." (Spring 2009)

"Professor Nieh is the best professor I've studied under at Columbia University. His high standards boundless energy and ability to draw students into the lecture are amazing. His class is known for being the toughest and most demanding in our program. Yet I looked forward each day to attending his lectures and attacked the difficult problem sets with motivation and vigor unlike any other class. He inspires students to do the tough work not unlike the manner in which an athletic coach pushes and motivates his or her players. I wanted to do well in this class wanted to pull the countless all nighters if for no other reason than having the pride and incredible sense of accomplishment that comes with being able to hang with Jason Nieh. We need more professors like this who are able to set incredibly high standards while also inspiring students to achieve them while at the same time leaving the student with a very solid understanding of theory and very marketable skills." (Fall 2008)

"This course is the best CS course I have ever taken...Jason is an excellent teacher, who is very approachable and answers any question with insight and dedication, so take this course with him if you have the chance." (Fall 2008)

"This is by far the most demanding and rewarding class I have taken as a CS grad student at Columbia." (Fall 2008)

"Prof. Nieh is amazingly knowledgeable in this area and is able to communicate the material in an effective interesting manner that truly captivates students attention. Undoubtedly the best CS lecturer I have come across at Columbia." (Fall 2008)

"The best instructor I've encountered at CU." (Fall 2008)

"OS is the most thorough classes I've taken and has taught me the most." (Fall 2008)

"Prof. Nieh really knows his stuff and has some pretty amazing homework lined up. You can tell he put a lot of work into designing problems that seem plausible and teach you a lot. Much to my classmates chagrin I'd say the homework is the best part of the class." (Fall 2008)

"...the best course I have taken. So much to learn and the hands-on Linux kernel development is fantastic." (Fall 2008)

"Professor is amazing." (Fall 2008)

"Great course. I actually look forward to going to class each lecture. The instructor is very engaging -- by far the best lecturer I've had at CU...The class is tough but I really feel like I am getting a ton of value out of it." (Fall 2008)

"The professor and TAs definitely know the material inside-out and the lectures are excellent and far more educational than other classes I've taken in the CS dept." (Fall 2008)

"...I really enjoyed OS...(undoubtedly) the most challenging course I've taken, but it was the most interesting and I believe will be the most useful." (Fall 2008)

"One of the best courses taken..." (Spring 2008)

"This class was the class I have learned the most from, and has also been the class from which I have gained the most marketable skills I have and have at least indirectly landed me job offers." (Fall 2007)

"I probably learned more in this course than my last three CS courses combined." (Fall 2007)

"Prof. Nieh is the greatest teacher I ever met." (Fall 2004)

"Best CS teacher at Columbia hands down." (Fall 2004)

"The best lecturer I have ever." (Fall 2004)

"The best one (course) I have ever taken..." (Fall 2004)

"Amazing class and teacher." (Fall 2004)

"Brilliant, knowledgeable, approachable professor." (Fall 2004)

"There's nothing he can't do." (Fall 2004)

"Outstanding professor. Knows EVERYTHING about linux and operating systems in general." (Fall 2004)

"...definitely recommended for any Computer Science student." (Fall 2004)

“Dr. Nieh took a potentially dry topic and made it very interesting. The classroom was very crowded throughout the semester: not just because there were way too many desks and not enough space, but because Dr. Nieh made lectures intriguing enough that most students always came.” (Fall 2004)

“Dr. Nieh is a great professor. I took an Operating Systems course at my undergrad university, and it was very dry. Dr. Nieh made the lectures interesting, and he kept our attention...” (Fall 2004)

“One of the best! If we had more professors like this one, the MS would be number 1!” (Fall 2004)

“I rate this one of the best courses in Columbia University.” (Fall 2004)

“...a fun and highly informative class!” (Fall 2004)

“...my favorite. Being able to hack the Linux kernel is awesome. I am learning a lot. And Professor Nieh’s delivery is second to none...I really do love the course.” (Fall 2004)

“...extremely well organized and handled, despite having a huge number of students.” (Fall 2004)

“Best teacher I have had so far.” (Fall 2003)

“Great teacher, great course. Extremely clear about why things are how they are. Challenges the students to think through the answer instead of just stating it, which too few professors in CS do.” (Fall 2003)

“...a master in his field...a brilliant orator, presenter and well a learned man all in one.” (Fall 2003)

“Professor Nieh runs a class that is orders of magnitude more organized and more thoughtfully planned. He’s structured unbelievably dense material extremely well so that I’m able to follow the course of the subject easily.” (Fall 2003)

“The course material was invaluable. The skills and knowledge you learn are immense.” (Fall 2003)

“...the most enjoyable, informative, and well-structured course...every CS student at Columbia should not miss out the opportunity to learn under him.” (Fall 2003)

“Best lecturer in Computer Science in my academic career.” (Fall 2003)

“The best CS class I’ve had, combines very well theory and practice.” (Fall 2003)

“I recommend more in-depth classes on operating systems to be taught by Prof. Nieh.” (Fall 2003)

“Professor Nieh clearly knows his stuff about OS and is able to teach it to his students very well.” (Fall 2003)

“Very organized, approachable, unlike some professors, knows his stuff very very well. Overall, an awesome professor.” (Fall 2003)

“Professor Nieh is very approachable and extremely knowledgeable. He exudes everything that a teacher should be.” (Fall 2003)

“Knows the subject inside out...very approachable and friendly...strives to provide a quality class, makes no compromises.” (Fall 2003)

“...knows his subject so well...amongst the best professors I have met.” (Fall 2003)

“...very well-lectured and well-run, and I was impressed by the amount that we learned.” (Fall 2003)

“...a very good professor who knows how to relate a difficult subject in a very easy to understand manner.” (Fall 2003)

“Great teacher...you’ll get a lot out from this class, in terms of programming skills and systems knowledge in general...definitely one of the best CS classes I took at Columbia.” (Spring 2003)

“Nieh is an awesome teacher that is very organized and that instructs his class with a lot of thought behind everything.” (Spring 2003)

“Nieh is clear, concise, and eminently knowledgeable within the contemporary operating systems field.” (Spring 2003)

“The best CS professor I have taken a class with.” (Spring 2003)

“Prof. Nieh is very friendly, very knowledgeable in his field and very open to students.” (Spring 2003)

“A tremendous amount of thought was clearly put into the course design. One of the best organized classes I’ve been in.” (Spring 2003)

“Professor Nieh is a great and very knowledgeable professor. He is also always available and willing to help.” (Spring 2003)

“Best organized class I’ve taken so far. Professor Nieh really cares about what people learn, and he takes his job seriously.” (Spring 2003)

“I’m really impressed...never had a course like this...” (Spring 2003)

“Prof. Nieh is an excellent teacher. He is always prepared for class. He maintains an outstanding course website. He also addresses student questions and allows them to think in the classroom... he is very approachable and is a really nice guy...you also gain a lot from the class.” (Spring 2003)

“Nieh is a terrific instructor. He has a gift for selecting just the right details to demonstrate a particular point so that the rest of the material falls into place...” (Fall 2002)

“I have not come across a professor as good as he is in my life.” (Fall 2002)

“Professor Nieh takes what is possibly the most difficult topic in Computer Science and explains it in a way that makes difficult topics seem almost common-sense. His classroom delivery is impeccable, and the amount learned is incredible.” (Fall 2002)

“Nieh is gifted; he has an ability to communicate ideas both colloquially but also with appropriate technical precision.” (Fall 2002)

“Aside from knowing his stuff, Prof. Nieh has a great style of lecturing. He always comes prepared, always ready to answer questions, and actually gets you to think about the material.” (Fall 2002)

“Great professor, knows his stuff.” (Fall 2002)

“Nieh is one of the best professors in the CS department...was always available whether during office hours or not. Compared to other professors, he is a much better speaker and has better presentation skills. His knowledge of subject matter is on par with other great professors I’ve had. Most importantly, he’s a nice and understanding guy which is very welcome in a department of professors who seem like they’re out to get you. I learned a tremendous amount and thoroughly enjoyed the class.” (Fall 2002)

“A very good instructor in all the sense of the word. He knows his material, listens to students, and is willing to help the students.” (Fall 2002)

“...made the Linux kernel accessible to students to a degree I wouldn’t have imagined possible.” (Fall 2002)

“It’s a great, great class.” (Fall 2002)

“Very, very knowledgeable and easily approachable.” (Fall 2002)

“Highly recommended...” (Spring 2002)

“This class was fun. It’s laid back and very instructive...” (Spring 2002)

“This is an excellent class.” (Spring 2002)

“Prof. Nieh is by far the best professor I have encountered in this school.” (Fall 2001)

“Must-take class for all CS majors.” (Fall 2001)

“The best CS class of my college career, both in terms of how much I learned and how valuable the information turned out to be in the real world. Writing new system calls, device drivers, schedulers... Mention to an interviewer that you know how to do this and they drool...” (Fall 2000)

“Hardest, but best class I’ve taken so far at Columbia...” (Fall 2000)

“This is the best course I have taken in 6 years at the CS dept.” (Spring 2000)

“I love that we’re working with a real OS like Linux. Doing the homework was fun, particularly so because it felt like really accomplishing something of practical value.” (Fall 1999)

“A relative new-comer to Columbia, Nieh is a VERY smart guy, and when it comes to OS, he is THE specialist. His lectures are one of the better ones here at Columbia, and you’ll actually learn a lot.” (Fall 1999)

“A great course, I really enjoyed it. Thanks.” (Spring 1999)

“Best course I’ve taken at Columbia thus far.” (Spring 1999)

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	7444671
<b>Application Number:</b>	95001270
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	2128
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	7188180
<b>Customer Number:</b>	23630
<b>Filer:</b>	Toby H. Kusmer./Kelly Ciarmataro
<b>Filer Authorized By:</b>	Toby H. Kusmer.
<b>Attorney Docket Number:</b>	077580-0090
<b>Receipt Date:</b>	19-APR-2010
<b>Filing Date:</b>	08-DEC-2009
<b>Time Stamp:</b>	19:40:05
<b>Application Type:</b>	inter partes reexam

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party	Nieh_Declaration.pdf	1488660 <small>39f74042d0fcc15599d3b66aa6721cf03e5a0ec8</small>	no	45

### Warnings:

### Information:



2	Reexam Certificate of Service	Cert_Serv_Nieh.pdf	24155	no	1
			2834a429e9606e2234d7163c061a5f3be2978427		

**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	1512815
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

# EXHIBIT E

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
TYLER DIVISION**

<b>VirnetX Inc.,</b>	§	
	§	
<b>Plaintiff,</b>	§	
	§	
<b>v.</b>	§	
	§	<b>CIVIL ACTION NO. 6:10-CV-417 LED</b>
<b>Cisco Systems, Inc.</b>	§	
<b>Apple Inc.</b>	§	<b>Judge: Hon. Leonard Davis</b>
<b>Aastra USA Inc.</b>	§	
<b>Aastra Technologies Ltd.</b>	§	
<b>NEC Corporation, and</b>	§	
<b>NEC Corporation of America,</b>	§	
	§	
<b>Defendants.</b>	§	
	§	

**DEFENDANT AND COUNTERCLAIM-PLAINTIFF AASTRA USA INC.’S  
ANSWER, AFFIRMATIVE DEFENSES AND  
COUNTERCLAIMS TO VIRNETX INC.’S ORIGINAL COMPLAINT**

Aastra USA Inc. (“Aastra USA”), defendant and counterclaim-plaintiff in the above-entitled and numbered civil action, replies to the Original Complaint of VirnetX Inc. (“VirnetX”) as follows.

**THE PARTIES**

1. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations that VirnetX is “a corporation organized and existing under the laws of the State of Delaware, and maintains its principal place of business at 5615 Scotts Valley Drive, Suite 110 Scotts Valley, California,” and, therefore, denies these allegations.

2. Aastra USA admits that Aastra Technologies Limited is a Canadian corporation with its principal place of business at 155 Snow Blvd., Concord, Ontario Canada, L4K 4N9. Aastra USA admits that it is a Delaware corporation with its principal place of business at 2811 Internet Blvd., Frisco, Texas 75034. Aastra USA denies that Aastra Technologies Limited regularly conducts and transacts business in Texas, throughout the United States, and within the Eastern District of Texas. Aastra USA admits that it regularly conducts and transacts business in Texas, throughout the United States, and within the Eastern District of Texas. Aastra USA denies that either it or Aastra Technologies Limited have committed or continues to commit any acts that give rise to any cause of action asserted in VirnetX's complaint. Except as admitted above, Aastra USA denies the allegations of Paragraph 2.

3. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 3 and therefore, denies these allegations.

4. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 4 and therefore, denies these allegations.

5. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 5 and therefore, denies these allegations.

### **JURISDICTION AND VENUE**

6. Aastra USA admits that VirnetX purports to bring this action under the patent laws of the United States, Title 35, United States Code, but Aastra USA denies

any liability thereunder. Aastra USA does not contest that the Court has exclusive subject matter over this matter under 28 U.S.C. § 1338. Except as admitted above, Aastra USA denies the allegations of Paragraph 6.

7. Admitted.

8. Aastra USA admits that this Court has personal jurisdiction over Aastra USA. Except as admitted above, Aastra USA denies the allegations of Paragraph 8.

### **ASSERTED PATENTS**

9. Aastra USA admits that United States Patent No. 6,502,135 (“the ‘135 patent”), entitled “Agile Network Protocol for Secure Communications with Assured System Availability” issued on December 31, 2002, but denies any further characterization of the ‘135 patent, its inventors, or its examination as alleged in Paragraph 9. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations that VirnetX is the “owner of all rights, title, and interest in and to the ‘135 patent and possesses all rights of recovery under the ‘135 patent” and, therefore, denies these allegations. Aastra USA admits that a purported copy of the ‘135 patent was attached to the complaint as Exhibit A. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 9.

10. Aastra USA admits that United States Patent No. 6,839,759 (“the ‘759 patent”), entitled “Method for Establishing Secure Communication Link Between Computers of Virtual Private Network Without User Entering Any Cryptographic Information” issued on January 4, 2005, but denies any further characterization of the ‘759 patent, its inventors, or its examination as alleged in Paragraph 10. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the

allegations that VirnetX is the “owner of all rights, title, and interest in and to the ‘759 patent and possesses all rights of recovery under the ‘759 patent” and, therefore, denies these allegations. Aastra USA admits that a purported copy of the ‘759 patent was attached to the complaint as Exhibit B. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 10.

11. Aastra USA admits that United States Patent No. 7,188,180 (“the ‘180 patent”), entitled “Method for Establishing Secure Communications Link Between Computers of Virtual Private Network” issued on March 6, 2007, but denies any further characterization of the ‘180 patent, its inventors, or its examination as alleged in Paragraph 11. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations that VirnetX is the “owner of all rights, title, and interest in and to the ‘180 patent and possesses all rights of recovery under the ‘180 patent” and, therefore, denies these allegations. Aastra USA admits that a purported copy of the ‘180 patent was attached to the complaint as Exhibit C. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 11.

12. Aastra USA admits that United States Patent No. 7,418,504 (“the ‘504 patent”), entitled “Agile Network Protocol for Secure Communications Using Secure Domain Names” issued on August 26, 2008, but denies any further characterization of the ‘504 patent, its inventors, or its examination as alleged in Paragraph 12. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations that VirnetX is the “owner of all rights, title, and interest in and to the ‘504 patent and possesses all rights of recovery under the ‘504 patent” and, therefore, denies these allegations. Aastra USA admits that a purported copy of the ‘504 patent

was attached to the complaint as Exhibit D. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 12.

13. Aastra USA admits that United States Patent No. 7,490,151 (“the ‘151 patent”), entitled “Establishment of a Secure Communication Link Based on a Domain Name Service (DNS) Request” issued on February 10, 2009, but denies any further characterization of the ‘151 patent, its inventors, or its examination as alleged in Paragraph 13. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations that VirnetX is the “owner of all rights, title, and interest in and to the ‘151 patent and possesses all rights of recovery under the ‘151 patent” and, therefore, denies these allegations. Aastra USA admits that a purported copy of the ‘151 patent was attached to the complaint as exhibit E. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 13.

### **COUNT ONE**

#### **PATENT INFRINGEMENT BY AASTRA USA**

14. Aastra USA incorporates by reference paragraphs 1-13 as if fully set forth herein. Aastra USA denies that it has infringed and/or continues to infringe the ‘135 patent.

15. Aastra USA admits that it makes, sells, offers for sale, exports, imports, supplies, and/or distributes within and from the United States the Clearspan platform, Pointspan platform, 6725ip telephone, 6721ip telephone, 6739i telephone, 6730i telephone, 6731i telephone, 6753i (53i) telephone, 6755i (55i) telephone, 6757i (57i) telephone, 6757i CT (57i CT) telephone, M670i (536M) Expansion Module, M675i (560M) Expansion Module, 9143i telephone, 9480i telephone, and 9480i CT

telephone. Aastra USA denies that any of these products infringe any valid claim of the '135 patent. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 15.

16. Aastra USA admits that it uses the products listed in Paragraph 15, but denies that such use infringes any valid claim of the '135 patent. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 16.

17. Aastra USA admits that it sells the products listed in Paragraph 15 to parties who use said products, but denies that such use infringes any valid claim of the '135 patent. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 17.

18. Denied.

19. Denied.

20. Denied.

21. Denied.

22. Aastra USA admits that it has received actual notice of infringement by virtue of the filing of this lawsuit. Aastra USA denies that it has received constructive notice. Aastra USA denies that VirnetX has complied with the requirements of 35 U.S.C. § 287. Except as expressly admitted above, Aastra USA denies the allegations in Paragraph 22.

## **COUNT TWO**

### **PATENT INFRINGEMENT BY APPLE**

23. Aastra USA incorporates by reference paragraphs 1-22 as if fully set forth herein. Aastra USA is without knowledge or information sufficient to form a belief as



to the truth of the allegations set forth in Paragraph 23 and therefore, denies these allegations.

24. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 24 and therefore, denies these allegations.

25. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 25 and therefore, denies these allegations.

26. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 26 and therefore, denies these allegations.

27. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 27 and therefore, denies these allegations.

28. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 28 and therefore, denies these allegations.

29. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 29 and therefore, denies these allegations.

30. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 30 and therefore, denies these allegations.

31. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 31 and therefore, denies these allegations.

32. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 32 and therefore, denies these allegations.

33. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 33 and therefore, denies these allegations.

34. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 34 and therefore, denies these allegations.

35. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 35 and therefore, denies these allegations.

36. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 36 and therefore, denies these allegations.

**COUNT THREE**

**PATENT INFRINGEMENT BY CISCO**

37. Aastra USA incorporates by reference paragraphs 1-36 as if fully set forth herein. Aastra USA is without knowledge or information sufficient to form a belief as

to the truth of the allegations set forth in Paragraph 37 and therefore, denies these allegations.

38. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 38 and therefore, denies these allegations.

39. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 39 and therefore, denies these allegations.

40. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 40 and therefore, denies these allegations.

41. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 41 and therefore, denies these allegations.

42. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 42 and therefore, denies these allegations.

43. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 43 and therefore, denies these allegations.

44. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 44 and therefore, denies these allegations.

45. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 45 and therefore, denies these allegations.

46. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 46 and therefore, denies these allegations.

47. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 47 and therefore, denies these allegations.

48. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 48 and therefore, denies these allegations.

49. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 49 and therefore, denies these allegations.

50. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 50 and therefore, denies these allegations.

51. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 51 and therefore, denies these allegations.

52. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 52 and therefore, denies these allegations.

53. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 53 and therefore, denies these allegations.

54. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 54 and therefore, denies these allegations.

55. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 55 and therefore, denies these allegations.

56. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 56 and therefore, denies these allegations.

57. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 57 and therefore, denies these allegations.

58. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 58 and therefore, denies these allegations.

59. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 59 and therefore, denies these allegations.

60. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 60 and therefore, denies these allegations.

61. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 61 and therefore, denies these allegations.

62. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 62 and therefore, denies these allegations.

63. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 63 and therefore, denies these allegations.

**COUNT FOUR**

**PATENT INFRINGEMENT BY NEC**

64. Aastra USA incorporates by reference paragraphs 1-63 as if fully set forth herein. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 64 and therefore, denies these allegations.

65. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 65 and therefore, denies these allegations.

66. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 66 and therefore, denies these allegations.

67. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 67 and therefore, denies these allegations.

68. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 68 and therefore, denies these allegations.

69. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 69 and therefore, denies these allegations.

70. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 70 and therefore, denies these allegations.

71. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 71 and therefore, denies these allegations.

72. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 72 and therefore, denies these allegations.

73. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 73 and therefore, denies these allegations.

74. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 74 and therefore, denies these allegations.

75. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 75 and therefore, denies these allegations.

76. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 76 and therefore, denies these allegations.

77. Aastra USA is without knowledge or information sufficient to form a belief as to the truth of the allegations set forth in Paragraph 77 and therefore, denies these allegations.

#### **AASTRA USA'S AFFIRMATIVE DEFENSES**

78. Aastra USA has not and does not literally, directly, contributorily, by way of inducement, and/or under the doctrine of equivalents, infringe any valid and/or enforceable claim of the '135 patent.



79. Each of the claims of the '135 patent are invalid for failing to comply with one of more of the requirements for patentability specified by Part II of Title 35 of the United States Code §101 *et seq.*, including without limitation 35 U.S.C. §§ 102, 103 and/or 112.

80. VirnetX is estopped from construing the claims of the '135 patent to cover or include, either literally or by application of the doctrine of equivalents, methods used, devices manufactured, used, imported, sold or offered for sale by Aastra USA because of admissions and statements to the PTO during prosecution of the applications leading to the issuance of the patent, disclosure or language in the specification of the patent and/or limitations in the claims of the patent.

81. The relief sought by VirnetX is barred in whole or in part by the doctrine of laches.

82. To the extent that products accused of infringement were or are used or manufactured by or for the United States, the relief sought by VirnetX is limited by 28 U.S.C. § 1498(a).

83. The relief sought by VirnetX is barred in whole or in part by 35 U.S.C. § 287.

84. VirnetX is not entitled to an injunction against Aastra USA because VirnetX has an adequate remedy at law.

85. VirnetX lacks standing to bring suit to enforce the '135 patent because it does not possess all substantial rights in the '135 patent.

86. The '135 patent is unenforceable due to inequitable conduct. Based on the contents of the prosecution history and based on Aastra USA's understanding of the

allegations by VirnetX, one or more of the people substantively involved in the prosecution of the application leading to the '135 patent, and the subsequent reexamination of the '135 patent, were aware of information material to the patentability of the claims of the '135 patent, but withheld that information from the Patent Office with the intent to deceive.

Existence of US. Patent Application No. 09/399,753 ("the Miller Application"), was withheld during the prosecution of the '135 patent. The pendency of the Miller Application was information material to patentability of the '135 patent based on Aastra USA's understanding of the allegations by VirnetX. The withheld information also includes RFC 2401-Security Architecture for the Internet Protocol ("RFC 2401") and the Aventail Administrator's Guide ("Aventail"), which are material to patentability based upon Aastra USA's understanding of the allegations by VirnetX. This withholding of information material to patentability with the intent to deceive the Patent Office constitutes inequitable conduct.

The Miller Application, RFC 2401, and the Aventail reference are not cumulative to the prior art made of record during prosecution of the '135 patent. There is a substantial likelihood that a reasonable examiner would have considered this art in determining whether to allow the '135 patent to issue.

During the prosecution of the application leading to the '135 patent, one or more of the people substantively involved in its prosecution (including Ross Dannenburg) were aware of the Miller Application. Mr. Dannenburg was involved in the prosecution of the Miller Application during the prosecution of the '135 patent at least as early as June 14, 2002, when he signed an Amendment / Response in the

prosecution history of the Miller Application. Mr. Dannenburg was involved in the prosecution of the '135 patent at least as early as January 28, 2002, when he signed a Transmittal Form for an Amendment / Response in the prosecution file history of the '135 patent. Therefore, Mr. Dannenburg was involved in the prosecution of the Miller Application while he was prosecuting the '135 patent. Based on Aastra USA's understanding of the allegations by VirnetX, the pendency of the Miller Application is information material to patentability. Nonetheless, those substantively involved in the prosecution of the application intentionally failed to disclose this material information to the Patent Office at any time during the prosecution of the '135 patent with intent to deceive. Moreover, the materiality of the Miller Application leads to an inference of intent to deceive. This withholding of information material to patentability with the intent to deceive the Patent Office constitutes inequitable conduct.

During the prosecution of the application leading to the '135 patent, one or more of the people substantively involved in its prosecution were aware of RFC 2401, including Mr. Dannenburg, because it is mentioned in the specification of the '135 patent. Based on Aastra USA's understanding of the allegations by VirnetX, RFC 2401 is material prior art. Nonetheless, those substantively involved in the prosecution of the application intentionally failed to submit this material prior art reference to the Patent Office as required by 37 C.F.R. 1.56 and 37 C.F.R. 1.97, with intent to deceive. Moreover, in mentioning RFC 2401 in the application, those substantively involved in the prosecution of the application described RFC 2401 in a way that concealed its materiality, with intent to deceive. Moreover, the materiality of

RFC 2401 leads to an inference of intent to deceive. This conduct, undertaken with the intent to deceive the Patent Office, constitutes inequitable conduct.

VirnetX also committed inequitable conduct during the reexamination of the '135 patent. On or about February 15, 2007, VirnetX filed a lawsuit against Microsoft Corporation ("Microsoft") in the Eastern District of Texas, Tyler Division, C.A. No. 6:07-CV-80 (the "Microsoft trial"), alleging that Microsoft infringed certain VirnetX patents, including the '135 patent.

During the Microsoft trial, one or more witnesses for VirnetX, including inventor Edward Munger, testified that the claims of the '135 patent were conceived no earlier than three months after September 23, 1999, placing the date of conception for claims 1-10 and 12 on or after December 23, 1999.

During the Microsoft trial, Microsoft alleged, in part, that claims 1-10 and 12 of the '135 patent were anticipated by the Aventail reference, which on information and belief bears a copyright date between 1996 – 1999.

In December 2009, Microsoft filed a reexamination request with the Patent Office requesting re-examination of claims 1-10 and 12 of the '135 patent, citing, among other references, the Aventail reference as prior art under 35 U.S.C. § 102(a). Microsoft asserted that the Aventail reference anticipated claims 1-10 and 12 of the '135 patent.

On or about December 31, 2009, the Patent Office ordered re-examination of claims 1-10 and 12 of the '135 patent, finding, in part, that the Aventail reference raised a substantial new question of patentability of all of the requested claims of the '135 patent.

On or about January 15, 2010, the Patent Office issued a non-final action rejecting claims 1, 3, 4, 6-10, and 12 as being anticipated by the Aventail reference.

On or about February 22, 2010, VirnetX filed a petition to extend its deadline for responding to the office action, pointing out, in part, that it needed additional time to investigate whether the Aventail reference was proper prior art, including investigating the dates of conception and reduction to practice of the inventions claimed in the '135 patent as well as diligence there between. The petition also cited as a basis for extension that the Microsoft case was causing a "significant drain" on VirnetX's resources. Moreover, the petition stated that the extension "would likely also permit consideration of any court conclusions regarding the claims presently under reexamination." The petition was filed by Toby Kusmer of McDermott Will & Emery, the same firm that represented VirnetX in the Microsoft case until 2009. The Patent Office responded on or about February 24, 2010, granting an extension, and setting the deadline for response as April 15, 2010.

On or about March 8, 2010, the Microsoft trial commenced. During trial, Microsoft argued that the Aventail reference invalidated claims 1-10 and 12 of the '135 patent. Microsoft presented evidence indicating that the Aventail reference may have been published as early as June 1999. Based on a review of the trial record, VirnetX did not dispute the publication date of the Aventail reference. The Microsoft trial concluded on or about March 16, 2010. Therefore, at least as of March 16, VirnetX was aware that the Aventail reference may have been published at least as early as June 1999, which is prior to the February 15, 2000, filing date of the application that matured into the '135 patent and prior to the earliest conception date

of December 1999 claimed by the inventor of the '135 patent.

On or about March 25, 2010 VirnetX gave notice to the Patent Office of the outcome of the case and submitted the jury verdict form from the case. On or about March 29, 2010, VirnetX filed a petition requesting that the re-examination proceeding be suspended. The Patent Office did not respond to the request until after the date set for VirnetX's response to the non-final office action rejection.

On or about April 15, 2010, VirnetX responded to the office action rejection, in part, by asserting that the Aventail reference should not be considered prior art because no evidence had been submitted by Microsoft that established the actual publication date of the Aventail reference. Moreover, VirnetX did not provide the result of any investigation it may have made with respect to the publication date of the Aventail reference or the dates of conception or reduction to practice of the '135 patent that it indicated it would make in its petition for an extension of time, nor did VirnetX provide any information that it learned from the Microsoft trial that related to the publication date of the Aventail reference. Based on a review of the prosecution history, VirnetX did not disclose that its conception date for the claims of the '135 patent was no earlier than December 1999, nor did VirnetX disclose that the Aventail reference may have been published as early as June 1999, a fact to which VirnetX was made aware during the Microsoft trial.

On June 16, 2010, the Patent Office issued an Action Closing Prosecution. In the action, the examiner recites that he made an attempt to determine the publication date of the Aventail reference, but was unsuccessful. Based on the lack of evidence of the publication date, the examiner withdrew all of the rejections that had

been based on the Aventail reference.

VirnetX and/or its representatives, agents, and attorneys who were substantively involved in the prosecution of the re-examination knew or should have known of the Microsoft trial and the evidence presented regarding the publication date of the Aventail reference. For example, Mr. Kusmer specifically referenced the Microsoft trial and the potential for additional material information to come to light during that trial when seeking an extension to respond to an office action, as set forth above. VirnetX and/or its representatives, agents, and attorneys withheld this information with the intent to deceive, either willfully or with such gross negligence or recklessness as constituting an act of willfulness amounting to inequitable conduct. Moreover, the high degree of materiality of the Aventail publication and the aforementioned evidence presented at the Microsoft trial leads to an inference of intent to deceive. Among other things, the information withheld was material to the reexamination of the '135 patent, in violation of the duty of candor the representatives and/or the attorneys owed to the Patent Office.

### **AASTRA USA'S COUNTERCLAIMS**

87. Aastra USA Inc. ("Aastra USA") is a Delaware corporation with its principal place of business at 2811 Internet Blvd., Frisco, Texas 75034.

88. VirnetX, Inc. ("VirnetX"), as represented in Paragraph 1 of its Original Complaint, has claimed that it is a Delaware corporation with its principal place of business at 5615 Scotts Valley Drive, Suite 110 Scotts Valley, California.

89. This Court has subject matter jurisdiction over the Counterclaim pursuant to 28 U.S.C. §§ 1331, 1338, and 2201 as it arises under an Act of Congress relating to patents.

90. Venue is proper in this district under 28 U.S.C. §§ 1391(b), (c) and 1400.

91. By filing its complaint, VirnetX has consented to the personal jurisdiction of this Court.

**DECLARATORY JUDGMENT FOR NON-INFRINGEMENT OF UNITED STATES PATENT NO. 6,502,135**

92. Aastra USA hereby re-alleges and incorporates by reference Paragraphs 87-91 as though fully set forth herein.

93. United States Patent No. 6,502,135 (“the ‘135 patent”), entitled “Agile Network Protocol for Secure Communications with Assured System Availability” was issued on December 31, 2002. VirnetX claims to be the owner by assignment of the ‘135 patent.

94. Aastra USA has not directly infringed, contributed to infringement, or induced infringement of any valid claim of the ‘135 patent, nor is Aastra USA directly infringing, contributing to infringement, or inducing infringement of any valid claim of the ‘135 patent.

95. An actual controversy exists between Aastra USA and VirnetX regarding the alleged infringement ‘135 patent by virtue of VirnetX’s allegation of infringement.

96. Aastra USA is entitled to judgment from this Court that the ‘135 patent is not infringed by Aastra USA.



**DECLARATORY JUDGMENT FOR INVALIDITY OF UNITED STATES  
PATENT NO. 6,502,135**

97. Aastra USA hereby re-alleges and incorporates by reference Paragraphs 87-96 as though fully set forth herein.

98. The '135 patent is invalid for failing to comply with one or more of the requirements for patentability set forth in Part II of Title 35 U.S.C. § 101 *et seq.*, including without limitation 35 U.S.C. §§102, 103 and/or 112.

99. An actual controversy exists between Aastra USA and VirnetX regarding the validity of the '135 patent by virtue of VirnetX's allegation of infringement.

100. Aastra USA is entitled to judgment from this Court that the '135 patent is invalid.

**DECLARATORY JUDGMENT FOR UNENFORCEABILITY OF UNITED  
STATES PATENT NO. 6,502,135**

101. Aastra USA hereby re-alleges and incorporates by reference Paragraphs 87-100 as though fully set forth herein.

102. The '135 patent is unenforceable due to inequitable conduct. Based on the contents of the prosecution history and based on Aastra USA's understanding of the allegations by VirnetX, one or more of the people substantively involved in the prosecution of the application leading to the '135 patent, and the subsequent reexamination of the '135 patent, were aware of information material to the patentability of the claims of the '135 patent, but withheld that information from the Patent Office with the intent to deceive.

103. The existence of US. Patent Application No. 09/399,753 ("the Miller Application"), was withheld during the prosecution of the '135 patent. The pendency

of the Miller Application was information material to patentability of the '135 patent based on Aastra USA's understanding of the allegations by VirnetX. The withheld information also includes RFC 2401-Security Architecture for the Internet Protocol ("RFC 2401") and the Aventail Administrator's Guide ("Aventail"), which are material to patentability based upon Aastra USA's understanding of the allegations by VirnetX. This withholding of information material to patentability with the intent to deceive the Patent Office constitutes inequitable conduct.

104. The Miller Application, RFC 2401, and the Aventail reference are not cumulative to the prior art made of record during prosecution of the '135 patent. There is a substantial likelihood that a reasonable examiner would have considered this art in determining whether to allow the '135 patent to issue.

105. During the prosecution of the application leading to the '135 patent, one or more of the people substantively involved in its prosecution (including Ross Dannenburg) were aware of the Miller Application. Mr. Dannenburg was involved in the prosecution of the Miller Application during the prosecution of the '135 patent at least as early as June 14, 2002, when he signed an Amendment / Response in the prosecution history of the Miller Application. Mr. Dannenburg was involved in the prosecution of the '135 patent at least as early as January 28, 2002, when he signed a Transmittal Form for an Amendment / Response in the prosecution file history of the '135 patent. Therefore, Mr. Dannenburg was involved in the prosecution of the Miller Application while he was prosecuting the '135 patent. Based on Aastra USA's understanding of the allegations by VirnetX, the pendency of the Miller Application is information material to patentability. Nonetheless, those substantively involved in

the prosecution of the application intentionally failed to disclose this material information to the Patent Office at any time during the prosecution of the '135 patent with intent to deceive. Moreover, the materiality of the Miller Application leads to an inference of intent to deceive. This withholding of information material to patentability with the intent to deceive the Patent Office constitutes inequitable conduct.

106. During the prosecution of the application leading to the '135 patent, one or more of the people substantively involved in its prosecution were aware of RFC 2401, including Mr. Dannenburg, because it is mentioned in the specification of the '135 patent. Based on Aastra USA's understanding of the allegations by VirnetX, RFC 2401 is material prior art. Nonetheless, those substantively involved in the prosecution of the application intentionally failed to submit this material prior art reference to the Patent Office as required by 37 C.F.R. 1.56 and 37 C.F.R. 1.97, with intent to deceive. Moreover, in mentioning RFC 2401 in the application, those substantively involved in the prosecution of the application described RFC 2401 in a way that concealed its materiality, with intent to deceive. Moreover, the materiality of RFC 2401 leads to an inference of intent to deceive. This conduct, undertaken with the intent to deceive the Patent Office, constitutes inequitable conduct.

107. VirnetX also committed inequitable conduct during the reexamination of the '135 patent. On or about February 15, 2007, VirnetX filed a lawsuit against Microsoft Corporation ("Microsoft") in the Eastern District of Texas, Tyler Division, C.A. No. 6:07-CV-80 (the "Microsoft trial"), alleging that Microsoft infringed certain VirnetX patents, including the '135 patent.

108. During the Microsoft trial, one or more witnesses for VirnetX, including inventor Edward Munger, testified that the claims of the '135 patent were conceived no earlier than three months after September 23, 1999, placing the date of conception for claims 1-10 and 12 on or after December 23, 1999.

109. During the Microsoft trial, Microsoft alleged, in part, that claims 1-10 and 12 of the '135 patent were anticipated by the Aventail reference, which on information and belief bears a copyright date between 1996 – 1999.

110. In December 2009, Microsoft filed a reexamination request with the Patent Office requesting re-examination of claims 1-10 and 12 of the '135 patent, citing, among other references, the Aventail reference as prior art under 35 U.S.C. § 102(a). Microsoft asserted that the Aventail reference anticipated claims 1-10 and 12 of the '135 patent.

111. On or about December 31, 2009, the Patent Office ordered re-examination of claims 1-10 and 12 of the '135 patent, finding, in part, that the Aventail reference raised a substantial new question of patentability of all of the requested claims of the '135 patent.

112. On or about January 15, 2010, the Patent Office issued a non-final action rejecting claims 1, 3, 4, 6-10, and 12 as being anticipated by the Aventail reference.

113. On or about February 22, 2010, VirnetX filed a petition to extend its deadline for responding to the office action, pointing out, in part, that it needed additional time to investigate whether the Aventail reference was proper prior art, including investigating the dates of conception and reduction to practice of the inventions claimed in the '135 patent as well as diligence there between. The petition

also cited as a basis for extension that the Microsoft case was causing a “significant drain” on VirnetX’s resources. Moreover, the petition stated that the extension “would likely also permit consideration of any court conclusions regarding the claims presently under reexamination.” The petition was filed by Toby Kusmer of McDermott Will & Emery, the same firm that represented VirnetX in the Microsoft case until 2009. The Patent Office responded on or about February 24, 2010, granting an extension, and setting the deadline for response as April 15, 2010.

114. On or about March 8, 2010, the Microsoft trial commenced. During trial, Microsoft argued that the Aventail reference invalidated claims 1-10 and 12 of the ‘135 patent. Microsoft presented evidence indicating that the Aventail reference may have been published as early as June 1999. Based on a review of the trial record, VirnetX did not dispute the publication date of the Aventail reference. The Microsoft trial concluded on or about March 16, 2010. Therefore, at least as of March 16, 2010, VirnetX was aware that the Aventail reference may have been published at least as early as June 1999, which is prior to the February 15, 2000, filing date of the application that matured into the ‘135 patent and prior to the earliest conception date of December 1999 claimed by the inventor of the ‘135 patent.

115. On or about March 25, 2010, VirnetX gave notice to the Patent Office of the outcome of the case and submitted the jury verdict form from the case. On or about March 29, 2010, VirnetX filed a petition requesting that the re-examination proceeding be suspended. The Patent Office did not respond to the request until after the date set for VirnetX’s response to the non-final office action rejection.

116. On or about April 15, 2010, VirnetX responded to the office action rejection, in part, by asserting that the Aventail reference should not be considered prior art because no evidence had been submitted by Microsoft that established the actual publication date of the Aventail reference. Moreover, VirnetX did not provide the result of any investigation it may have made with respect to the publication date of the Aventail reference or the dates of conception or reduction to practice of the '135 patent that it indicated it would make in its petition for an extension of time, nor did VirnetX provide any information that it learned from the Microsoft trial that related to the publication date of the Aventail reference. Based on a review of the prosecution history, VirnetX did not disclose that its conception date for the claims of the '135 patent was no earlier than December 1999, nor did VirnetX disclose that the Aventail reference may have been published as early as June 1999, a fact to which VirnetX was made aware during the Microsoft trial.

117. On June 16, 2010, the Patent Office issued an Action Closing Prosecution. In the action, the examiner recites that he made an attempt to determine the publication date of the Aventail reference, but was unsuccessful. Based on the lack of evidence of the publication date, the examiner withdrew all of the rejections that had been based on the Aventail reference.

118. VirnetX and/or its representatives, agents, and attorneys who were substantively involved in the prosecution of the re-examination knew or should have known of the Microsoft trial and the evidence presented regarding the publication date of the Aventail reference. For example, Mr. Kusmer specifically referenced the Microsoft trial and the potential for additional material information to come to light

during that trial when seeking an extension to respond to an office action, as set forth above. VirnetX and/or its representatives, agents, and attorneys withheld this information with the intent to deceive, either willfully or with such gross negligence or recklessness as constituting an act of willfulness amounting to inequitable conduct. Moreover, the high degree of materiality of the Aventail publication and the aforementioned evidence presented at the Microsoft trial leads to an inference of intent to deceive. Among other things, the information withheld was material to the reexamination of the '135 patent, in violation of the duty of candor the representatives and/or the attorneys owed to the Patent Office.

#### **EXCEPTIONAL CASE**

119. This is an exceptional case pursuant to 35 U.S.C. § 285 entitling Aastra USA to an award of attorneys' fees as a result of, *inter alia*, VirnetX's assertion of the '135 patent against Aastra USA with the knowledge that the '135 patent is unenforceable and for VirnetX's failure to perform a reasonable pre-suit investigation of its infringement contentions against Aastra USA.

#### **DEMAND FOR JURY TRIAL**

120. Aastra USA hereby demands a jury for all issues so triable.

#### **PRAYER FOR RELIEF**

121. WHEREFORE, Aastra USA prays for the following relief:

- A. That the Court enter judgment that VirnetX is not entitled to any relief with respect to its allegations against Aastra USA and dismiss all of VirnetX's allegations with prejudice;

- B. That the Court enter a judgment that Aastra USA has not infringed and is not directly infringing or indirectly infringing by contribution or inducement, whether willfully or otherwise, any claim of the '135 patent, as alleged by VirnetX;
- C. That the Court enter a judgment that the claims of the '135 patent are invalid;
- D. That the Court enter a judgment that the claims of the '135 patent are unenforceable;
- E. That the Court enter a declaratory judgment that the claims of the '135 patent are not infringed;
- F. That the Court enter a declaratory judgment that the claims of the '135 patent are invalid;
- G. That the Court enter a declaratory judgment that the claims of the '135 patent are unenforceable;
- H. That the Court declare this an exceptional case and award Aastra USA its costs, expenses, and reasonable attorneys' fees pursuant to 35 U.S.C. § 285 and all other applicable statutes, rules, and common law; and
- I. That the Court award Aastra USA such other and further relief as the Court may deem just and proper.



DATED: October 29, 2010

Respectfully Submitted,

By: /s/ Phillip N. Cockrell  
Phillip N. Cockrell  
*Lead Attorney*  
State Bar No. 04465500  
pcockrell@pattonroberts.com  
PATTON ROBERTS, PLLC  
400 Century Plaza  
2900 St. Michael Dr.  
Texarkana, Texas 75503  
Telephone: 903-334-7000  
Facsimile: 903-334-7007

Jon B. Hyland  
jhyland@pattonroberts.com  
State Bar No. 24046131  
Robert D. Katz  
rkatz@pattonroberts.com  
State Bar No. 24057936  
PATTON ROBERTS, PLLC  
901 Main St., Suite 3300  
Dallas, Texas 75202  
Telephone: 214-580-3826  
Facsimile: 903-334-7007

**CERTIFICATE OF SERVICE**

This is to certify that all counsel of record who are deemed to have consented to electronic service are being served with a copy of this document via the Court's CM/ECF system per Local Rule CV-5(a)(3) on this the 29th. Day of October, 2010.

/s/ Phillip N. Cockrell

EXHIBIT H

<p style="text-align: center;">IN THE UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF TEXAS TYLER DIVISION</p> <hr/> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">VIRNETX INC. AND SCIENCE</td> <td style="width: 5%; text-align: center;">}</td> <td style="width: 35%;"></td> </tr> <tr> <td>APPLICATIONS INTERNATIONAL CORP.,</td> <td style="text-align: center;">}</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">}</td> <td></td> </tr> <tr> <td style="text-align: center;">Plaintiff,</td> <td style="text-align: center;">}</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">}</td> <td style="text-align: center;">Civil Action</td> </tr> <tr> <td style="text-align: center;">v.</td> <td style="text-align: center;">}</td> <td style="text-align: center;">No. 6:07CV80V (LED)</td> </tr> <tr> <td></td> <td style="text-align: center;">}</td> <td></td> </tr> <tr> <td>MICROSOFT CORPORATION,</td> <td style="text-align: center;">}</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">}</td> <td></td> </tr> <tr> <td style="text-align: center;">Defendant.</td> <td style="text-align: center;">}</td> <td></td> </tr> </table> <hr/> <p style="text-align: center;">Videotape Deposition Upon Oral Examination of GARY TOMLINSON</p> <hr/> <p style="text-align: center;">Taken at 925 Fourth Avenue, Suite 2900 Seattle, Washington</p> <p>DATE: Friday, February 27, 2009</p> <p>REPORTED BY: Ronald L. Cook CCR, RMR, CRR</p>	VIRNETX INC. AND SCIENCE	}		APPLICATIONS INTERNATIONAL CORP.,	}			}		Plaintiff,	}			}	Civil Action	v.	}	No. 6:07CV80V (LED)		}		MICROSOFT CORPORATION,	}			}		Defendant.	}		<p style="text-align: right;">Page 3</p> <p style="text-align: center;">I N D E X</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">EXAMINATION BY:</td> <td style="width: 20%;"></td> <td style="width: 20%; text-align: right;">PAGE</td> </tr> <tr> <td>Mr. King</td> <td></td> <td style="text-align: right;">5</td> </tr> <tr> <td>Mr. Lin</td> <td></td> <td style="text-align: right;">87</td> </tr> <tr> <td>Mr. King</td> <td></td> <td style="text-align: right;">141</td> </tr> <tr> <td colspan="3" style="text-align: center;">* * *</td> </tr> <tr> <td>EXHIBIT</td> <td>DESCRIPTION</td> <td style="text-align: right;">FOR I.D.</td> </tr> <tr> <td>EX. 1</td> <td>Document entitled "Subpoena in a Civil Case," dated October 19, 2007, with attachments.</td> <td style="text-align: right;">7</td> </tr> <tr> <td>EX. 2</td> <td>Document entitled "Aventail Connect, v3.1/v2.6, Administrator's Guide, Windows."</td> <td style="text-align: right;">28</td> </tr> <tr> <td>EX. 3</td> <td>Document entitled "Aventail ExtraWeb Server v3.2 Administrator's Guide."</td> <td style="text-align: right;">36</td> </tr> <tr> <td>EX. 4</td> <td>Document entitled "Aventail Connect, v3.1/v2.6, Administrator's Guide, Windows."</td> <td style="text-align: right;">39</td> </tr> <tr> <td>EX. 5</td> <td>DVD, entitled "Aventail ExtraNet Center, 2.6 / 3.1 / 3.2, SRC."</td> <td style="text-align: right;">41</td> </tr> <tr> <td>EX. 6</td> <td>Source code.</td> <td style="text-align: right;">56</td> </tr> <tr> <td>EX. 7</td> <td>Source code.</td> <td style="text-align: right;">56</td> </tr> </table>	EXAMINATION BY:		PAGE	Mr. King		5	Mr. Lin		87	Mr. King		141	* * *			EXHIBIT	DESCRIPTION	FOR I.D.	EX. 1	Document entitled "Subpoena in a Civil Case," dated October 19, 2007, with attachments.	7	EX. 2	Document entitled "Aventail Connect, v3.1/v2.6, Administrator's Guide, Windows."	28	EX. 3	Document entitled "Aventail ExtraWeb Server v3.2 Administrator's Guide."	36	EX. 4	Document entitled "Aventail Connect, v3.1/v2.6, Administrator's Guide, Windows."	39	EX. 5	DVD, entitled "Aventail ExtraNet Center, 2.6 / 3.1 / 3.2, SRC."	41	EX. 6	Source code.	56	EX. 7	Source code.	56
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<p style="text-align: center;">Page 2</p> <p style="text-align: center;">A P P E A R A N C E S</p> <p>For the Plaintiffs: HONG S. LIN McDermott Will &amp; Emery 275 Middlefield Road Suite 100 Menlo Park, California 94025-4004 650.815.7560 hlin@mwe.com and CHRISTOPHER D. BRIGHT McDermott Will &amp; Emery 18191 Von Karman Avenue Suite 500 Irvine, California 92612 cbright@mwe.com</p> <p>For the Defendant: THOMAS KING Weil, Gotshal &amp; Manges 201 Redwood Shores Parkway Redwood Shores, California 94065 650.802.3210 thomas.king@weil.com</p> <p>For the SonicWALL, Inc., and the Witness: LAUREL M.V. BUCKNER 2101 Fourth Avenue Suite 400 Seattle, Washington 98121 206.438.7367 lbuckner@sonicwall.com</p> <p>Also Present: CHRISTOPHER STOW, Videographer</p>	<p style="text-align: center;">Page 4</p> <p style="text-align: center;">SEATTLE, WASHINGTON; FRIDAY, FEBRUARY 27, 2009 10:08 A.M. --o0o--</p> <p style="text-align: center;">THE VIDEOGRAPHER: Here begins Volume I, Videotape No. 1, in the deposition of Richard Aventail, in the matter of VirnetX, Incorporated, and Science Applications International corporation vs. Microsoft, in the United States District Court for the Eastern District of Texas, Tyler Division, Case No. 6:07CV80V(LED). Today's date is Friday, February 27, 2009. The time on the video monitor is 10:08 a.m. The video operator today is Chris Stow, contracted by Merrill Legal Solutions, San Francisco, California. This video deposition is taking place at 925 Fourth Avenue, Suite 2900, Seattle, Washington, 98104. Counsel, please identify yourselves and state whom you represent. MR. KING: Thomas King, from Weil, Gotshal &amp; Manges, here on behalf of Microsoft Corporation. MR. BRIGHT: Chris Bright, with McDermott Will &amp; Emery, on behalf of plaintiff, VirnetX. MR. LIN: Hong Lin, also from McDermott Will &amp; Emery, for plaintiff VirnetX.</p>
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(Pages 1 to 4)

Page 5

1 MS. BUCKNER: And I'm Laurel Buckner,  
 2 associate general counsel at SonicWALL, which was the  
 3 acquirer of Aventail Corporation, and I'm here primarily to  
 4 protect SonicWALL's confidential information.  
 5 THE VIDEOGRAPHER: The court reporter today  
 6 is Ronald L. Cook, of Premiere Realtime Litigation Services.  
 7 Would the reporter please swear in the  
 8 witness.  
 9  
 10 GARY TOMLINSON, deponent herein, being  
 11 first duly sworn on oath,  
 12 was examined and testified  
 13 as follows:  
 14  
 15 MR. KING: Before we begin the questioning,  
 16 I'd like to just state -- get -- clarify the record for the  
 17 record. This is the -- the witness is Gary Tomlinson, and  
 18 this is a -- he's here representing a company called  
 19 SonicWALL, Inc.  
 20  
 21 EXAMINATION  
 22 BY MR. KING:  
 23 Q. Good morning, Mr. Tomlinson.  
 24 A. Good morning.  
 25 Q. You understand that you're here to testify

Page 7

1 A. No, there's no reason.  
 2 MR. KING: Let's see. I'd like to mark an  
 3 exhibit.  
 4 (Discussion off the record.)  
 5 (Deposition Exhibit 1 was marked  
 6 for identification.)  
 7 Q. BY MR. KING: Have you ever seen this  
 8 document before?  
 9 A. Let me look.  
 10 I'm not sure if I've seen this. I think I  
 11 have but I'm not sure. I've seen several documents  
 12 presented to us.  
 13 Q. Okay.  
 14 I'll represent to you that is the subpoena  
 15 that we sent SonicWALL, requesting production of documents  
 16 and requesting that someone from -- a representative from  
 17 SonicWALL come to testify about a partic -- some topics.  
 18 Would you mind turning to Page 6?  
 19 A. Sure.  
 20 Q. It's Page 6 of Attachment A.  
 21 A. Of Attachment --  
 22 Q. Or might also be --  
 23 A. It says "Attachment B."  
 24 Q. It's labeled "Attachment B." Okay.  
 25 A. Is that --

Page 6

1 today on behalf of SonicWALL, Incorporated; is that --  
 2 A. I do.  
 3 Q. -- is that correct?  
 4 Before we -- before we begin with the  
 5 deposition, I just want to set a few -- few ground rules.  
 6 Because you're represented by counsel, I presume you're  
 7 somewhat familiar with this process, but the way this is  
 8 going to work today is I'll be asking some questions and  
 9 you'll be answering those questions to the best of your  
 10 ability. Is that fair?  
 11 A. Yes.  
 12 Q. At some point during the process either your  
 13 counsel or counsel for VirnetX might interpose some  
 14 objections. That's just for the record, and you understand  
 15 that you're still under an obligation to answer those  
 16 questions unless -- unless your counsel directs otherwise;  
 17 is that fair?  
 18 A. Yes, I understand that, mm-hmm.  
 19 Q. And the last thing, and this is hard, but --  
 20 as the day goes on, but for the sake of the court reporter,  
 21 let's try to just have one person talking at a time so we  
 22 can have a clear record. Is that fair?  
 23 A. Yes.  
 24 Q. Is there any reason why you can't give full  
 25 and -- full and truthful testimony today?

Page 8

1 Q. That's it.  
 2 A. Okay.  
 3 Q. Do you see up at the top where it says  
 4 "Deposition Topics"?  
 5 A. Yes.  
 6 Q. Have you seen -- have you seen this page  
 7 before?  
 8 A. I believe so. It's been some time since I've  
 9 seen it.  
 10 Q. All right.  
 11 Are you prepared to testify on these topics  
 12 today?  
 13 A. Yeah, to my best of my ability, yes.  
 14 Q. Okay.  
 15 Before we do that, I'd like to take a few  
 16 minutes and walk through -- walk through your background,  
 17 your -- starting with your education. Would you please tell  
 18 me where you went to school after -- after high school?  
 19 A. I went to two schools. I went to Antelope  
 20 Valley Community College, where I picked up an Associate's  
 21 of Science degree on my way to a four-year degree, and then  
 22 I matriculated into California State University at  
 23 Northridge, where I picked up a Bachelor of Science in  
 24 business administration, information systems.  
 25 Q. And what -- what year did you graduate from

(Pages 5 to 8)

Page 9

1 **Cal State Northridge?**  
 2 A. 1979.  
 3 **Q. Where did you go to -- where did you start**  
 4 **working after graduation?**  
 5 A. I began my career at -- let's see. Sperry  
 6 Univac was the name at that time, in Salt Lake City, Utah,  
 7 and I was there four years for my first stint.  
 8 **Q. And what was your -- what was your position**  
 9 **at Sperry Univac?**  
 10 A. I was a -- a systems developer, so I was  
 11 brought in and I worked on operating systems and  
 12 communication subsystems.  
 13 **Q. What is Sperry Univac's line of business?**  
 14 A. At that time?  
 15 **Q. At that time.**  
 16 A. Primarily -- I mean, it was a -- what would  
 17 you call it? A large-scale computer systems provider. I  
 18 worked in mainframes and at that time front-end processors,  
 19 which were -- you'd think of more like a minicomputer of the  
 20 era but specialized.  
 21 **Q. Where did you go after leaving Sperry Univac?**  
 22 A. I went to a startup that some friends of mine  
 23 had done, and I -- we were in -- oddly enough, insurance  
 24 sales support systems. I spent two years there, until the  
 25 business folded.

Page 10

1 **Q. This was in 1985?**  
 2 A. Yeah. Yeah, it -- that's right. It folded  
 3 in 1985.  
 4 **Q. Where did you go after -- after the -- after**  
 5 **your startup folded?**  
 6 A. I returned to -- to Sperry.  
 7 **Q. Mm-hmm.**  
 8 A. And I stayed there until 1989. I went  
 9 through the Unisys merger.  
 10 **Q. What was your role during those -- during**  
 11 **that time period at Sperry?**  
 12 A. I was a developer.  
 13 **Q. Mm-hmm.**  
 14 A. I -- along the way, in 1982, I started  
 15 picking up Unix skills at Sperry Univac. I went back  
 16 because I had extensive Unix background, and I did  
 17 development of TCP/IP and quite a bit of ARPANET type --  
 18 type stuff.  
 19 **Q. Are you a programmer?**  
 20 A. Am I a programmer?  
 21 **Q. Yes.**  
 22 A. I'm a poor programmer nowadays. At one time  
 23 I was quite skilled.  
 24 **Q. What were you doing with -- with TCP/IP?**  
 25 A. I was developing X.25 interfaces for Millnet.

Page 11

1 We had contracts with the Department of Army and -- what was  
 2 it? I guess Air Force. So we were hooking in the  
 3 underlying communication systems to the IP layer, and then I  
 4 moved on to doing some more, you know, of the IP kind of  
 5 expanding the stack out in the Berkeley Unix as well as the  
 6 System 5 Unix.  
 7 **Q. So you were -- were you building a TCP/IP**  
 8 **stack for Unix?**  
 9 A. Extending it. So the code that we had came  
 10 from University of California at Berkeley.  
 11 **Q. Mm-hmm.**  
 12 A. So we were extending -- there was in that era  
 13 considerable work going on in the Department of Defense  
 14 around options and things that weren't in the standard  
 15 commercial space.  
 16 **Q. You mentioned X.25. Can you tell me what**  
 17 **that is, very briefly?**  
 18 A. Oh, it's a packet-switched protocol. I don't  
 19 know if it -- how much it's used anymore, but it was a  
 20 wide-area protocol, and the -- at that time the standard  
 21 communi -- wide-area communications that was available was  
 22 ARPA 1822, which was the original standard that was --  
 23 produced the ARPANET, and the U.S. Government -- or the  
 24 military didn't want to really use that. It was -- it was a  
 25 little bit of an oddball standard, right? And so X.25 was

Page 12

1 an international standard, and they were using that for  
 2 wide-area communications.  
 3 **Q. What were some of the extensions to TCP/IP**  
 4 **that you -- that you built?**  
 5 A. In -- specifically, mostly centered in the IP  
 6 layer. There's an area called IP options, and nowadays it's  
 7 maybe better documented, although I would say marginally  
 8 documented in some areas. The DOD had a number of -- and  
 9 I'm not -- I don't really know what they're used for, I just  
 10 know how to parse them -- options that they were adding in  
 11 there that we had to include or pass through. And I -- most  
 12 of it had to do with cryptography.  
 13 **Q. Are you familiar with cryptography?**  
 14 A. Marginally.  
 15 **Q. Are you familiar with network security?**  
 16 A. That's a broad topic. Yes, to some extent I  
 17 am.  
 18 **Q. When did you start working on -- on network**  
 19 **security as a -- as a broad topic?**  
 20 A. 19 -- well, -- yeah, I'd say probably 1996,  
 21 in earnest.  
 22 **Q. Okay.**  
 23 **Now, you mentioned that you were with Sperry**  
 24 **through a Unisys merger --**  
 25 A. Yes.

(Pages 9 to 12)

Page 13

1 **Q. -- in 1989?**  
 2 A. That merger occurred I believe in 1986, '7.  
 3 I don't remember exactly. But yes. I was -- I was there  
 4 until 1989.  
 5 **Q. When did you leave the combined Sperry Unisys**  
 6 **company?**  
 7 A. September of 1989.  
 8 **Q. And where did you go?**  
 9 A. I went to Novell.  
 10 **Q. How long were you at Novell?**  
 11 A. 10 years.  
 12 **Q. Until 1999?**  
 13 A. Yes.  
 14 **Q. Okay.**  
 15 A. Actually, until -- I guess slightly over 10  
 16 years -- 2000. Until June of 2000.  
 17 **Q. What was your -- what were your**  
 18 **responsibilities during the time you were at Novell?**  
 19 A. I was a -- I began as kind of a lead  
 20 developer, and I developed some of the core NetWare product,  
 21 and then I moved on to Unix and began doing NetWare work  
 22 with Unix, both on the client and the server sides, and  
 23 produced -- we produced some stuff for the next computer  
 24 for -- for Steve Jobs.  
 25 And then I moved on to experimental operating

Page 14

1 systems in the advanced technologies group, and we produced  
 2 some sort of operating systems that actually never were --  
 3 were commercialized, although variations of them were cut  
 4 out and commercialized in NetWare. And I was a part of  
 5 the -- the Unix -- when Novell acquired the Unix labs, I was  
 6 promoted to a director position. I ran a fairly large  
 7 engineering team, on the order of about 80 people.  
 8 And when I was in the advanced technologies I  
 9 was kind of a combination individual contributor and I ran  
 10 the organization from the -- the development side of  
 11 advanced tech.  
 12 I guess -- let's see. What would be  
 13 interesting?  
 14 That's where my security actually began. So  
 15 it was with respect to Internet security.  
 16 So we -- when I was in Novell we produced  
 17 very, very fast and scalable proxy technology, and to that  
 18 we added a comprehensive security suite, known as the Border  
 19 Manager of the era. I believe that was first made available  
 20 in -- commercially in nineteen ninety -- either seven or  
 21 eight. I don't recall when it actually came to the street,  
 22 but it was developed in the '95 to '97 time frame.  
 23 And in that we put in virtual private  
 24 networking technology, both the beginnings of the IPSEC of  
 25 that era as well as we put SOCKS in. That was kind of an

Page 15

1 emerging space that -- that people were actually using for  
 2 some virtual private networks of the day.  
 3 And that's -- that's kind of where I began  
 4 what you would think of as a -- a net -- you know, a network  
 5 security background, was -- was putting those in. And  
 6 firewall rules, things like that.  
 7 **Q. Mm-hmm.**  
 8 **Can you explain more about how Border Manager**  
 9 **worked?**  
 10 A. Sure. Border Manager was a -- a suite of  
 11 services that ran on the NetWare operating system. The  
 12 services were -- let's see. There was a basic firewall that  
 13 would not be a stateful packet firewall, that would be just  
 14 a strictly rule-based, you know, simple layer 3 and 4  
 15 firewall, just kind of ACLs, not really looking at content.  
 16 We also had a -- like I said, a SOCKS proxy  
 17 in there, to do various forms of what we would think as  
 18 virtual private networks. We had an early-day IPSEC VPN,  
 19 and we also had a Web proxy, both a forward proxy as well as  
 20 a reverse proxy, that had access control capabilities, and  
 21 so that could also be used for a form of security or  
 22 acceleration and scaling. That was a whole suite of  
 23 products, known as Border Manager.  
 24 And then I went on to a variation of that,  
 25 which was called Internet Caching System, ICS, and that was

Page 16

1 OEM to a number of companies. Dell and IBM were the -- the  
 2 two biggest that come to mind. What we were doing there is  
 3 the -- the Border Manager was a product that was very  
 4 NetWare centric so it was kind of to a classic Novell  
 5 audience and not as -- not as broadly applicable outside the  
 6 Novell networks. I don't know if you remember the era.  
 7 Novell was quite large in those days, had somewhere like  
 8 90 percent of the market share, so -- anyway, the Border  
 9 Manager was relatively popular, but, you know, we had a  
 10 number of ISPs that -- they didn't really want NetWare, they  
 11 wanted it, quote, to look like a Cisco router, so, you know,  
 12 we repackaged it into an appliance and kind of took it out  
 13 the NetWareisms and offered that.  
 14 That product was not really a security --  
 15 security-oriented product. That was mainly a Internet  
 16 infrastructure scaling product. So that was more around the  
 17 Web caches and things like that.  
 18 **Q. Okay. We'll come back to that one.**  
 19 **Where did you -- where did you go after**  
 20 **leaving Novell in 2000?**  
 21 A. I went to a startup, called Entera,  
 22 E-n-t-e-r-a, Inc.  
 23 **Q. And what were your -- what was your job title**  
 24 **at Entera, Inc.?**  
 25 A. I was the chief scientist of Entera.

(Pages 13 to 16)

Page 17

1 **Q. And what were your responsibilities?**  
 2 A. Designing kind of and managing the -- well,  
 3 designing new products and managing the technology for the  
 4 CTO. And our products were in streaming media, so we did  
 5 stream splitting and caching, and it was very much oriented  
 6 around scaling streaming media for -- basically for public  
 7 infrastructure, primarily.

8 **Q. How long were you at Entera?**  
 9 A. Well, Entera became acquired by CacheFlow,  
 10 and I moved in to CacheFlow, I was there until April of  
 11 2002, and my last role was the CTO of the company.

12 **Q. Mm-hmm.**  
 13 **Was that when you joined Aventail?**  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: What was that?  
 16 MR. LIN: I was objecting to form.  
 17 THE WITNESS: Objecting?  
 18 MR. LIN: Yes.  
 19 THE WITNESS: Okay.  
 20 MR. KING: Let me just ask a different  
 21 question, then.

22 **Q. Where did you go after leaving Entera or**  
 23 **leaving -- in 2002?**  
 24 A. Where did I go?  
 25 I was doing some independent consulting.

Page 18

1 **Q. Mm-hmm.**  
 2 A. And I knew the Aventail folks from prior --  
 3 from my Novell days. We had done some work with them. And  
 4 so I -- I had developed a considerable background in kind of  
 5 the appliance space, Internet appliances, and Aventail was  
 6 interested in producing such a product. So I took on a  
 7 consulting role that grew to consuming all of my time. I  
 8 was a consultant from May 2002 until February 2003, at which  
 9 point I joined Aventail as their chief architect.

10 **Q. Mm-hmm.**  
 11 **Are you still a chief architect within**  
 12 **SonicWALL?**  
 13 A. No. I am a vice-president of -- of one of  
 14 the software engineering groups.

15 **Q. Mm-hmm.**  
 16 A. Primarily the VPN group.

17 **Q. Okay.**  
 18 **What was your -- what were your**  
 19 **responsibilities when you joined Aventail in 2003 as a chief**  
 20 **architect?**  
 21 A. I was responsible for bringing essentially  
 22 the -- the overall architecture of -- of our product lines,  
 23 you know, kind of bringing them together and driving them  
 24 forward over time into new products. And additionally, you  
 25 know, I had to manage some of the teams along the way.

Page 19

1 **Q. What Aventail products were you working with**  
 2 **in 2003, when you joined?**  
 3 A. I worked primarily with -- well, to some  
 4 extent all of them in my role. My -- my primary area was on  
 5 the server side, so we -- we already had existing clients  
 6 that they were in reasonably good shape, but the challenge  
 7 was we were moving from a managed service -- we had a  
 8 managed service offering, and we needed to turn that into,  
 9 you know, the -- an appliance, and that's -- I mean, that's  
 10 very much around turnkey and kind of op -- you know, there's  
 11 no humans involved in back rooms and things like hosted  
 12 services. So a lot of my attention in the early part was on  
 13 the server, getting that into a suitable form factor for,  
 14 you know, what -- what customers would consider an appliance  
 15 that met the operational expense needs.

16 Then -- in -- so from the very beginning it  
 17 was mostly taking existing services and straightening them  
 18 out. That would have been a lot of 2003.

19 **Q. Can you give me the -- some names of Aventail**  
 20 **servers that were in existence when you started in 2003?**  
 21 A. Oh, the services?  
 22 **Q. Sorry. Servers.**  
 23 A. Servers.  
 24 What do you mean by "server"?  
 25 **Q. Let's start -- did Aventail sell a VPN server**

Page 20

1 **when you joined in 2003?**  
 2 A. Yes.  
 3 **Q. What was it called?**  
 4 A. There were two VPN servers. I -- I tend to  
 5 call them services. I may have messed you up. I think the  
 6 term "server" is sometimes overloaded to mean either a  
 7 particular piece of software on a box or the box.

8 **Q. Mm-hmm.**  
 9 A. So -- but if you mean a piece of software on  
 10 the box that provided a service, yes. There were two  
 11 servers in 2003 that were VPN oriented. One was called the  
 12 Anywhere VPN Server, AVPN, formerly known as the ExtraNet  
 13 Server in marketing. The other was the ExtraWeb Server.  
 14 The Ex -- the AVPN server -- or I guess maybe I should just  
 15 refer to it as ExtraNet; I think that people know it better  
 16 by that term -- was a SOCKS-based VPN server, that would  
 17 handle TCP traffic -- it was, well, tunneled through TCP and  
 18 SOCKS, it could handle TCP-originated connections from  
 19 clients, you know, to other systems, and it had some minimal  
 20 UDP capabilities in it.

21 The ExtraWeb Server was a reverse Web proxy  
 22 that would represent basically a whole series of internal  
 23 Web servers, basically doing rewriting of URLs, right? So  
 24 everything would be redirected to it, and through URL  
 25 encoding, right, it would derive the correct destination Web

(Pages 17 to 20)



Page 21

1 server and then present it through. And that -- that was a  
 2 Web-only VPN service, as opposed to the AVPN/ExtraNet, which  
 3 was a -- kind of a general, you know, TCP/IP and limited UDP  
 4 application VPN.

5 **Q. Now, you mentioned -- you've mentioned SOCKS**  
 6 **a couple times. Can you tell me what -- what SOCKS stands**  
 7 **for?**

8 A. Oh. You know, I don't remember the exact  
 9 definition. I mean -- it's an I -- it's an IETF standard,  
 10 and I -- I don't remember. But it's -- you know, it's a --  
 11 it's a way to encapsulate traffic securely through a tunnel.

12 **Q. You mentioned ExtraNet Server a few minutes**  
 13 **ago.**

14 A. Yes.

15 **Q. What -- what was Aventail's current version**  
 16 **of ExtraNet Server when you joined in 2003?**

17 A. Boy. Hmm.  
 18 I'm a little un -- unsure, because we  
 19 renumbered and named things in 2002. So it -- by then they  
 20 were all a part of a -- of the -- the new appliance  
 21 software, which was called ASAP, Aventail Secure Access  
 22 Platform. And it was using a relatively new version of the  
 23 SOCKS server that was developed in -- I am not sure when it  
 24 started, but it -- it came to market for the first time  
 25 in -- in 2002.

Page 22

1 Oh, wait. Let me think.  
 2 In beta form in 2002, and was released to the  
 3 public in the spring of 2003. And I don't -- I don't know  
 4 the number because it was kind of -- became part of ASAP.

5 **Q. We've been talking about the server side of**  
 6 **Aventail's products. What about the -- the client side,**  
 7 **what was the client -- what was Aventail's VPN client**  
 8 **called?**

9 A. Connect proxy.

10 **Q. Mm-hmm.**

11 A. And -- when I came to the company was called  
 12 Connect proxy. It was also known as AutoSOCKS.

13 **Q. Mm-hmm.**

14 A. From -- from an earlier era. I believe that  
 15 was the original name that it was marketed -- possibly  
 16 marketed under. Definitely internally known as AutoSOCKS.

17 **Q. Did it have any other names?**

18 A. Not to my knowledge. The marketing name was  
 19 Connect proxy.

20 **Q. Are you familiar with Aventail's corporate**  
 21 **history?**

22 MR. LIN: Object to form.  
 23 I'm going to be objecting periodically so --  
 24 THE WITNESS: Sure.  
 25 To varying degrees, yes. I first ran into

Page 23

1 Aventail in 1996, when I was at Novell, and we were working  
 2 on that Border Manager product that I told you about, and we  
 3 were building a SOCKS proxy ourself, and so our business  
 4 development people at Novell had run into Aventail, who was  
 5 a new startup in 1996, at one of the trade shows. I  
 6 don't -- I don't recall which. But -- and, of course,  
 7 Aventail had a SOCKS client, and they also had a SOCKS  
 8 server that they were, you know, producing. I don't believe  
 9 it was commercially available yet but, you know, they  
 10 were -- they were producing it.

11 And we -- we met them, and we did some joint  
 12 work with Aven -- with Aventail in 1997, and probably I  
 13 would imagine 1998, if -- if memory is correct, where we  
 14 were doing interoperability testing. So our SOCKS server at  
 15 Novell would -- was interoperable with Aventail's SOCKS  
 16 client. So I -- I was familiar with -- with that.

17 And then through the years, probably 1999 --  
 18 I moved to Seattle in the end of 1997, and after moving here  
 19 I -- I spent more time with the Aventail people on working  
 20 some of the -- you know, some -- some of the ongoing Novell  
 21 kind of -- you know, as the products -- versions would  
 22 change and things like that I would sort of work with  
 23 Aventail people because I was here. I was still with -- I  
 24 worked for Novell but I was here.  
 25 So, you know, I knew a little about, sort of

Page 24

1 from a technical standpoint, some of the evolution, although  
 2 not -- not firsthand, from Aventail. I know a considerably  
 3 greater amount from mid-2002 on.

4 **Q. BY MR. KING: What -- what sort of**  
 5 **communications or interactions did you have with Aventail**  
 6 **when a new product came out?**

7 A. We -- we talked about, sort of under  
 8 nondisclosure, obviously, some of the kinds of things that  
 9 we were doing at Novell.

10 **Q. Mm-hmm.**

11 A. And we were looking at ways -- you know, we  
 12 viewed Ave -- Aventail as -- as kind of a partner in an  
 13 ecosystem, so, you know, we would discuss where we were  
 14 going and, you know, they would discuss somewhat what --  
 15 what they were trying to do, as well.

16 And then we would look at, okay, you know,  
 17 what kind of extensions were we putting in, and then we'd  
 18 get into areas like -- one of -- one of the most challenging  
 19 areas was always the way security is done in SOCKS, and it  
 20 became that we all centralized on SSL, but, you know, SSL in  
 21 SOCKS is different. It's -- it's a little bit different  
 22 than SSL just straight up on TCP, right?

23 So, in other words, you have to encapsulate  
 24 SSL in SOCKS, and that was always an area that -- it was  
 25 kind of bleeding edge in the IETF and, you know --

(Pages 21 to 24)

Page 25

1 I don't know if you're familiar, but it's  
 2 always a bit of a challenge from an interoperability  
 3 standpoint until things are codified, so we -- that would be  
 4 like an area that we would be working on. There would be,  
 5 you know, some new cipher or something and some new option.  
 6 So it always required a little, you know, dinking around  
 7 with both sides to, you know, get them to talk to each  
 8 other. Things like that.

9 **Q. Okay.**  
 10 **Were you -- are you familiar with WinSock 2?**

11 A. I'm -- I'm not an expert in WinSock 2, but  
 12 yes, I know what it is.

13 **Q. What is WinSock 2?**

14 A. WinSock 2 is a -- a -- well, it's a -- it's a  
 15 plug-in architecture in the WinSock libraries from Microsoft  
 16 that allow --

17 Well, first off, it's a Microsoft version of  
 18 Sockets, modeled loosely after Berkeley, and then WinSock 2  
 19 was essentially a Microsoft, I guess, somewhat proprietary  
 20 standard but modeled after open standards, that had  
 21 capabilities to put in layered service providers, and that  
 22 was a -- a way to be able to plug in the underlying network  
 23 infrastructure that WinSock would run over.

24 So, in other words, it wasn't -- it wasn't  
 25 designed just strictly, say, to run only with Microsoft's

Page 26

1 TCP/IP directly, it was designed to be run over intermediate  
 2 infrastructure, as well, from a networking standpoint.

3 **Q. Did Aventail provide a product that was a**  
 4 **layered service provider?**

5 A. Yes.

6 MR. LIN: Object to form.

7 **Q. BY MR. KING: Do you recall discussing**  
 8 **layered service providers with Aventail during your time at**  
 9 **Novell?**

10 A. Minimally. Minimally. I mean, I was  
 11 familiar with it and I knew that Aventail was using that  
 12 architecture to build their SOCKS client such that it would  
 13 not require what is known as socksification. So --  
 14 Are you familiar with socksification?

15 **Q. Why don't -- why don't you explain what it**  
 16 **is.**

17 A. So in the very beginning, the way SOCKS was  
 18 designed, it was a requirement of the day -- this would be  
 19 roughly 1995 to probably -- well, till the layered service  
 20 provider world came out, that the applications had to  
 21 actually incorporate the SOCKS mechanisms themselves. So,  
 22 in other words, there -- there was no provider they could  
 23 link to like as a library, I mean -- or as an intermediate  
 24 infrastructure. They had to actually code in SOCKS  
 25 capabilities. And making an application work with SOCKS was

Page 27

1 known as socksification.

2 So I was familiar with Aventail wanting to,  
 3 you know -- obviously that -- that wasn't a leveraged, you  
 4 know, type, you know -- an economically leveraged, you know,  
 5 mechanism to -- to sell your products, right? If you had to  
 6 go and socksify all of the client applications, that might  
 7 limit the utility of the SOCKS servers. And so we were  
 8 familiar that Aventail was -- at Novell was working on  
 9 layered service providers. They briefed us on that.

10 And, of course, at Novell we were very  
 11 interested in this because, you know, if they could make it  
 12 possible for a wide variety of applications to work over  
 13 SOCKS without modification, it would probably enable the  
 14 industry to work -- you know, I mean, it would provide a  
 15 much larger opportunity for all of us, and we were  
 16 interested in selling SOCKS servers, so --

17 MR. LIN: I'm going to object to that -- that  
 18 question -- that answer as being a narrative and  
 19 nonresponsive.

20 **Q. BY MR. KING: Do you know whether or not**  
 21 **Aventail --**  
 22 **Strike that.**  
 23 **Do you know when Aventail released its first**  
 24 **product using what -- that was a layered service provider?**  
 25 MR. LIN: Object to form.

Page 28

1 THE WITNESS: Actually, I am not -- I am not  
 2 sure. I think it was in 1998.

3 **Q. BY MR. KING: Mm-hmm.**  
 4 **Did you know whether or not --**  
 5 **Strike that.**  
 6 **Did Aventail release a -- its layered service**  
 7 **provider product before you left Novell in 2000?**  
 8 MR. LIN: Object to form.  
 9 THE WITNESS: Yes, it did.

10 **Q. BY MR. KING: And how do you know that?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: Because I used it.

13 **Q. BY MR. KING: What was the name of the**  
 14 **product you used?**

15 A. I believe it was called AutoSOCKS.

16 **Q. Now, when did you leave Mi -- when did you**  
 17 **leave Novell?**

18 A. July of 2000.

19 **Q. Okay.**  
 20 **Do you remember whether you used this**  
 21 **layered -- Aventail's layered service provider product in**  
 22 **1999?**

23 A. Yes. For sure. And I believe probably 1998.  
 24 MR. KING: I'm going to mark another exhibit.  
 25 (Deposition Exhibit 2 was marked

(Pages 25 to 28)

Page 29

1 for identification.)  
 2 (Discussion off the record.)  
 3 **Q. BY MR. KING: Do you recognize this document?**  
 4 A. Yes, I do.  
 5 **Q. What is it?**  
 6 A. It's the administrator's guide for the  
 7 Aventail Connect proxy application.  
 8 **Q. How do you recognize this document? Where**  
 9 **have you seen this document before?**  
 10 MR. LIN: Object to form.  
 11 THE WITNESS: I have seen this document  
 12 because when we were -- I'm not sure of the correct  
 13 technical term but served subpoena, I guess to provide  
 14 information, we went back through our -- our archives and  
 15 produced information for the years requested, and this was a  
 16 piece of information that we provided.  
 17 **Q. BY MR. KING: When you say you went back**  
 18 **through your archives, what -- what kind of archives does --**  
 19 **does Aventail maintain?**  
 20 A. Well, formerly Aventail.  
 21 **Q. Mm-hmm.**  
 22 A. Aventail maintained two different  
 23 repositories of archives. One was source code control that  
 24 was CVS based in this -- in this time frame, and the other  
 25 was a -- a document management archive that was LiveLink

Page 30

1 maintained. This particular piece came from the LiveLink  
 2 archives.  
 3 **Q. What is LiveLink?**  
 4 A. It's a Web-based portal and documentation  
 5 management system, probably similar to what we would think  
 6 of as SharePoint today.  
 7 **Q. Did Exhibit 2 come from your LiveLink**  
 8 **database?**  
 9 A. Yes, it did.  
 10 **Q. Why was -- why was Exhibit 2 stored in the**  
 11 **LiveLink database?**  
 12 A. It's produced by the -- the technical  
 13 documentation group.  
 14 **Q. Mm-hmm.**  
 15 A. And that group typically does not store  
 16 things in the source code repository. That's not -- I mean,  
 17 not the friendliest system for nonprogrammers. So the  
 18 LiveLink system was used to store all of the sort of  
 19 non-code-related material in the company, and so the  
 20 documentation group stored things in there, and they're  
 21 archived over time by -- by revision and by -- by product.  
 22 **Q. What does the technical documentation -- what**  
 23 **did the technical documentation group at Aventail do?**  
 24 A. I can only speak since mid-2002.  
 25 They would write the administrator's guides,

Page 31

1 the end user's guides, and also edit some of the technical  
 2 marketing material and things like that. Not -- not write  
 3 the copy but do the copy edits. But roughly that -- that  
 4 type of work.  
 5 **Q. Were the technical marketing -- were members**  
 6 **of the technical marketing group responsible for being**  
 7 **familiar with the products they were writing about?**  
 8 MR. LIN: Object to form.  
 9 THE WITNESS: Yes. From what we would think  
 10 of as a -- a technical white paper point of view, yeah, and  
 11 in terms of data sheets and things like that, yes.  
 12 **Q. BY MR. KING: Mm-hmm.**  
 13 **Were these manuals reviewed by developers or**  
 14 **others at Aventail who were responsible for creating the**  
 15 **products?**  
 16 MR. LIN: Object to form.  
 17 THE WITNESS: I don't know about this one,  
 18 because it predates me being a part of the organization, but  
 19 all the documents that were written from mid-2002 on are  
 20 reviewed by the developers and the management of  
 21 development, you know, for accuracy.  
 22 **Q. BY MR. KING: Mm-hmm.**  
 23 **Is it Aventail's general practice to review**  
 24 **product manuals for accuracy?**  
 25 A. Yes.

Page 32

1 MR. LIN: Object to form.  
 2 **Q. BY MR. KING: Is it Aventail's general**  
 3 **practice to release product manuals that are -- that**  
 4 **accurately reflect how its products work?**  
 5 MR. LIN: Object to form.  
 6 THE WITNESS: Yes, as accurately as, you  
 7 know, we can afford.  
 8 **Q. BY MR. KING: Are product manuals such as**  
 9 **Exhibit 2 given to customers who buy the product?**  
 10 MR. LIN: Object to form.  
 11 THE WITNESS: Yes.  
 12 **Q. BY MR. KING: Is it part of --**  
 13 **Strike that.**  
 14 **Does Aventail store manuals such as this in**  
 15 **its LiveLink database as part of its ordinary course of --**  
 16 **in the ordinary course of business?**  
 17 MR. LIN: Object to form.  
 18 THE WITNESS: It did. SonicWALL now uses --  
 19 THE REPORTER: I'm sorry. It's --  
 20 THE WITNESS: Yes.  
 21 THE REPORTER: It did?  
 22 Aventail did during -- yes, until -- until  
 23 Aventail was acquired.  
 24 **Q. BY MR. KING: And where -- where are the**  
 25 **documents that were stored in the LiveLink database stored**

(Pages 29 to 32)

Page 33

1 **now?**  
 2 MR. LIN: Object to form.  
 3 THE WITNESS: They're still in the LiveLink  
 4 database. It's a -- archive -- I mean, it's a system that's  
 5 maintained for archival purposes.  
 6 **Q. BY MR. KING: Okay.**  
 7 **Let's turn to Page i, the first -- the first**  
 8 **page.**  
 9 A. Mm-hmm.  
 10 **Q. Do you see up at the top it says "© 1996-1999**  
 11 **Aventail Corporation. All rights reserved"?**  
 12 A. Yes, I see that.  
 13 **Q. Does that indicate to you when this product**  
 14 **manual was released to the public?**  
 15 MR. LIN: Object to form.  
 16 THE WITNESS: No, it does not.  
 17 **Q. BY MR. KING: Why not?**  
 18 A. That's a copyright that's spanning material  
 19 over a several-year duration.  
 20 **Q. Mm-hmm.**  
 21 **Does that indicate to you that this product**  
 22 **was released to the public no later than 1999?**  
 23 MR. LIN: Object to form.  
 24 THE WITNESS: As an individual?  
 25 **Q. BY MR. KING: Mm-hmm.**

Page 34

1 A. Yeah, I would interpret that.  
 2 **Q. And why -- why would you interpret that as**  
 3 **being -- as showing that it was released in 1999?**  
 4 MR. LIN: Same objection.  
 5 THE WITNESS: I wouldn't say it was re --  
 6 well, I would interpret that because I think it is common  
 7 practice for organizations to update their copyrights to  
 8 current.  
 9 **Q. BY MR. KING: Mm-hmm.**  
 10 A. So -- typically I would find the most  
 11 advanced year to be the year that it came from.  
 12 **Q. Is it common practice --**  
 13 MR. LIN: Object to that answer as being  
 14 nonresponsive. Excuse me.  
 15 MR. KING: Can I hear the question and answer  
 16 back?  
 17 (Record read.)  
 18 **Q. BY MR. KING: Is it Aventail's ordinary**  
 19 **practice to mark its product manuals with a copyright date**  
 20 **showing when the -- when the manual was published?**  
 21 MR. LIN: Object to form.  
 22 THE WITNESS: I'm not sure I understand that  
 23 question exactly.  
 24 **Q. BY MR. KING: Was it -- was it Aventail's**  
 25 **practice to mark its user manuals, such as Exhibit 2, with a**

Page 35

1 **copyright date?**  
 2 A. Yes.  
 3 **Q. And when Aventail -- would that copyright**  
 4 **date be put into the document by a technical writer or**  
 5 **someone from the technical writing group?**  
 6 MR. LIN: Object to form.  
 7 THE WITNESS: It would be put in by the  
 8 documentation group.  
 9 **Q. BY MR. KING: In your experience at Aventail,**  
 10 **does the technical -- is it the technical writing group's**  
 11 **standard practice to mark a user manual such as Exhibit 2**  
 12 **with a copyright date showing when the manual was actually**  
 13 **finished and published?**  
 14 MR. LIN: Objection.  
 15 THE WITNESS: See, this is where I'm a little  
 16 bit confused, because you're asking a date, and the  
 17 copyright is typically a range in time.  
 18 **Q. BY MR. KING: Okay. So I --**  
 19 A. It is the practice -- was the practice of  
 20 Aventail and is the practice of SonicWALL that we maintain  
 21 our copyrights, so we would be advancing our copyrights each  
 22 year. If this was produced in 2000 it would say 2000.  
 23 **Q. And what does it mean that this document says**  
 24 **"1996-1999" at the top?**  
 25 MR. LIN: Object to form.

Page 36

1 THE WITNESS: My understanding is the  
 2 material that is contained here within began in some form in  
 3 1996 and derivatives of it are spanning through 1999.  
 4 **Q. BY MR. KING: Okay.**  
 5 MS. BUCKNER: We've been going for about an  
 6 hour, Counsel. Do you think we could take a break?  
 7 MR. KING: Absolutely.  
 8 THE VIDEOGRAPHER: Going off the record. The  
 9 time is 10:58 a.m.  
 10 (Short recess.)  
 11 THE VIDEOGRAPHER: We are now back on the  
 12 record. The time is 11:09 a.m.  
 13 **Q. BY MR. KING: Referring back to Exhibit 2, I**  
 14 **want to ask you a few more follow-up questions. Did**  
 15 **Aventail have a technical writing group before you joined in**  
 16 **2002?**  
 17 A. I -- I don't know that.  
 18 **Q. Okay. All right.**  
 19 **I'm going to mark as Exhibit 3 a document**  
 20 **entitled "Aventail ExtraWeb Server 3.2 Administrator's**  
 21 **Guide."**  
 22 **(Deposition Exhibit 3 was marked**  
 23 **for identification.)**  
 24 **Q. BY MR. KING: Have you ever seen Exhibit 3**  
 25 **before?**

(Pages 33 to 36)

Page 37

1 A. I have.  
 2 **Q. What is Exhibit 3?**  
 3 A. It's the administrator's guide for the  
 4 ExtraNet Server.  
 5 **Q. When have you seen this document previously?**  
 6 A. When we went through the archives looking for  
 7 information that was being subpoenaed.  
 8 **Q. That's the LiveLink system?**  
 9 A. Yes. We found -- I did not. It was found  
 10 for me by one of my subordinates.  
 11 **Q. Okay.**  
 12 **Let me just ask a slightly different**  
 13 **question. And I apologize for the repetition. Was this**  
 14 **document stored in the LiveLink system?**  
 15 MR. LIN: Object to form.  
 16 THE WITNESS: Yes, it was.  
 17 **Q. BY MR. KING: Who -- who did you ask to**  
 18 **search the LiveLink system in order to -- who actually**  
 19 **located this document within the LiveLink system?**  
 20 A. A manager of our documentation department.  
 21 **Q. Who is that?**  
 22 A. Mary Siple.  
 23 **Q. Do you know who wrote Exhibit 3?**  
 24 A. I do not.  
 25 MR. LIN: Object to form.

Page 38

1 **Q. BY MR. KING: Was Exhibit 3 written by**  
 2 **Aventail's technical documentation group?**  
 3 MR. LIN: Object to form.  
 4 THE WITNESS: I don't have knowledge of that.  
 5 **Q. BY MR. KING: Was it Aventail's general**  
 6 **practice to have their technical documentation group prepare**  
 7 **manuals such as -- such as Exhibit 3?**  
 8 MR. LIN: Object to form.  
 9 THE WITNESS: I don't know if through that  
 10 time frame.  
 11 **Q. BY MR. KING: Is it -- was it Aventail's**  
 12 **general practice from 2003 through -- through the time of**  
 13 **the acquisition to have its technical documentation group**  
 14 **prepare product manuals?**  
 15 A. Yes.  
 16 **Q. Why did Aventail have its technical**  
 17 **documentation group prepare product manuals?**  
 18 MR. LIN: Object to form.  
 19 THE WITNESS: In what time frame?  
 20 **Q. BY MR. KING: In the -- we'll start with the**  
 21 **2003 time frame, when you were working at -- at Aventail.**  
 22 A. To provide information to our customers on  
 23 how to operate our products.  
 24 **Q. Do you have any -- any reason to believe that**  
 25 **was -- that Aventail created product manuals for a different**

Page 39

1 **purpose prior to the time that you joined?**  
 2 MR. LIN: Object to form.  
 3 THE WITNESS: I don't have any knowledge of  
 4 that. Speculating, I would imagine that's what it was for.  
 5 **Q. BY MR. KING: Mm-hmm.**  
 6 **From 2003 onward was it Aventail's general**  
 7 **practice to store product manuals in its LiveLink system?**  
 8 A. Yes.  
 9 **Q. And was this product manual stored in -- in**  
 10 **the Aventail LiveLink system?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: This -- can you rephrase that  
 13 question?  
 14 **Q. BY MR. KING: Certainly.**  
 15 **Was Exhibit 3 stored in the Aventail LiveLink**  
 16 **system?**  
 17 A. It -- it is currently stored there.  
 18 MR. KING: I'm going to mark as Exhibit 4 a  
 19 document called "Aventail Connect User's Guide."  
 20 (Deposition Exhibit 4 was marked  
 21 for identification.)  
 22 **Q. BY MR. KING: Have you seen this document**  
 23 **before?**  
 24 A. Yes, I've seen this document.  
 25 **Q. What is it?**

Page 40

1 A. This is the end user's guide for Connect  
 2 proxy.  
 3 **Q. Where have you seen this document before?**  
 4 A. I've seen it when we produced it according to  
 5 a subpoena.  
 6 **Q. Where was this document stored within**  
 7 **Aventail?**  
 8 A. In the LiveLink archive system.  
 9 **Q. Mm-hmm.**  
 10 **Is this document a user manual?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: This -- yes, this document is  
 13 intended for end users of Connect proxy to be able to  
 14 utilize it.  
 15 **Q. BY MR. KING: Is it Aventail's general**  
 16 **practice to prepare user manuals for -- so that its users**  
 17 **can correctly operate its software?**  
 18 MR. LIN: Object to form.  
 19 THE WITNESS: In what -- which years?  
 20 **Q. BY MR. KING: Well, start with the time**  
 21 **period that you're familiar with.**  
 22 A. Yes.  
 23 MR. LIN: Object to form.  
 24 **Q. BY MR. KING: Why was this document stored in**  
 25 **the Aventail LiveLink archives?**

(Pages 37 to 40)

Page 41

1 MR. LIN: Object to form.  
 2 THE WITNESS: We store all of our user  
 3 document -- or all of our documentation -- product  
 4 documentation in the LiveLink archive, until the merger with  
 5 SonicWALL.  
 6 **Q. BY MR. KING: So this -- this document states**  
 7 **that it's for Version 3.1 of Aventail Connect. Are you**  
 8 **familiar with any earlier versions of -- of an Aventail**  
 9 **product that are stored in the LiveLink system?**  
 10 MR. LIN: Object to form.  
 11 THE WITNESS: I am not.  
 12 **Q. BY MR. KING: Do you know how far back in**  
 13 **time the archives go in the LiveLink system?**  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: I -- I don't know the -- the --  
 16 no, I do not know how far back.  
 17 **Q. BY MR. KING: Okay.**  
 18 **Let's take a quick break to get this computer**  
 19 **up and running.**  
 20 THE VIDEOGRAPHER: Going off the record. The  
 21 time is 11:18 a.m.  
 22 (Discussion off the record.)  
 23 (Deposition Exhibit 5 was marked  
 24 for identification.)  
 25 THE VIDEOGRAPHER: Back on the record. The

Page 42

1 time is 11:21 a.m.  
 2 MR. KING: Thanks.  
 3 **Q. We've given you on the break what's been**  
 4 **marked as Exhibit 5. Can you -- do you mind reading what**  
 5 **Exhibit 5 is for the record?**  
 6 A. It says, "Property of SonicWALL, Inc.,  
 7 Outside Counsel Eyes Only, Source Code, Confidential  
 8 Information. Aventail ExtraNet Center, 2.6 / 3.1 / 3.2,  
 9 Source."  
 10 **Q. Thank you.**  
 11 **In responding to Microsoft's subpoena, did**  
 12 **you search for source code that was responsive to the**  
 13 **questions that Microsoft asked?**  
 14 A. Yes.  
 15 **Q. And where did you search for the source code?**  
 16 A. In our CVS archive, which is a source code  
 17 control archive that we maintain for -- not for active use  
 18 but for archival use.  
 19 **Q. Mm-hmm.**  
 20 **Can you tell me more?**  
 21 MR. LIN: Object to form.  
 22 THE WITNESS: Tell --  
 23 **Q. BY MR. KING: Can you describe your CVS**  
 24 **archive more fully?**  
 25 MR. LIN: Same objection.

Page 43

1 THE WITNESS: Yes. CVS is a -- an open  
 2 source source code management tool, and it was the  
 3 management tool that we were using up until 2004.  
 4 **Q. BY MR. KING: Mm-hmm.**  
 5 A. All of Aventail's source code prior to 2004  
 6 is in there.  
 7 **Q. When you say "all of Aventail's source code,"**  
 8 **do you mean all of Aventail's source code starting in 1996?**  
 9 MR. LIN: Object to form.  
 10 THE WITNESS: All that I am aware of.  
 11 **Q. BY MR. KING: Does that include Version 2 of**  
 12 **Aventail's VPN product?**  
 13 A. It --  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: It includes that to at least  
 16 this information. I don't -- I don't know definitively if  
 17 there's more than that in there.  
 18 **Q. BY MR. KING: Mm-hmm.**  
 19 **Do you know when Aventail or around what time**  
 20 **period Aventail started using the CVS source archive?**  
 21 MR. LIN: Object to form.  
 22 THE WITNESS: I do not know when it was put  
 23 into place.  
 24 **Q. BY MR. KING: Okay.**  
 25 **How does C -- how does CVS --**

Page 44

1 **Strike that.**  
 2 **What properties does CVS have that allow it**  
 3 **to be used as a source code archival system?**  
 4 MR. LIN: Object to form.  
 5 THE WITNESS: CVS maintains a record and  
 6 version history of -- of all versions of a file, and it's  
 7 structured in a way that is, you know, common practice for  
 8 software development.  
 9 **Q. BY MR. KING: Is CVS used by software**  
 10 **developers at the time that they're developing the software?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: Yes.  
 13 **Q. BY MR. KING: Who inputs files into CVS?**  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: A variety of people. Whomever  
 16 is responsible for a particular file.  
 17 **Q. BY MR. KING: How do you know when source**  
 18 **code is input into CVS?**  
 19 MR. LIN: Object to form.  
 20 **Q. BY MR. KING: That was a little unclear. Let**  
 21 **me rephrase.**  
 22 **Does CVS track the date and time when source**  
 23 **code is input into the system or modified?**  
 24 A. Yes.  
 25 **Q. How does it do that?**

(Pages 41 to 44)

Page 45

1 MR. LIN: Object to form.  
 2 THE WITNESS: It uses the clock of the server  
 3 that it's on.  
 4 **Q. BY MR. KING: Mm-hmm.**  
 5 **And where is this date and time tracking**  
 6 **information stored within CVS?**  
 7 A. It's stored in the attributes,  
 8 meta-attributes, along with the files.  
 9 **Q. When you say the attributes, what do you**  
 10 **mean?**  
 11 A. The attributes have information about who did  
 12 it, what time it was done, and what the chain sets were or  
 13 the deltas that were applied.  
 14 **Q. Where are the attributes stored within the**  
 15 **CVS system?**  
 16 A. I -- I don't know the actual structure of  
 17 CVS.  
 18 **Q. Mm-hmm.**  
 19 **Does CVS put a time stamp within the actual**  
 20 **source code file describing the time when changes were made?**  
 21 A. Not to my knowledge. It's been awhile since  
 22 I've looked at CVS.  
 23 **Q. When you were looking for source code in**  
 24 **response to Microsoft's subpoena, what source code did**  
 25 **you -- what source code did you extract from the CVS system?**

Page 46

1 A. We extracted all of the source code that was  
 2 in the time frame that was specified in the subpoena and  
 3 that was within the scope of what we thought the subpoena  
 4 was asking.  
 5 **Q. Mm-hmm.**  
 6 **Do you remember what versions of Aventail's**  
 7 **products that included?**  
 8 A. I do not. I do not remember.  
 9 **Q. Okay.**  
 10 **Would you mind taking that DVD and putting it**  
 11 **into the computer system.**  
 12 A. (Witness complies.)  
 13 **Q. Would you please cancel that and open up an**  
 14 **Explorer window.**  
 15 **It's probably under My Computer.**  
 16 A. Ah. Yes.  
 17 **Q. And open up the DVD.**  
 18 A. Okay.  
 19 **Q. What does the top-level directory of the DVD**  
 20 **include?**  
 21 A. It includes different versions of the  
 22 product.  
 23 **Q. How do you know that those are different**  
 24 **versions of the product that are shown at the top-level**  
 25 **directory of Exhibit 5?**

Page 47

1 MR. LIN: Object to form.  
 2 THE WITNESS: I know because of the way  
 3 they're tagged. They're named.  
 4 **Q. BY MR. KING: Do you recognize these**  
 5 **directories?**  
 6 A. Yes, I do.  
 7 **Q. How do you recognize -- where have you seen**  
 8 **these directories before?**  
 9 A. These were the directories that my team  
 10 collected the information and pulled out from CVS.  
 11 **Q. Once you pulled these directories out of CVS,**  
 12 **what did you do with them?**  
 13 A. Put them on a DVD and gave them to Laurel.  
 14 **Q. Okay.**  
 15 **Who was it on your team who actually took**  
 16 **these directories out of the CVS system?**  
 17 A. Well, there were several people.  
 18 **Q. Mm-hmm.**  
 19 A. Primarily there was Bill Perry and Bryan  
 20 Sauve.  
 21 **Q. Did Bill and Perry -- did Bill and Bryan pull**  
 22 **this source code out at your direction?**  
 23 A. Yes.  
 24 **Q. Would you mind opening up the version --**  
 25 **Let me ask another question. See where it**

Page 48

1 **says -- there's a folder titled "V260"?**  
 2 A. Yes.  
 3 **Q. What does "V260" mean?**  
 4 MR. LIN: Object to form.  
 5 THE WITNESS: It means Version 2.6.  
 6 **Q. BY MR. KING: Version 2.6 of what?**  
 7 A. I have to look in here. I don't recall  
 8 what's all in here.  
 9 **Q. Okay. Fair enough.**  
 10 **What does "V310" mean?**  
 11 A. Version 3.1.  
 12 **Q. And "V320"?**  
 13 A. Version 3.6.  
 14 MR. LIN: Object --  
 15 **Q. BY MR. KING: 3.6? Are you sure?**  
 16 A. Oh. Excuse me. Version 3.2.  
 17 **Q. Thank you.**  
 18 **Would you mind opening up the Version 3.1**  
 19 **directory.**  
 20 A. (Witness complies.)  
 21 **Q. And would you mind reading that. What**  
 22 **directory is shown under there?**  
 23 A. This is SOCKS S5.  
 24 **Q. What does SOCKS S5 refer to?**  
 25 A. It refers to Version 5 of the SOCKS server.

(Pages 45 to 48)

Page 49

1 **Q. Mm-hmm.**  
 2 **And would you please open up the SOCKS 5**  
 3 **directory.**  
 4 A. (Witness complies.)  
 5 **Q. And what -- what is contained within the**  
 6 **Version 5 of the SOCKS directory?**  
 7 MR. LIN: Object to form.  
 8 THE WITNESS: It is the -- I'm not -- I  
 9 haven't looked at this code for a long time, but from what I  
 10 can tell, it has both the client and the server for the --  
 11 for this version source code contained in it.  
 12 **Q. BY MR. KING: How can you tell that it**  
 13 **contains the code for both the client and the server?**  
 14 A. There's a directory called AS, and that  
 15 refers to AutoSOCKS.  
 16 **Q. Okay.**  
 17 A. There's a directory called Server, obviously  
 18 a bunch of server stuff, NT. I'm not familiar with all the  
 19 structure but, I mean, I can tell that both sides are at  
 20 least partially contained here, I suspect entirely, given  
 21 the developers pulled it for me.  
 22 **Q. How do you know that AS stands for AutoSOCKS?**  
 23 A. I'm familiar with the source tree. There's  
 24 nothing that says Connect proxy inside the source tree.  
 25 **Q. Okay.**

Page 50

1 **Is the source tree at the top level similar**  
 2 **to source trees that you encountered when you joined**  
 3 **Aventail in 2003?**  
 4 MR. LIN: Object to form.  
 5 THE WITNESS: This is different, but it would  
 6 be similar. It's relative to this particular product set.  
 7 **Q. BY MR. KING: Okay.**  
 8 **Does the V -- does the Version 3.1 directory**  
 9 **on Exhibit 5 correspond to Aventail Connect Version 3.1 --**  
 10 **the Aventail Connect Version 3.1 manuals --**  
 11 **Let me start over.**  
 12 **Would you pull out Exhibit 2 for a second.**  
 13 A. Yes.  
 14 **Q. Mm-hmm.**  
 15 A. Mm-hmm.  
 16 **Q. Exhibit 2 states that it's for Version 3.1**  
 17 **and 2.6 of Aventail Connect, right?**  
 18 A. It does.  
 19 **Q. Does the Version 3.1 on Exhibit 2 correspond**  
 20 **to Version 3.1 in the source code DVD that we've marked as**  
 21 **Exhibit 5?**  
 22 MR. LIN: Object to form.  
 23 THE WITNESS: I'm told by a person who is  
 24 familiar with it that it does.  
 25 **Q. BY MR. KING: Who -- who told you that?**

Page 51

1 MR. LIN: Object to form.  
 2 THE WITNESS: Bryan Sauve.  
 3 **Q. BY MR. KING: How does Bryan know that**  
 4 **they -- that Version 3.1 --**  
 5 A. He --  
 6 MR. LIN: Object to form.  
 7 Hold on.  
 8 Object to form.  
 9 **Q. BY MR. KING: Let me back up. How does Bryan**  
 10 **know that -- that this manual corresponds to the source code**  
 11 **on -- labeled Version 3.1 on Exhibit 5?**  
 12 MR. LIN: Object to form.  
 13 THE WITNESS: Bryan was a developer who  
 14 worked on Version 3.1.  
 15 **Q. BY MR. KING: Mm-hmm.**  
 16 **Let's go to Version 2.6 on the source code**  
 17 **DVD, Exhibit 5.**  
 18 **And I'll note for the record that you just**  
 19 **entered the SOCKS S5 directory.**  
 20 A. Oh, excuse me. Excuse me. I'm sorry. I  
 21 went a little fast.  
 22 Yes. SOCKS S5 is the first.  
 23 **Q. Would you mind opening up the SOCKS S5**  
 24 **directory.**  
 25 A. Yes, I will do that.

Page 52

1 **Q. What is shown within the SOCKS S5 directory**  
 2 **of the Version 2.6 branch of the source code?**  
 3 A. I believe it shows the entire set of source  
 4 for the 2.6 product. Both the client and the server.  
 5 **Q. Where is the server code stored within**  
 6 **Version 2.6 of the source code branch?**  
 7 MR. LIN: Object to form.  
 8 THE WITNESS: Well, it's primarily in server,  
 9 but, again, source code does have referrals across common  
 10 code.  
 11 **Q. BY MR. KING: And where is the client code**  
 12 **for Version 2.6 stored within this directory?**  
 13 MR. LIN: Object to form.  
 14 THE WITNESS: It's primarily stored in the AS  
 15 directory.  
 16 **Q. BY MR. KING: AS stands for AutoSOCKS?**  
 17 A. AutoSOCKS.  
 18 **Q. Okay.**  
 19 **Do you know whether the Version 2.6 of the**  
 20 **source code on the source code DVD corresponds to**  
 21 **Version 2.6 of Aventail Connect as described in Exhibit 2?**  
 22 MR. LIN: Object to form.  
 23 THE WITNESS: I -- I don't know firsthand  
 24 that. I believe it does.  
 25 **Q. BY MR. KING: Why do you believe that it**

(Pages 49 to 52)



Page 53

1 **does?**  
 2 A. Because --  
 3 MR. LIN: Object to form.  
 4 THE WITNESS: -- the developer told me it  
 5 did.  
 6 **Q. BY MR. KING: And this is Bryan --**  
 7 A. Yes.  
 8 **Q. What was his last name?**  
 9 A. Sauve.  
 10 **Q. Sauve. Okay.**  
 11 **Let's go to the Version 3.2 branch on**  
 12 **Exhibit 5.**  
 13 A. Yes.  
 14 **Q. Can you open that up?**  
 15 A. Yes.  
 16 **Q. What's shown within the Version 3.2 branch?**  
 17 A. SOCKS S5.  
 18 **Q. Would you mind opening the SOCKS S5**  
 19 **directory.**  
 20 A. Yes.  
 21 **Q. Can you describe what is contained within the**  
 22 **SOCKS S5 directory?**  
 23 A. I believe it has the entire source for the  
 24 3.2 product, both the client and server.  
 25 **Q. And where is the server code primarily stored**

Page 54

1 **within this directory?**  
 2 MR. LIN: Object to form.  
 3 THE WITNESS: It's primarily stored in the  
 4 server folder.  
 5 **Q. BY MR. KING: Where is the client code**  
 6 **primarily stored within this directory?**  
 7 A. In the --  
 8 MR. LIN: Same objection.  
 9 THE WITNESS: -- AS folder.  
 10 MR. LIN: Did you get my objection?  
 11 THE REPORTER: Yes.  
 12 **Q. BY MR. KING: Does the Version 3.2 folder on**  
 13 **Exhibit 5 correspond to Exhibit 3, the Aventail ExtraNet**  
 14 **Center Version 3.2 administrator's guide?**  
 15 MR. LIN: Object to form.  
 16 THE WITNESS: Yes, I believe the server does.  
 17 **Q. BY MR. KING: Mm-hmm.**  
 18 **And why do you believe that the source code**  
 19 **corresponds to Exhibit 3?**  
 20 MR. LIN: Object to form.  
 21 THE WITNESS: Because a developer vouched for  
 22 it.  
 23 **Q. BY MR. KING: And which developer was that?**  
 24 A. Bill Perry.  
 25 **Q. Okay.**

Page 55

1 **How does Bill Perry know that the Version 3.2**  
 2 **of the source code as contained in Exhibit 5 corresponds to**  
 3 **the Aventail ExtraNet Center Version 3.2 manual that**  
 4 **we've -- that we're talking about with Exhibit 3?**  
 5 MR. LIN: Object to form.  
 6 THE WITNESS: Bill Perry developed part of  
 7 the ExtraNet Server.  
 8 **Q. BY MR. KING: Who at Aventail -- or who at**  
 9 **SonicWALL is responsible for maintaining the CVS tree at the**  
 10 **present time?**  
 11 A. It's not actively used anymore.  
 12 **Q. Mm-hmm.**  
 13 A. Our build master is responsible for  
 14 maintaining the archive.  
 15 **Q. And who is your build master?**  
 16 A. Wade Valentine.  
 17 **Q. Who does -- does Wade Valentine report to**  
 18 **you?**  
 19 A. Not anymore.  
 20 **Q. Did he report to you in the past?**  
 21 A. Yes.  
 22 **Q. What was your -- what was your title when he**  
 23 **reported to you?**  
 24 A. Chief architect and director of software  
 25 engineering.

Page 56

1 **Q. Okay.**  
 2 **Was Wade Valentine, at the time he reported**  
 3 **to you, your build master?**  
 4 A. Yes.  
 5 **Q. Was he responsible for maintaining the CVS**  
 6 **tree?**  
 7 A. Maintaining the system, yes, as an archive.  
 8 **Q. Okay.**  
 9 **Is it Aventail's ordinary course of business**  
 10 **to --**  
 11 **Or strike that.**  
 12 **Was it Aventail's typical business practice**  
 13 **to store source code in -- in the CVS system?**  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: Yes, at that time.  
 16 **Q. BY MR. KING: Mm-hmm.**  
 17 **And was developing source code one of**  
 18 **Aventail's standard business activities?**  
 19 MR. LIN: Object to form.  
 20 THE WITNESS: It has been since I have been  
 21 an employee, yes.  
 22 **Q. BY MR. KING: Okay.**  
 23 **Going to mark two more exhibits.**  
 24 **(Deposition Exhibits 6 and 7 were**  
 25 **marked for identification.)**

(Pages 53 to 56)

Page 57

1 THE WITNESS: Yes.  
 2 **Q. BY MR. KING: Mm-hmm.**  
 3 **So you're -- we've handed you Exhibits 6 and**  
 4 **7, which are two files of source code that I'll represent to**  
 5 **you came from Exhibit 5.**  
 6 **Have you ever seen -- let's start with**  
 7 **Exhibit 6. Have you ever seen a document -- have you ever**  
 8 **seen Exhibit 6 before?**  
 9 MR. LIN: Object to form.  
 10 THE WITNESS: I might have seen it before. I  
 11 don't recall whether I've actually looked at the source or  
 12 not.  
 13 **Q. BY MR. KING: Mm-hmm.**  
 14 **Have you ever seen doc -- are you familiar**  
 15 **with documents like this at Aventail?**  
 16 MR. LIN: Object to form.  
 17 THE WITNESS: Yes.  
 18 **Q. BY MR. KING: What -- what is Exhibit 6?**  
 19 A. This is source code. Source code to the  
 20 AutoSOCKS redirector.  
 21 **Q. What is the AutoSOCKS redirector?**  
 22 A. That's part of the layered service provider  
 23 that takes requests that are coming in from applications and  
 24 redirects them into the VPN.  
 25 **Q. Mm-hmm.**

Page 58

1 A. It's part of that system.  
 2 **Q. Okay.**  
 3 **Do you see the first half of this page has a**  
 4 **slash and then a line of -- of asterisks going down the**  
 5 **side?**  
 6 A. Yes.  
 7 **Q. What does -- what does the slash and that**  
 8 **line of asterisks indicate?**  
 9 A. It means that these are comments.  
 10 **Q. Mm-hmm.**  
 11 **And what do these -- we'll start with the**  
 12 **first comment up at the top, where it says "\$Header."**  
 13 A. Yes.  
 14 **Q. What does that comment indicate to you?**  
 15 A. That would have been produced by CVS.  
 16 **Q. Mm-hmm.**  
 17 **When you say it was produced by CVS, what do**  
 18 **you mean?**  
 19 A. CVS put its time stamp in there when it  
 20 was -- and I'm not sure. I think when it was checked in.  
 21 My knowledge of CVS is starting to get old.  
 22 **Q. Okay.**  
 23 **So where is the time stamp within the -- the**  
 24 **first header of Exhibit 6?**  
 25 A. It's at the top of the comments.

Page 59

1 **Q. Mm-hmm.**  
 2 **And when does it say that Exhibit 6 was**  
 3 **marked by CVS?**  
 4 A. February -- let's see. Ooh. Let me think.  
 5 You know, I'm -- I'm not sure. I'd have to  
 6 look it up. It's either February 8th or August 2nd. I  
 7 don't remember the order that CVS puts these out. At 1:22  
 8 in the afternoon.  
 9 **Q. That's the 1322?**  
 10 A. 1322.  
 11 **Q. Okay.**  
 12 **Do you see at the right-hand side of the**  
 13 **first line where it says "v 1.5"?**  
 14 A. Yes.  
 15 **Q. What does that mean?**  
 16 A. That's the specific version of this source  
 17 file.  
 18 **Q. Did CVS always put time -- time and date**  
 19 **stamps like this at the top of files when they were checked**  
 20 **in?**  
 21 MR. LIN: Object to form.  
 22 THE WITNESS: I would have to actually  
 23 examine the source code to answer that. I don't know.  
 24 **Q. BY MR. KING: Mm-hmm.**  
 25 A. I think it does.

Page 60

1 **Q. Have you seen -- you've seen headers like**  
 2 **this before?**  
 3 A. I have.  
 4 **Q. Okay.**  
 5 A. Yes.  
 6 **Q. Let's turn to the -- the end of -- of**  
 7 **Exhibit 6.**  
 8 A. Which -- which page? The very end?  
 9 **Q. I guess it's three pages from the end, where**  
 10 **the comments begin.**  
 11 A. Yes.  
 12 **Q. Do you see where it says "\$Log"?**  
 13 A. I do.  
 14 **Q. What does that refer to?**  
 15 A. This is CVS information that it's maintaining  
 16 for revision history.  
 17 **Q. And what -- what is revision history?**  
 18 A. Talks about various check-ins that have been  
 19 done to the code.  
 20 **Q. Mm-hmm.**  
 21 **Do you see where it says "Revision 1.5**  
 22 **1999/02/08"?**  
 23 A. I do.  
 24 **Q. What does that refer to?**  
 25 A. I think I can actually refer -- now I can see

(Pages 57 to 60)

Page 61

1 it because I can see the next one down.  
 2 That would be February 8th, 1999. A fifth  
 3 revision was done to this. I think this would be a more  
 4 major branch.  
 5 My CVS is getting old now.  
 6 And it was done by the initials DB.  
 7 **Q. What do those initials refer to?**  
 8 A. Derek Brown.  
 9 **Q. Who is Derek Brown?**  
 10 A. He's one of the founders of Aventail who  
 11 wrote the original AutoSOCKS.  
 12 **Q. Is Derek Brown a software developer?**  
 13 A. Yes.  
 14 **Q. Let's go -- do you see below that it says,**  
 15 **"Remerge the stuff from the branch back to the trunk"?**  
 16 A. Yes. So --  
 17 **Q. Why -- why is that statement contained within**  
 18 **Exhibit 6, if you know?**  
 19 MR. LIN: Object to form.  
 20 THE WITNESS: My interpretation --  
 21 **Q. BY MR. KING: Mm-hmm.**  
 22 A. -- as -- as a software developer?  
 23 This is a comment stating that other branches  
 24 had changes made that needed to be merged back into the main  
 25 trunk. So probably one of the earlier versions of the

Page 62

1 product had changes made that were being merged back into  
 2 the currently under development version.  
 3 **Q. What is a trunk within CVS terminology?**  
 4 A. CVS is -- you can have branches, so like a  
 5 product branch typically would be branched, some instance,  
 6 and the trunk is kind of where all the sort of continuum is  
 7 going on. So you take snapshots in time that are called  
 8 branches, and you can make modifications there that are  
 9 unique to that particular branch. And if you need to have  
 10 them in any other branch, you have to merge them.  
 11 The trunk is kind of the continuum over time,  
 12 right? Does that make sense?  
 13 You take a branch of code in time. Trunk  
 14 just continues on.  
 15 **Q. Okay.**  
 16 **Let's go back to the first page of Exhibit 6.**  
 17 **Do you see at the top of the first CVS header where it says,**  
 18 **"/usr/aventail/prodroot," et cetera?**  
 19 A. Yes.  
 20 **Q. And then it says "socks5" after that?**  
 21 A. Yes.  
 22 **Q. Does that "socksf5" -- what does that**  
 23 **"socksf5" refer to?**  
 24 MR. LIN: Object to form.  
 25 MR. KING: Sorry. "Socks5," just for the

Page 63

1 record.  
 2 THE WITNESS: So the -- the actual CVS  
 3 repository was on a Unix system and not a Windows system.  
 4 This is a Unix path.  
 5 I can't state definitively because I can't  
 6 see this, but it's probably referring to the same SOCKS 5  
 7 that we're seeing here under the -- each of these versions.  
 8 I don't know which particular version this -- this came  
 9 from.  
 10 **Q. BY MR. KING: Would you see if you can find**  
 11 **this file within the Version 3.1 branch of Exhibit 5?**  
 12 A. Yeah. Let's see. Probably going to be under  
 13 AS.  
 14 **Q. I think you're under the Version 3.2 branch**  
 15 **right now.**  
 16 A. Am I under -- you are correct.  
 17 Okay. So I've gone into AS, and then I go  
 18 into WIN. I'm going to go into S5HOOK.  
 19 Do you see an S5HOOK up here?  
 20 Yeah. Okay.  
 21 And REDIR.CPP is probably -- yup. Probably  
 22 right here.  
 23 Ooh. This is Unix.  
 24 **Q. Maybe you can open it with WordPad instead of**  
 25 **NotePad.**

Page 64

1 A. That's probably a good idea.  
 2 Okay.  
 3 Yeah, it looks remarkably similar, huh?  
 4 1322. February 8th.  
 5 **Q. Does the file you're looking at on Exhibit 5**  
 6 **have the same CVS header?**  
 7 A. Yes, it has the same CVS header.  
 8 **Q. All right.**  
 9 **And can you use that CVS header to**  
 10 **determine --**  
 11 **Strike that.**  
 12 **Let me ask you another question.**  
 13 **Let's go to Exhibit 7.**  
 14 A. Yes.  
 15 **Q. What is Exhibit 7?**  
 16 A. Appears to be the same as Exhibit 6, but I'm  
 17 not sure.  
 18 I don't know where this actually originated  
 19 from.  
 20 **Q. Well, I'll represent to you --**  
 21 **Let me start over. Do you see the top CVS**  
 22 **header?**  
 23 A. Yes.  
 24 **Q. Does that provide you with any indication of**  
 25 **what this -- of what Exhibit 7 is?**

(Pages 61 to 64)

Page 65

1 MR. LIN: Object to form.  
 2 THE WITNESS: It does, although it looks to  
 3 be the same to me as Exhibit 6.  
 4 **Q. BY MR. KING: Can I see that?**  
 5 A. Mm-hmm.  
 6 **Q. You are correct.**  
 7 **Let me see if I can fix that.**  
 8 **All right. I guess we had a copy error.**  
 9 A. Okay.  
 10 **Q. Let's go back to Exhibit 6.**  
 11 A. Yes.  
 12 **Q. Looking again at the CVS time stamp, what --**  
 13 **how did CVS generate that -- the time stamp shown at the top**  
 14 **of Exhibit 6?**  
 15 MR. LIN: Object to form.  
 16 THE WITNESS: From what I know of CVS, it  
 17 used the then current time that this was checked in by Derek  
 18 Brown to generate that -- that additional header. If you  
 19 notice, that's actually a -- a separate comment.  
 20 **Q. BY MR. KING: Mm-hmm.**  
 21 **And when you say "the then current time,"**  
 22 **what -- what do you mean?**  
 23 A. When Derek committed this change, there is a  
 24 command that when you're done coding and doing whatever  
 25 you're going to do you commit it, and it -- it was at that

Page 66

1 time the system actually took a time stamp as it was  
 2 committing it into the archive.  
 3 **Q. Okay.**  
 4 **Let's go back to Exhibit 5. If you could**  
 5 **close down the WordPad --**  
 6 **Sorry. We're going back to Exhibit 5 on the**  
 7 **computer.**  
 8 A. Okay.  
 9 **Q. If you could close down the WordPad file.**  
 10 A. Yes.  
 11 **Q. Can you change the Internet Explorer window**  
 12 **so that it shows times and dates on -- or the time and date**  
 13 **those files were modified?**  
 14 A. Yeah, this is --  
 15 This right here?  
 16 **Q. That's correct.**  
 17 A. Yes.  
 18 **Q. Okay.**  
 19 **Now, can you find the time and date that**  
 20 **REDIR.CPP was -- was modified?**  
 21 MR. LIN: Object to form.  
 22 THE WITNESS: Oh. This says February 7th,  
 23 1999, at 4:13.  
 24 **Q. BY MR. KING: What does that -- what is the**  
 25 **significance that -- of --**

Page 67

1 **Are you familiar with the way in which files**  
 2 **obtain date modified notations within -- within operating**  
 3 **systems?**  
 4 MR. LIN: Object to form.  
 5 THE WITNESS: Yeah, at one time I was pretty  
 6 familiar with the Unix.  
 7 **Q. BY MR. KING: Mm-hmm.**  
 8 **What does it mean when it says date mod -- a**  
 9 **date modified of February --**  
 10 A. I believe this means this was the last time  
 11 that there was a write operation performed on it.  
 12 MR. LIN: I'm going to object -- object to  
 13 that question.  
 14 **Q. BY MR. KING: Is it unusual that that date on**  
 15 **REDIR.CPP is different from the CVS header that we saw on a**  
 16 **printed -- on the printed version of REDIR.CPP as Exhibit 6?**  
 17 MR. LIN: Object to form.  
 18 THE WITNESS: I can't account for that. I  
 19 don't know why that is.  
 20 **Q. BY MR. KING: Okay. All right.**  
 21 **Let's go to -- go back to Exhibit 2.**  
 22 **Exhibit -- can you tell me what -- what**  
 23 **Aventail Connect is?**  
 24 MR. LIN: Object to form.  
 25 THE WITNESS: Yes. Aventail Connect is a --

Page 68

1 a marketing name for a product that is a -- or was a -- a  
 2 VPN client that would redirect application traffic into a --  
 3 a SOCKS-based VPN server.  
 4 **Q. BY MR. KING: How would -- you said Aventail**  
 5 **Connect is a VPN client, right?**  
 6 A. Yes.  
 7 **Q. What does that mean that it's a VPN client?**  
 8 MR. LIN: Object to form.  
 9 THE WITNESS: By Aventail definition, it  
 10 means that it is a piece of software that will securely  
 11 connect an application on the client side with a service or  
 12 an application on the server side that's located through a  
 13 cryptographically protected tunnel, so that you can use  
 14 information on servers that are on other networks securely  
 15 from typically an insecure network that you're on at that  
 16 point. The end user.  
 17 **Q. BY MR. KING: The end user.**  
 18 **Is Aven -- where is Aventail Connect**  
 19 **installed?**  
 20 MR. LIN: Object to form.  
 21 THE WITNESS: It's installed on Windows-based  
 22 clients.  
 23 **Q. BY MR. KING: Is it -- how do end users use**  
 24 **Aventail Connect?**  
 25 MR. LIN: Object to form.

(Pages 65 to 68)

Page 69

1 THE WITNESS: They use it to establish a  
 2 secure communications channel to remote resources that they  
 3 want to keep confidential.  
 4 **Q. BY MR. KING: Mm-hmm.**  
 5 **Is Aventail Connect installed on an end**  
 6 **user's computer?**  
 7 A. One who's going to use this particular VPN,  
 8 yes.  
 9 **Q. Okay.**  
 10 **Can we go to -- let's go to Page 7 of the**  
 11 **administrator's guide, Exhibit 2.**  
 12 **Do you see the second paragraph from the**  
 13 **bottom, last sentence, "Aventail Connect does not require**  
 14 **administrators to manually establish an encrypted tunnel;**  
 15 **Aventail Connect can establish an encrypted tunnel**  
 16 **automatically"?**  
 17 A. Yes.  
 18 **Q. Can you tell me what that means?**  
 19 MR. LIN: Object to form.  
 20 THE WITNESS: Yeah. I can tell you what it  
 21 means. The -- the interpretation in this -- in this  
 22 instance is the -- the application does not have to initiate  
 23 any kind of cryptography on its own. They connect -- a  
 24 proxy client will automatically initiate that cryptography  
 25 when the connection is placed through the VPN.

Page 70

1 **Q. BY MR. KING: Does the user have to do**  
 2 **anything to initiate the cryptography?**  
 3 MR. LIN: Object to form.  
 4 THE WITNESS: They have to do one thing.  
 5 They have to log into the VPN prior, and then while they're  
 6 logged in, all applications going to resources in the VPN  
 7 will have the cryptography automatically instantiated for  
 8 them.  
 9 **Q. BY MR. KING: How did -- what do users have**  
 10 **to enter into the computer in order to log into the VPN?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: They have to connect to the  
 13 server, and they have to pass some authentication  
 14 challenges.  
 15 **Q. BY MR. KING: What sort of authentication**  
 16 **challenges do they have to pass?**  
 17 MR. LIN: Object to form.  
 18 THE WITNESS: That depends on the kind of  
 19 authentication that the administrator has chosen.  
 20 **Q. BY MR. KING: Mm-hmm.**  
 21 A. There are different forms. One would be user  
 22 name and password, very typical. Another form might be --  
 23 in the Connect supported is challenge response, so  
 24 multifactor tokens, where you know more than just a user  
 25 name, a user name and a PIN and some random number

Page 71

1 generator, things like that. But that's -- that's based on  
 2 what the administrator chose for the authentication.  
 3 **Q. Does the user have to enter any cryptographic**  
 4 **information when logging into the VPN under the user name**  
 5 **and password scenario?**  
 6 MR. LIN: Object to form.  
 7 THE WITNESS: No, not -- not as I would  
 8 consider cryptographic. I mean, nothing outside the scope  
 9 of what I just said.  
 10 **Q. BY MR. KING: Mm-hmm.**  
 11 **What about in the multifactor scenario, in that**  
 12 **scenario does the user have to enter any cryptographic**  
 13 **information?**  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: No.  
 16 **Q. BY MR. KING: Let's go to Page 11.**  
 17 **Do you see where it says "How Does Aventail**  
 18 **Connect Work?"**  
 19 A. Yes.  
 20 **Q. I want to spend a couple minutes and just**  
 21 **walk through Page 11 and Page 12 and Page 13 and have you**  
 22 **describe for us how Aventail Connect works. Is that fair?**  
 23 A. Yeah. I might have to read this a little bit  
 24 with you.  
 25 **Q. That's fine.**

Page 72

1 A. I haven't seen this for a while.  
 2 **Q. That's fine.**  
 3 **Let's -- actually -- let's start with**  
 4 **Page 10.**  
 5 **Not even Page 10. Page 9. Where it says**  
 6 **"What Does Aventail Connect Do?"**  
 7 A. Yes.  
 8 **Q. Do you see that -- that picture on Page 9?**  
 9 A. Yes, I see, yes, protocol stack.  
 10 MR. LIN: Tom, can I lodge a standing  
 11 objection at this point to form as to all the questions  
 12 regarding AVN 00015 and 00016?  
 13 MR. KING: What's the basis for your  
 14 objection?  
 15 MR. LIN: The witness has -- did not prepare  
 16 this document. He wasn't employed by Aventail at the time  
 17 this product was released. Lacks foundation, personal  
 18 knowledge.  
 19 MR. KING: Okay.  
 20 MR. LIN: Yeah.  
 21 MR. BRIGHT: Tom, just to be clear, is that  
 22 okay that we have a standing objection, or do you want us to  
 23 lodge the objection to every question?  
 24 MR. KING: I'm not sure that's an objection  
 25 to form, so I don't -- I don't -- you can do --

(Pages 69 to 72)

Page 73

1 MR. BRIGHT: What we feel necessary?  
 2 MR. KING: -- what you feel necessary.  
 3 MR. BRIGHT: Okay.  
 4 MR. KING: And I'll note that if it's not an  
 5 objection to form, you'd be waiving it by stating it on the  
 6 record.  
 7 MR. BRIGHT: You can note what you want.  
 8 **Q. BY MR. KING: What does the figure on Page 9**  
 9 **of Exhibit 2 show?**  
 10 MR. LIN: Object to form.  
 11 THE WITNESS: It is a representation of how  
 12 Microsoft networking stacks were composed in Win 95.  
 13 **Q. BY MR. KING: And can you walk me through**  
 14 **this figure and explain to me what it shows?**  
 15 A. Yeah, to the best of my ability, I can.  
 16 **Q. Mm-hmm.**  
 17 A. The top box refers to an application that's  
 18 running on Windows 95 that -- that is going to use the  
 19 TCP/IP protocol, and it's going to consume that -- or it's  
 20 going to interface with TCP/IP either through the older  
 21 WinSock 1.1 API or the newer WinSock 2 API.  
 22 MR. LIN: I'm going to object to the previous  
 23 question.  
 24 THE WITNESS: The box immediately below it,  
 25 that says WinSock 2, is describing the WinSock 2 sort of

Page 74

1 block architecture, in that the application can directly use  
 2 WinSock 2 through the right arrow. That's a -- that was the  
 3 more modern API of the day. And on the left, the  
 4 WinSock 1.1 interface was also for compatibility provided by  
 5 the WinSock 2 provider. So it could -- either a WinSock 1.1  
 6 or a WinSock 2 client or application could use the WinSock 2  
 7 API.  
 8 And then in the middle, it says "Aventail  
 9 Connect (Layered Service Provider)," and over on the right  
 10 it says, "Multiple LSPs can be installed at this level." So  
 11 the -- what that is saying is the Aventail Connect is  
 12 actually implemented as a layered service provider in the  
 13 Win -- WinSock 2 architecture and that the -- and it may  
 14 coexist with other WinSock providers.  
 15 And when an application makes a call to  
 16 WinSock 2, it ultimately will pass through the Aventail  
 17 Connect provider, who will inspect it and decide what to do,  
 18 and once the Aventail Connect has decided what to do, the  
 19 traffic will be passed on to the TCP/IP stack, where it will  
 20 be forwarded on whatever the physical connector is, such as,  
 21 say, ethernet.  
 22 **Q. BY MR. KING: Were you familiar with this**  
 23 **architecture -- architectural model during the time that you**  
 24 **were at Novell?**  
 25 MR. LIN: Object to form.

Page 75

1 THE WITNESS: Yes.  
 2 **Q. BY MR. KING: What was your -- was your**  
 3 **understanding of how Aventail's products work -- worked in**  
 4 **1999 consistent with this model as shown in Aventail**  
 5 **Connect -- in the Aventail Connect 3.1 manual that is**  
 6 **Exhibit 2?**  
 7 MR. LIN: Object to form.  
 8 THE WITNESS: Yes.  
 9 **Q. BY MR. KING: Let's go to Page 11.**  
 10 **And you'll see that Page 11 through 13 has a**  
 11 **number of numbers and bullet points, Step 1, 2, 3, and then**  
 12 **some bullet points. Do you see that?**  
 13 A. I do see that.  
 14 **Q. Let's start with -- would you take a minute**  
 15 **to -- to read Pages 11 through 13.**  
 16 A. Yes, I will.  
 17 Okay.  
 18 **Q. Okay.**  
 19 **We need to change the tape, so why don't we**  
 20 **just take a quick break.**  
 21 THE VIDEOGRAPHER: Going off the record. The  
 22 time is 12:11 p.m.  
 23 (Discussion off the record.)  
 24 (Short recess.)  
 25 THE VIDEOGRAPHER: This marks the beginning

Page 76

1 of Tape No. 2. Back on the record. The time is 12:17 p.m.  
 2 **Q. BY MR. KING: Referring to Exhibit 2, do you**  
 3 **see Paragraph No. 1 on Page 11?**  
 4 A. Yes.  
 5 **Q. Would you mind reading that into the record?**  
 6 A. Starting with --  
 7 **Q. Starting with, "The application."**  
 8 A. On which page?  
 9 **Q. On Page -- sorry. Page 11.**  
 10 A. 11? Yeah.  
 11 **Q. See where it says, "1. The application does**  
 12 **a DNS lookup"?**  
 13 A. Oh, oh, oh. Okay. Excuse me. Okay. Yes.  
 14 Okay. All right.  
 15 "The application does a DNS lookup to convert  
 16 the hostname to an IP address or, in rare cases, it will do  
 17 a reverse DNS lookup to convert the IP address to a host  
 18 name. If the application already knows the IP address, the  
 19 entire step is skipped. Otherwise, Aventail Connect does  
 20 the following."  
 21 **Q. What does -- can you explain -- explain to me**  
 22 **what Paragraph 1 means?**  
 23 MR. LIN: Object to form.  
 24 THE WITNESS: Yes. So most of the time an  
 25 application is actually looking up something by name --

(Pages 73 to 76)

Page 77

1 **Q. BY MR. KING: Mm-hmm.**  
 2 A. -- such as, say, www.google.com, and so  
 3 there's a system called DNS, or the Domain Name Service,  
 4 which will try and convert a name into an IP address.  
 5 Applications can't connect directly to names, they have to  
 6 connect to addresses. So what it's saying is it -- most  
 7 likely the application is going to do a DNS name, and  
 8 sometimes it's the opposite. Sometimes it knows an IP  
 9 address name but it wants to know a name for it. That's not  
 10 a typical kind of thing, but if that's the case, the DNS  
 11 system can be programmed to reverse it.  
 12 **Q. Let's put reverse DNS to the side for now.**  
 13 A. Reverse. Yeah, it's not probably --  
 14 That's what that means.  
 15 **Q. Mm-hmm.**  
 16 **What sort of applications could use Aventail**  
 17 **Connect 3.1?**  
 18 MR. LIN: Object to form.  
 19 THE WITNESS: Well, from what I recall of  
 20 3.1, any TCP/IP application that's initiating a connection  
 21 out.  
 22 **Q. BY MR. KING: Can you give me some examples**  
 23 **of programs that use TCP/IP?**  
 24 A. Mm-hmm.  
 25 MR. LIN: Object to form.

Page 78

1 THE WITNESS: Outlook, the mail reader, FTP  
 2 would do it. Web, so use IE would do it.  
 3 **Q. BY MR. KING: IE is what?**  
 4 A. Internet Explorer.  
 5 **Q. Where does your familiarity of Aventail**  
 6 **Connect 3.1 come from?**  
 7 MR. LIN: Object to form.  
 8 THE WITNESS: It comes as -- as a user of it,  
 9 not -- not -- not a heavy user of it but a user of it in  
 10 testing with Novell products.  
 11 **Q. BY MR. KING: That was during the -- the 1999**  
 12 **time frame?**  
 13 A. Yeah. Ninety -- yeah, between 1998 and 2000,  
 14 so --  
 15 **Q. BY MR. KING: Okay.**  
 16 **Let's go to the next paragraph. Do you see**  
 17 **where it says, "If the hostname"?**  
 18 A. Yes.  
 19 MR. LIN: Object to form.  
 20 **Q. BY MR. KING: I won't ask you to read that**  
 21 **for the record, but would you mind explaining to -- you**  
 22 **know, with that paragraph in mind, would you mind explaining**  
 23 **to me what Aventail Connect did when it received a DNS**  
 24 **lookup request from an application?**  
 25 MR. LIN: Object to form.

Page 79

1 THE WITNESS: Yeah. So the Aventail Connect  
 2 component had a set of rules that defined the servers and  
 3 application, primarily it would be servers, servers that  
 4 were in the VPN, that the traffic should be intercepted and  
 5 redirected through the VPN, the cryptographically protected  
 6 VPN. And so the Aventail Connect ran inside the LSP,  
 7 meaning that all of the communications coming down it could  
 8 intercept and look at. So it wanted to see if a DNS name  
 9 that was coming down was in the redirection set.  
 10 **Q. BY MR. KING: When you say it was wanted --**  
 11 **it wanted to see whether a DNS name was in the redirection**  
 12 **set, can you explain to me what that means, and maybe --**  
 13 A. Yeah. So --  
 14 **Q. In the way that you would explain to it a**  
 15 **layperson?**  
 16 MR. LIN: Object to form.  
 17 THE WITNESS: Yeah. So I'll give you two  
 18 examples of how this would sort of -- when it would  
 19 intervene and when it would not. So let's say that it sees  
 20 a name www.myco.com, and that name is a name that the  
 21 administrator of the VPN has registered as being inside the  
 22 VPN. Okay. So when a request comes in, let's say it's in  
 23 Internet Explorer, so you type www.myco.com, and the  
 24 Aventail Connect proxy sees this, because it's sitting in  
 25 the -- it's filtering all the traffic coming from the

Page 80

1 application from WinSock. It says, Oh, that matches a rule  
 2 that's in the VPN. I'm going to have to intercept that and  
 3 begin doing some of these other operations that -- that are  
 4 described here. Okay?  
 5 As opposed to, let's say that you were saying  
 6 www.google.com, right? A public name, not programmed for  
 7 redirection by the VPN administrator. Aventail Connect  
 8 would look at that and say, Oh. That's not in the  
 9 redirection set. Do not, you know, intercept this request,  
 10 just let it flow on through, without any disturbance by the  
 11 Aventail Connect. That's so that it could go out through a  
 12 different provider.  
 13 **Q. BY MR. KING: How did the Aventail Connect**  
 14 **proxy determine whether the DNS request should be sent to**  
 15 **the DNS server as opposed to --**  
 16 **Or sorry. Let me strike that.**  
 17 **How did the Aventail Connect proxy determine**  
 18 **whether to direct traffic to a VPN or not?**  
 19 MR. LIN: Object to form.  
 20 THE WITNESS: It used a configuration file  
 21 that was stored on the client that contained all the  
 22 redirection rules, so when it loaded it read that in, and  
 23 then it used that as a rule set to look at against  
 24 connection -- or name requests coming through.  
 25 **Q. BY MR. KING: Did redirection rules specify**

(Pages 77 to 80)

Page 81

1 **whether or not a host name corresponded to a secure target?**  
 2 MR. LIN: Object to form.  
 3 THE WITNESS: Well, you know, I don't have  
 4 firsthand knowledge from this era.  
 5 **Q. BY MR. KING: Mm-hmm.**  
 6 A. From the year 2002 on, there's no -- there's  
 7 no information in there as to whether that -- that was a --  
 8 a secure site or not.  
 9 **Q. How did Aventail Connect determine whether or**  
 10 **not to send traffic over a VPN, then?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: Yeah. Let me read the rest of  
 13 these steps.  
 14 **Q. BY MR. KING: Mm-hmm.**  
 15 A. What it would do is it would need to  
 16 determine if the request coming in was either a name that is  
 17 in the VPN or an address that's in the VPN. The rules could  
 18 be either. If -- if it is a name, it has to get a name  
 19 translated to an address, because the -- the actual connect  
 20 request is going to come from an application, it's not going  
 21 to be a name. You can't say connect to and then a name,  
 22 right? You have to connect to an address.  
 23 So in the case that it's a name, it has to  
 24 convert it to an address that it can subsequently intercept,  
 25 right? So it's going to say, Oh. Here's a name. It needs

Page 82

1 to be resolved within the -- the VPN. And it would do that  
 2 by essentially impersonating the -- the DNS system, and it  
 3 would -- it would forward the -- the request to the server,  
 4 and the server would attempt to resolve it by name inside  
 5 the remote network. And then if the name was resolved, the  
 6 server responds to the client and tells him what the actual  
 7 real address is. And then the client, Aventail Connect,  
 8 would generate a fake IP address and give it back that it  
 9 would remember, so it would tag it and give kind of a fake  
 10 address that -- that would go back to the -- to the client  
 11 application.  
 12 And then when the client application  
 13 subsequently makes the connect request, it wants to  
 14 establish a TCP connection, it would intercept either the  
 15 fake address or an address that's in the redirected  
 16 namespace, that's a rule, and basically divert that into its  
 17 SSL -- or a SOCKS tunnel.  
 18 And that's essentially what this whole thing  
 19 is saying here.  
 20 If it's not an address that's in the  
 21 redirection set, it would not redirect it, it would just  
 22 pass it on through to whoever the next provider is.  
 23 **Q. Was a -- was a user -- was an end user aware**  
 24 **that any of this was happening behind the scenes when they**  
 25 **used Aventail Connect?**

Page 83

1 MR. LIN: Object to form.  
 2 THE WITNESS: Not typically. A user could  
 3 be, if they wanted to understand how to program the client,  
 4 but typically that would be done by the administrator, and  
 5 the user didn't really know unless they were challenged by  
 6 the VPN to -- to log in.  
 7 **Q. BY MR. KING: Did -- did Aventail Connect**  
 8 **allow applications to connect directly to the target**  
 9 **computer through a VPN, or did all communications have to go**  
 10 **through the SOCKS server?**  
 11 MR. LIN: Object to form.  
 12 THE WITNESS: They would have to go through  
 13 the SOCKS server.  
 14 **Q. BY MR. KING: Why -- why did all**  
 15 **communications have to go through the SOCKS server?**  
 16 MR. LIN: Object to form.  
 17 THE WITNESS: They had to be put into a  
 18 cryp -- well, typically cryptographically protected. It's  
 19 possible to run SOCKS without it, but typically an  
 20 SSL-encrypted tunnel in SOCKS, so what it had to do is it  
 21 had to take the requests from the client and redirect them  
 22 into a tunnel that was cryptographically protected, and that  
 23 tunnel was a connection between the physical client and the  
 24 SOCKS server, and traffic would transit on this encrypted  
 25 connection, at which point the server would take it out of

Page 84

1 the tunnel and then forward it on to the correct IP address  
 2 using just routed -- you know, routing inside the VPN.  
 3 **Q. BY MR. KING: Mm-hmm.**  
 4 **Did the server have a -- have a VPN**  
 5 **connection to the target computer?**  
 6 MR. LIN: Object to form.  
 7 THE WITNESS: No.  
 8 **Q. BY MR. KING: Was the Aventail Connect client**  
 9 **aware of the real IP address of the target computer?**  
 10 MR. LIN: Object to form.  
 11 THE WITNESS: I -- I don't recall.  
 12 **Q. BY MR. KING: Mm-hmm.**  
 13 **Do you see at the bottom of Page 12, the last**  
 14 **partial sentence, "From the applications point of view, the**  
 15 **entire SOCKS negotiation, including the authentication**  
 16 **negotiation, is merely the TCP handshaking"?**  
 17 **It's the last sentence of Page 12, and then**  
 18 **going on to Page 13.**  
 19 A. Yes, I see that.  
 20 **Q. Can you tell me what that sentence means?**  
 21 MR. LIN: Object to form.  
 22 THE WITNESS: Yes. The -- yes. So the --  
 23 the TCP connection itself can't be completed until the SOCKS  
 24 negotiation is done and the tunnel. In SOCKS these -- these  
 25 were not multiplex, so the -- each and every individual

(Pages 81 to 84)



Page 85

1 connection being made by a client application had a separate  
 2 TCP/IP connection to the server that was going -- that was  
 3 SOCKS encapsulated, and so the process of establishing the  
 4 SOCKS communication was done transparently to the  
 5 application, such that its request was held up while the  
 6 Connect proxy actually contacted the server, negotiated it  
 7 all out, and once -- if it got, you know, a clean tunnel up,  
 8 then it would allow the TCP/IP traffic to flow through and  
 9 complete the TCP handshake.

10 **Q. You said it was transparent to the**  
 11 **application. Does that also mean that it was transparent to**  
 12 **the end user?**

13 MR. LIN: Object to form.  
 14 THE WITNESS: Yes.

15 **Q. BY MR. KING: I'll just wrap up with a few**  
 16 **questions going back to your time at Novell. You said that**  
 17 **Novell -- was Novell interested in developing a WinSock 2**  
 18 **layered service provider VPN?**

19 A. No.  
 20 **Q. No?**  
 21 **Why not?**

22 MR. LIN: Object to form.

23 **Q. BY MR. KING: Actually, strike that. Let me**  
 24 **ask a different question.**  
 25 **Are you aware of anybody other than Aventail**

Page 86

1 **who developed a WinSock 2 layered service provider VPN?**

2 A. No.  
 3 MR. LIN: Object to form.

4 **Q. BY MR. KING: Aventail is the only one you're**  
 5 **aware of?**

6 A. In that era.  
 7 **Q. Okay.**  
 8 **All right. Well, that's all of the questions**  
 9 **I have for now. Why don't we break for lunch.**

10 THE VIDEOGRAPHER: Going off the record. The  
 11 time is 12:33 p.m.  
 12 (A luncheon recess was taken at  
 13 12:33 p.m.)  
 14 ---o---  
 15  
 16  
 17  
 18  
 19  
 20  
 21  
 22  
 23  
 24  
 25

Page 87

1 SEATTLE, WASHINGTON; FRIDAY, FEBRUARY 27, 2009  
 2 1:35 P.M.  
 3 --o0o--  
 4  
 5 THE VIDEOGRAPHER: Back on the record. The  
 6 time is currently 1:35 p.m.  
 7  
 8 EXAMINATION  
 9 BY MR. LIN:  
 10 **Q. Now the roles are reversed. I'm going to be**  
 11 **asking you some questions.**  
 12 **Do you understand that you're still under**  
 13 **oath?**

14 A. I do.  
 15 **Q. Okay.**  
 16 **If I could have you turn to what's previously**  
 17 **been marked as Exhibit 2.**

18 A. Yes.  
 19 **Q. Is it correct, sir, that you did not prepare**  
 20 **Exhibit 2?**

21 A. I did not prepare it, no.  
 22 **Q. Have you ever seen this document before,**  
 23 **Exhibit 2?**

24 A. I have seen it, yes.  
 25 **Q. When did you see this document?**

Page 88

1 A. I saw it when we were asked to produce  
 2 information.  
 3 **Q. Have you ever seen Exhibit 2 prior to being**  
 4 **asked to produce information?**

5 A. I think I did, but I'm -- I'm not exactly  
 6 sure.  
 7 **Q. So you don't -- so you don't know that you**  
 8 **reviewed this precise version of Exhibit 2?**

9 A. I don't know that I ever reviewed this one.  
 10 **Q. Okay.**  
 11 **And do you know who maintained custody of**  
 12 **Exhibit 2 from the time it was first produced until the time**  
 13 **that you joined Aventail?**

14 A. I don't know for sure when it was first  
 15 produced. I know who had custody when I did join Aventail,  
 16 and that was Scott Boggan.  
 17 **Q. Do you have any personal knowledge as to who**  
 18 **maintained custody of this document prior to you joining**  
 19 **Aventail?**

20 A. I do not.  
 21 **Q. And do you have any personal knowledge as to**  
 22 **when this document was published?**

23 A. I do not.  
 24 **Q. And have you ever reviewed this document to**  
 25 **confirm the accuracy of the contents of Exhibit 2?**

(Pages 85 to 88)

Page 89

1 A. Yes, I have reviewed it with our developers  
 2 with respect to the source code.  
 3 **Q. And when was that?**  
 4 A. December of 2007.  
 5 **Q. And was that in response to receiving the**  
 6 **subpoena by Microsoft?**  
 7 A. Yes.  
 8 **Q. Who did you speak with to verify the accuracy**  
 9 **of the contents of Exhibit 2?**  
 10 A. Bryan Sauve.  
 11 **Q. And who is Bryan Sauve?**  
 12 A. He's a former Aventail and SonicWALL employee  
 13 who was a developer of Connect.  
 14 **Q. When did Bryan Sauve depart from Aventail?**  
 15 A. He departed from SonicWALL in September of  
 16 2008.  
 17 **Q. And can you describe the steps that you took**  
 18 **to confirm the accuracy of the contents of Exhibit 2 with**  
 19 **respect to the source code?**  
 20 A. Yes. We matched the source code up against  
 21 the descriptions in this document.  
 22 **Q. And how much time did you spend verifying the**  
 23 **contents of Exhibit 2?**  
 24 A. Less than one day.  
 25 **Q. And how many source code files are --**

Page 90

1 **Excuse me. How many source code files are**  
 2 **there for the versions of Aventail Connect described in**  
 3 **Exhibit 2?**  
 4 A. That I don't know off the top of my head.  
 5 **Q. Would it be more than a thousand files?**  
 6 A. No, I don't believe it's more than a thousand  
 7 files.  
 8 **Q. Can I direct your attention to Exhibit 5, and**  
 9 **if you --**  
 10 A. Yes.  
 11 **Q. -- will remain the computer.**  
 12 **Could you -- could you go to the root**  
 13 **directory, the C, please.**  
 14 A. (Witness complies.)  
 15 **Q. Is that the root directory?**  
 16 **Thanks.**  
 17 A. Okay.  
 18 **Q. Could you please open the file that -- excuse**  
 19 **me -- open the folder that corresponds to Version 3.1?**  
 20 A. (Witness complies.)  
 21 **Q. And can you do a right click on that SOCKS 5**  
 22 **folder?**  
 23 A. Yes.  
 24 **Q. And click on Properties?**  
 25 A. Yes.

Page 91

1 **Q. And how many files are in that folder?**  
 2 A. There's 4,000 files, of which the lion's  
 3 share I believe are on the server side.  
 4 **Q. Okay.**  
 5 **So it's your testimony that on the Connect**  
 6 **side --**  
 7 A. Yeah, I -- I don't know exactly how many.  
 8 I'd have to sit down with the guys.  
 9 **Q. Okay.**  
 10 A. The server is considerably larger than the --  
 11 than the client.  
 12 **Q. And did you review every single source code**  
 13 **file for Aventail Connect Version 3.1?**  
 14 A. No, we did not go through every single file.  
 15 **Q. How many files, approximately, did you go**  
 16 **through with Mike Sauve?**  
 17 **Did I get the name correct?**  
 18 A. Oh, Bryan.  
 19 **Q. Bryan.**  
 20 A. Bryan Sauve. It's S-a-u-v-e.  
 21 I don't recall how many.  
 22 **Q. And did you do a page-by-page analysis in**  
 23 **Exhibit 2?**  
 24 A. Not in depth.  
 25 **Q. Not in depth?**

Page 92

1 A. Not in depth.  
 2 **Q. And when you identified a feature described**  
 3 **in Exhibit 2, did Bryan Sauve direct you to the relevant**  
 4 **source code?**  
 5 A. He did not go source file by source file, as  
 6 he was aware of what -- what the entire tree was.  
 7 **Q. So to what extent did you review the contents**  
 8 **of Exhibit 2 in connection with the source code?**  
 9 A. We verified that the source that we had  
 10 pulled in Exhibit -- oh -- that what is described in  
 11 Exhibit 2 was matched up with what we had found in the  
 12 source.  
 13 **Q. And how did you determine what was pulled**  
 14 **from the source matched what was described in Exhibit 2?**  
 15 A. If I recall, we looked at the configuration  
 16 file, primarily, to see if it lined up correctly with what  
 17 was described in here, and then we matched the time of the  
 18 archives between the LiveLink as well as the CVS, to confirm  
 19 they were from the same epoch.  
 20 **Q. So you confirmed that the source code was**  
 21 **approximately developed at the same time as Exhibit 2? Is**  
 22 **that what you're saying?**  
 23 A. That was our intent.  
 24 **Q. And which of the source code files in**  
 25 **Exhibit 5 did Bryan Sauve write?**

(Pages 89 to 92)

Page 93

1 A. That I'm not sure.  
 2 **Q. Okay.**  
 3 **And you also said that you reviewed a**  
 4 **configuration file. Is that something that was produced in**  
 5 **Exhibit 5?**  
 6 A. Yes, I believe it's in here.  
 7 **Q. And how did what was contained in the**  
 8 **exhibit file confirm for you that the source code**  
 9 **corresponded to what was described in Exhibit 2?**  
 10 A. The schema for it.  
 11 **Q. Excuse me?**  
 12 A. The schema for the configuration file  
 13 contained the elements described in this document.  
 14 **Q. So Exhibit 2 describes the configuration**  
 15 **file, and -- is that correct?**  
 16 A. Indirectly, yes. If you look at each of the  
 17 capabilities that you can configure, that's what you'd be  
 18 looking for in the schema.  
 19 **Q. So what -- what do you mean by schema of the**  
 20 **configuration?**  
 21 A. The structure of it. Did it have -- you  
 22 know, did it have the element set present that would match  
 23 this.  
 24 **Q. So you made sure that the configuration file**  
 25 **had certain -- had a certain structure that was reflected in**

Page 94

1 **what was described in Exhibit 2?**  
 2 A. Yes.  
 3 **Q. Did you confirm, as well, that on a --**  
 4 **Excuse me. Let me strike -- let me rephrase.**  
 5 **Did you also confirm that the source code**  
 6 **would interact with the configuration file in a manner**  
 7 **described in Exhibit 2?**  
 8 A. No, we did not.  
 9 **Q. So is it fair to say, then, you reviewed the**  
 10 **configuration file to make sure that the structure of the**  
 11 **configuration was similar to what was described in Exhibit 2**  
 12 **and you reviewed the time stamps in the source code archive**  
 13 **to ensure that it was in the same time frame; is that -- as**  
 14 **when Exhibit 2 was prepared?**  
 15 MR. KING: Objection, form.  
 16 **Q. BY MR. LIN: You may answer.**  
 17 A. Yes.  
 18 **Q. Okay.**  
 19 **Now, do you have any personal knowledge that**  
 20 **Exhibit 2 describes a product that was released?**  
 21 A. I do have some personal knowledge, yes.  
 22 **Q. What's the extent of that personal knowledge?**  
 23 A. When I was in Novell and we were interacting  
 24 with Aventail, we had to do some setup and work with them,  
 25 so -- I can't attest that this exact one I worked on, but I

Page 95

1 can attest that something that approximated this was  
 2 released.  
 3 **Q. So when you worked at Novell you acquired a**  
 4 **released version of Aventail software; is that correct?**  
 5 A. Yes.  
 6 **Q. And while you were at Novell did you have**  
 7 **access to Aventail confidential information or source code?**  
 8 A. I don't believe we had access to the source  
 9 code. We had access to some confidential information, the  
 10 sharing of -- of design documents.  
 11 **Q. Was Aventail under nondisclosure agreement**  
 12 **with Novell before February of 2000?**  
 13 A. I believe so.  
 14 **Q. And can you describe the extent to which you**  
 15 **tested the Aventail software while you were at Novell?**  
 16 A. Yeah. We tested the software against --  
 17 against our SOCKS server for interoperability. We also  
 18 tested it against our own network client as another LSP  
 19 provider, so that the two could cooperate simultaneous.  
 20 **Q. So Aventail Connect is capable of**  
 21 **communicating with SOCKS servers other than Aventail's SOCKS**  
 22 **server?**  
 23 A. It was in -- at that time.  
 24 **Q. It was not?**  
 25 A. It was at that time.

Page 96

1 **Q. At the time. Okay.**  
 2 **And do you have any personal knowledge of**  
 3 **the -- any sales of Aventail Connect Version 3.1?**  
 4 A. I do not.  
 5 **Q. Do you have any personal knowledge of any**  
 6 **offers for sale of Aventail Connect Version 3.1?**  
 7 A. No, I do not.  
 8 **Q. Do you have any personal knowledge of any**  
 9 **public uses of Aventail Connect Version 3.1?**  
 10 MR. KING: Objection, form.  
 11 THE WITNESS: During that time frame?  
 12 **Q. BY MR. LIN: Yes.**  
 13 A. No, no firsthand.  
 14 **Q. Okay. Thank you.**  
 15 **Do you have any personal knowledge of any**  
 16 **public disclosures of Aventail Version 3.1 prior to 2000?**  
 17 A. Not -- well, no. You're -- no, I do not.  
 18 **Q. Let me just ask the previous question again.**  
 19 **Do you have any personal knowledge of any public disclosures**  
 20 **of Aventail Version 3.1 prior to February 2000?**  
 21 A. Not public.  
 22 **Q. Okay. Thank you.**  
 23 **I'd like to direct your attention to**  
 24 **Exhibit 3.**  
 25 **And did you prepare Exhibit 3?**

(Pages 93 to 96)

Page 97

1 A. No, I did not.  
 2 **Q. Have you seen Exhibit 3 before?**  
 3 A. Yes, I have.  
 4 **Q. And when did you first see Exhibit 3?**  
 5 A. When we were pulling the information that we  
 6 were being subpoenaed on.  
 7 **Q. So you haven't seen Exhibit 3 prior to 2007;**  
 8 **is that correct?**  
 9 A. That is correct.  
 10 **Q. And do you have any personal knowledge of who**  
 11 **had custody of Exhibit 3 from the time it was prepared until**  
 12 **the time you joined Aventail?**  
 13 A. Not from when it was first prepared, but from  
 14 when I joined. That would be Scott Boggan.  
 15 **Q. But you don't have any personal knowledge as**  
 16 **to who had custody of this document from when it was first**  
 17 **prepared until when you joined Aventail?**  
 18 A. I do not.  
 19 **Q. And do you have any personal knowledge as to**  
 20 **when Exhibit 3 was first published?**  
 21 A. I haven't -- no, not firsthand.  
 22 **Q. And did you undertake to verify the accuracy**  
 23 **of the contents of Exhibit 3 with respect to any source**  
 24 **code?**  
 25 A. Yes, we did.

Page 98

1 **Q. And when did you do that?**  
 2 A. In December of 2007.  
 3 **Q. And who did you speak with to determine that**  
 4 **the contents of Exhibit 3 were consistent with the source**  
 5 **code?**  
 6 A. Bill Perry.  
 7 **Q. And is Bill Perry still with SonicWALL?**  
 8 A. Yes.  
 9 **Q. And how much time did you spend comparing the**  
 10 **contents of Exhibit 3 with the source code for Aventail**  
 11 **ExtraWeb Server 3.2?**  
 12 A. I spent less than a day.  
 13 **Q. Less than a day.**  
 14 **And do you know approximately how many files**  
 15 **are associated with ExtraWeb Server Version 3.2?**  
 16 A. Well, I might now. Probably somewhere  
 17 between -- maybe roughly 3,000 or so. I don't know the  
 18 exact breakdown between the two. Some -- some of the code  
 19 is shared.  
 20 **Q. And did you review all 3,000 files of source**  
 21 **code with Bill Perry?**  
 22 A. I did not.  
 23 **Q. Which source code files did Bill Perry write?**  
 24 A. I don't know which ones.  
 25 **Q. What was the extent of Bill Perry's**

Page 99

1 **involvement in developing the source code for ExtraWeb**  
 2 **Server 3.2?**  
 3 A. I don't -- I don't know the magnitude of it.  
 4 He is one of the founders.  
 5 **Q. And did you do a page-by-page review of**  
 6 **Exhibit 3 in connection with the source code?**  
 7 A. I did not do page-by-page. I did samplings  
 8 with Bill.  
 9 **Q. And did you select the samplings of Exhibit 3**  
 10 **to compare with the source code?**  
 11 A. Bill selected them.  
 12 **Q. And approximately how many pages did you**  
 13 **sample out of Exhibit 3 to compare with the source code?**  
 14 A. I'd say roughly about one-third.  
 15 **Q. One-third? Okay.**  
 16 **And when you identified a portion of**  
 17 **Exhibit 3 that you wanted to compare with source code, how**  
 18 **did you compare that portion of Exhibit 3 with the source**  
 19 **code?**  
 20 A. We used the same strategy. We used the  
 21 configuration files to match up, you know, the user  
 22 interface material with the actual structure of the  
 23 configuration files.  
 24 **Q. So you compared the structure of the**  
 25 **configuration files. Did you also undertake to look at**

Page 100

1 **source code that might interact with the configuration files**  
 2 **to perform a certain function?**  
 3 A. I did not.  
 4 **Q. And do you have personal knowledge of whether**  
 5 **Exhibit 3 accurately describes a product that was released?**  
 6 A. I do not have personal knowledge.  
 7 **Q. Do you have personal knowledge of any sales**  
 8 **of ExtraWeb Server Version 3.2?**  
 9 A. Not -- no, not direct.  
 10 **Q. Do you have personal knowledge of any offer**  
 11 **for --**  
 12 **Excuse me. Let me re -- restate that.**  
 13 **Do you have any personal knowledge of any**  
 14 **offers for sale of Aventail ExtraWeb Server Version 3.2?**  
 15 A. I do not.  
 16 **Q. Do you have any personal knowledge of any**  
 17 **public use of Aventail ExtraWeb Server Version 3.2?**  
 18 A. I think so. I know of customer sites that I  
 19 believe were running this when I joined the company.  
 20 **Q. Do you have personal knowledge as to when**  
 21 **those customer sites began using Aventail ExtraWeb**  
 22 **Version 3.2?**  
 23 A. I do not.  
 24 **Q. Do you have any personal knowledge as to any**  
 25 **public disclosure of Aventail ExtraWeb Version 3.2?**

(Pages 97 to 100)

Page 101

1 A. Only in the form that it was at sites that  
 2 were -- had bought it commercially.  
 3 **Q. But you don't know when those sites first  
 4 started using ExtraWeb Version 3.2; is that correct?**  
 5 A. I do not.  
 6 **Q. And you don't know when those sites first --  
 7 Excuse me. Let me restate that.  
 8 And you don't know whether any of the sites  
 9 used ExtraWeb Version 3.2 prior to February of 2000; is that  
 10 correct?**  
 11 A. I do not.  
 12 **Q. So for Exhibits 2 and 3, you don't have any  
 13 personal knowledge as to anyone using these products prior  
 14 to February 15, 2000; is that correct?**  
 15 A. Not for commercial sale. I do in that we  
 16 used it in our own development with Aventail.  
 17 **Q. But not in public use; is that correct?**  
 18 A. But not in public use.  
 19 **Q. Okay. Thank you.  
 20 Do you have any personal knowledge as to how  
 21 source code was maintained at Aventail prior to your joining  
 22 Aventail in 2003?**  
 23 A. I do not.  
 24 **Q. And your experience with CVS, which is the  
 25 repository for source code, is between 2003 and 2004; is**

Page 102

1 **that correct?**  
 2 A. With Aventail, yes.  
 3 **Q. Do you know when Microsoft first contacted  
 4 SonicWALL in connection with the litigation with VirnetX?**  
 5 A. I do not.  
 6 **Q. Do you know whether Microsoft contacted  
 7 SonicWALL in connection with the litigation with VirnetX?**  
 8 A. I do not.  
 9 **Q. Have you ever seen a subpoena that Microsoft  
 10 sent to SonicWALL in connection with the litigation with  
 11 VirnetX?**  
 12 A. I may have.  
 13 **Q. Do you know of any meetings between Microsoft  
 14 and SonicWALL in connection with the litigation with  
 15 VirnetX?**  
 16 A. I do not.  
 17 Can I clarify that?  
 18 **Q. Yeah, please.**  
 19 A. How about a -- a representative of -- of  
 20 Microsoft?  
 21 **Q. Yes, that would include representatives from  
 22 Microsoft, including their counsel.**  
 23 A. I know of one where they were asking for  
 24 information.  
 25 **Q. Can you describe that meeting?**

Page 103

1 A. Briefly. We were talking, I believe, to Tom,  
 2 and Tom was clarifying the subpoena as to what --  
 3 essentially what they were looking for.  
 4 **Q. Do you know when this meeting took place?**  
 5 A. I believe it was November of 2007. I'm not  
 6 positive about that.  
 7 **Q. And in what regards did Microsoft or  
 8 attorneys for Microsoft clarify what they were looking for  
 9 in the subpoena?**  
 10 A. They described our products. They knew of  
 11 some of our products, specifically the ExtraNet and Connect,  
 12 if I remember, and possibly ExtraWeb, and we discussed sort  
 13 of the clarifications of what, you know, roughly those  
 14 products did, and then they asked for -- or I think it might  
 15 have been just Tom. I think it was Tom, asked for, you  
 16 know, the kinds of information like, Gee, yeah, get me  
 17 the -- the information on these, and that's where we kind of  
 18 defined the scope with -- with Laurel on what it was we  
 19 were -- they were looking for.  
 20 **Q. Did this conversation include discussions  
 21 about source code, Aventail source code?**  
 22 A. Yes, it did, at the time.  
 23 **Q. And what was said regarding Aventail source  
 24 code?**  
 25 A. That we could produce the source code.

Page 104

1 **Q. And did SonicWALL produce the source code to  
 2 Microsoft?**  
 3 A. I believe so, but I -- I don't know when. I  
 4 wasn't party to that.  
 5 **Q. Do you know if Microsoft was given access to  
 6 SonicWALL source code?**  
 7 A. I do not.  
 8 **Q. And when did you first gather the source code  
 9 for production in response to Microsoft's subpoena?**  
 10 A. In December of 2007.  
 11 **Q. And is it your understanding that source code  
 12 was actually provided to Microsoft in December of 2007?**  
 13 A. I don't believe it was, but I -- I'm not the  
 14 one who would provide it.  
 15 **Q. Do you know when the source code was first  
 16 provided to Microsoft?**  
 17 A. I believe it was recently.  
 18 **Q. How recently?**  
 19 A. Within the last couple months.  
 20 **Q. Okay.  
 21 Is it correct to say that Aventail Connect is  
 22 software that runs on a computer?**  
 23 A. Yes, it is correct.  
 24 **Q. And I'm referring to Aventail Connect  
 25 Version 3.1.**

(Pages 101 to 104)

Page 105

1 A. Yes, that is correct.

2 **Q. Is it correct to say that Aventail Connect**

3 **Version 3.1 runs on a client computer?**

4 A. That is a more precise.

5 **Q. Is it correct to say that Aventail Connect**

6 **does not always make a connection directly between the**

7 **client computer and the remote host?**

8 A. Yes, that is -- it never makes a direct

9 connection.

10 **Q. And is it okay with you if I also refer to**

11 **remote host as a target computer?**

12 A. Yes.

13 **Q. Will you understand what I'm saying?**

14 A. Yes.

15 **Q. Okay.**

16 A. As opposed to a VPN server?

17 **Q. Okay.**

18 **Is it correct to say that Aventail Connect is**

19 **specifically designed to operate only for TCP/IP**

20 **communication?**

21 A. That is incorrect.

22 **Q. And in what way is it incorrect?**

23 A. It could pass UDP traffic, as well.

24 **Q. Okay.**

25 **Is it correct to say that for connections**

Page 106

1 **that are redirected to a SOCKS server, that Aventail Connect**

2 **does not establish a direct connection between a client**

3 **computer and the target computer?**

4 MR. KING: Objection to form.

5 THE WITNESS: Yes, technically that is

6 correct.

7 **Q. BY MR. LIN: Is it correct to say that**

8 **Aventail Connect establishes a connection between the client**

9 **computer and the Aventail SOCKS server software?**

10 A. That is correct.

11 **Q. Is it correct to say that there's a separate**

12 **connection established between the Aventail SOCKS server**

13 **software and the target computer?**

14 A. That is correct.

15 **Q. Now, does Aventail Connect take any action in**

16 **the absence of an application requesting a connection?**

17 MR. KING: Objection, form.

18 THE WITNESS: Can you -- yeah. Maybe you

19 could clarify that to me.

20 **Q. BY MR. LIN: Okay.**

21 **What does Aventail Connect respond to?**

22 MR. KING: Objection, form.

23 THE WITNESS: It responds to -- in this --

24 circa this era, it responds to WinSock requests.

25 **Q. BY MR. LIN: And where are those WinSock**

Page 107

1 **requests -- where do those WinSock requests originate from?**

2 A. In the client application.

3 **Q. Okay.**

4 **So in the absence of a WinSock request from a**

5 **client application, does Aventail Connect do anything?**

6 A. No.

7 **Q. What precisely does Aventail Connect do in**

8 **response to a DNS request?**

9 A. It interprets the -- the type of request,

10 specifically looking for a name or an address --

11 And address could be a form of a name here.

12 **Q. Okay.**

13 A. -- that matches the configured redirection

14 rule set on the client. If it matches, it forwards the

15 request over a SOCKS connection to the SOCKS server to be

16 resolved.

17 **Q. Okay.**

18 **And does Aventail Connect do anything after**

19 **that in the absence of any request from the application?**

20 A. It caches the response as a handle, to be

21 used in a subsequent WinSock request at an unknown point in

22 time.

23 **Q. And could a subsequent WinSock request**

24 **include a connection request from the application?**

25 A. Yes.

Page 108

1 **Q. And what precisely does Aventail Connect do**

2 **in response to receiving a connection request?**

3 A. It looks to see if the IP address of the

4 target server matches a cached handle that it's resolved it

5 against its redirection set.

6 **Q. So could I direct your attention to**

7 **Exhibit 2. It's going to be Page 11. It's also Bates**

8 **stamped AVEN 00000015.**

9 A. You said Page 11?

10 **Q. Yes.**

11 A. Okay.

12 And what -- what was the rest of it?

13 **Q. I was also identifying the Bates number,**

14 **beginning in 015 at the beginning of the page.**

15 A. Yes, okay. Yes.

16 **Q. So Point No. 1, is that describing what**

17 **Aventail Connect does in response to a DNS request?**

18 A. Yeah, that -- it approximates it, yes.

19 **Q. So the first -- first point, in summary, says**

20 **that if the host name matches a local domain stream or does**

21 **not match a redirection rule, then Aventail Connect passes**

22 **the name resolution query through the IP -- TCP/IP stack,**

23 **correct?**

24 A. Yes, technically to whoever the next provider

25 is.

(Pages 105 to 108)

Page 109

1 **Q. And what is a local domain stream?**  
 2 A. I believe it's the DNS domain you're a member  
 3 of, that the client system is a member of.  
 4 **Q. And what does it mean to not match a**  
 5 **redirection rule?**  
 6 A. Ah. It means that the name that is being  
 7 looked up is not a name that has been programmed for  
 8 redirection into the VPN.  
 9 **Q. Why would you program a name for redirection**  
 10 **to the VPN?**  
 11 A. Because the system actually operates on names  
 12 rather than IP addresses. It treats IP addresses like  
 13 names.  
 14 For example, a host address or a subnet is  
 15 also a form of a name. A DNS server's a name -- I mean, a  
 16 DNS, either qualified fully or non, are names.  
 17 **Q. Okay.**  
 18 **And if you turn to the next page, Page 12.**  
 19 **Does the first bullet on Page 12 describe**  
 20 **what Aventail Connect does if a destination host name**  
 21 **matches a redirection rule?**  
 22 A. Yes, that's -- that's approximately what  
 23 happens.  
 24 **Q. And Aventail Connect creates a false DNS**  
 25 **entry, correct?**

Page 110

1 A. Yes.  
 2 **Q. And what is a false DNS entry?**  
 3 A. You know, I don't recall the exact structure.  
 4 It's a -- it's a tag that we were using to subsequently  
 5 recognize later on resolution.  
 6 **Q. Does a false DNS entry correspond to the**  
 7 **computer address of the target computer?**  
 8 A. I believe it is populated by the -- by it,  
 9 but it doesn't contain it at first.  
 10 Actually, let me clarify that a little more.  
 11 It's -- it's false in the sense that the server knows the  
 12 actual real address and that the proxy connection itself is  
 13 going to be bound to it, and so we create a -- kind of a  
 14 fake -- a fake address.  
 15 **Q. Okay.**  
 16 **But that doesn't necessarily include the**  
 17 **computer address of the target computer; is that correct?**  
 18 A. You know, my memory's a little faulty. I  
 19 don't believe it has the actual address of the target.  
 20 **Q. Okay. Thank you.**  
 21 **So let's say, for example, the application**  
 22 **has submitted a DNS request that matches a redirection rule.**  
 23 **What is the next step the application will take to initiate**  
 24 **a connection with the target computer?**  
 25 **And by "application" I'm talking about the**

Page 111

1 **WinSock application.**  
 2 A. Right.  
 3 So the -- this false entry, what happens  
 4 there is we've created essentially an alias IP address, and  
 5 I believe it's in the net2 namespace, which is not -- not  
 6 allocated so we kind of stole it. So --  
 7 **Q. Okay.**  
 8 A. So, in other words, we create -- they're  
 9 like NAT -- are you familiar with NAT?  
 10 **Q. I'm not.**  
 11 A. Okay.  
 12 So we create an address on the local side  
 13 that actually is going to end up becoming bound to the  
 14 remote address, right? Indirectly through the connection  
 15 going from Connect proxy to the server. The server knows  
 16 the real address associated with that -- that proxy -- it's  
 17 like a -- yeah. That TCP connection coming in from the  
 18 client's associated with remote address.  
 19 **Q. Mm-hmm.**  
 20 A. On the client side we associate a fake  
 21 address back to the application.  
 22 **Q. Okay.**  
 23 A. We resolve it.  
 24 When the application comes through and  
 25 initiates some form of a connect method, like Connect, let's

Page 112

1 say, for TCP, right, the address that they're connecting to  
 2 is one of our false addresses, that we recognize and then  
 3 look up in the table which T -- or who that's associated  
 4 with and place the SOCKS connection back to the server.  
 5 **Q. What do you mean, "who that's associated**  
 6 **with"?**  
 7 A. What -- what resolution that was associated  
 8 with.  
 9 **Q. What do you mean by "what resolution that was**  
 10 **associated with"?**  
 11 A. So if you -- if you translate a name, right,  
 12 that we resolve via the SOCKS server, we get an imaginary,  
 13 if you were, IP address that we've created for it, right?  
 14 We reassociate that and pass it back through to the SOCKS  
 15 server, who then looks up and says, Oh, this fake address on  
 16 the client side is really associated with this actual target  
 17 host.  
 18 **Q. So you're saying the DNS resolution takes**  
 19 **place at the SOCKS server; is that correct?**  
 20 A. Yes. The actual DNS resolution takes place  
 21 at the SOCKS server.  
 22 **Q. Is the false DNS entry associated with**  
 23 **anything that the SOCKS server might resolve?**  
 24 A. Yes.  
 25 **Q. And the purpose of that is to identify which**

(Pages 109 to 112)

Page 113

1 **SOCKS server will be used to redirect the connection; is**  
 2 **that correct?**  
 3 A. No. It's to identify what the target host is  
 4 we're supposed to proxy to.  
 5 **Q. So I believe you were in the process of**  
 6 **describing what happens when the application requests a**  
 7 **connection host, so you were saying that the application**  
 8 **tries to connect to this false address; is that correct?**  
 9 A. That's correct.  
 10 **Q. And then what happens after that?**  
 11 A. The Connect proxy intercepts that request,  
 12 realizes that it's an IP address that was fabricated for the  
 13 SOCKS server, and establishes the new SOCKS connection,  
 14 passes that through to the server. The server, of course,  
 15 now associates that with the real address.  
 16 Once that's all done, then we go ahead and  
 17 pass the traffic on the connect coming through, which in  
 18 TCP's case would be a TCP send.  
 19 **Q. But that would only be in response to the**  
 20 **application sending data; is that correct?**  
 21 A. That's correct.  
 22 **Q. Now, does the connection request contain a**  
 23 **domain name?**  
 24 A. It does not.  
 25 **Q. The application -- the connection request**

Page 114

1 **from the application includes a computer address; is that**  
 2 **correct?**  
 3 A. It does.  
 4 **Q. Does Aventail Connect respond to standard DNS**  
 5 **requests?**  
 6 A. Yes. It participates in the resolution of  
 7 standard DNS requests when those are in the re -- when their  
 8 name's in the redirected rule set.  
 9 **Q. Does Aventail Connect require the DNS request**  
 10 **from the application to be formatted in any particular way?**  
 11 A. No, any standard DNS is -- is allowed.  
 12 **Q. Does Aventail Connect modify the DNS software**  
 13 **that is part of the Microsoft operating system?**  
 14 A. It does not.  
 15 **Q. Does Aventail Connect remove any DNS software**  
 16 **that is part of the Microsoft operating system?**  
 17 A. It does not.  
 18 **Q. Does Aventail Connect disable the DNS**  
 19 **software that is part of the Microsoft operating system?**  
 20 A. It does not.  
 21 **Q. Is the DNS request a standard IETF DNS**  
 22 **request?**  
 23 A. Yes.  
 24 **Q. Does Aventail Connect's response to a DNS**  
 25 **request ever include initiating a TCP/IP connection to the**

Page 115

1 **target computer?**  
 2 A. No.  
 3 **Q. Does Aventail Connect's response to a DNS**  
 4 **request ever include initiating a VPN connection to the**  
 5 **target computer?**  
 6 A. Repeat that again.  
 7 **Q. Does Aventail Connect's response to a DNS**  
 8 **request ever include initiating a VPN connection to the**  
 9 **target computer?**  
 10 MR. KING: Objection, form.  
 11 THE WITNESS: No.  
 12 **Q. BY MR. LIN: Do the redirection rules**  
 13 **associated with Aventail Connect reside on the client**  
 14 **computer?**  
 15 A. Yes.  
 16 **Q. Does the use of Aventail Connect require a**  
 17 **user to configure the redirection rules on a client**  
 18 **computer?**  
 19 MR. KING: Objection, form.  
 20 THE WITNESS: It requires an administrator or  
 21 a user to.  
 22 **Q. BY MR. LIN: Without a user configuring the**  
 23 **redirection rules, will Aventail Connect be connected?**  
 24 A. It will be passive.  
 25 **Q. Passive.**

Page 116

1 **So if an application request matches a**  
 2 **redirection rule, is a new connection to the SOCKS server**  
 3 **created?**  
 4 A. Can you repeat that? I'm -- you're so  
 5 specific.  
 6 **Q. Sorry.**  
 7 A. It's okay.  
 8 **Q. If an application request matches a**  
 9 **redirection rule, is a new connection to the SOCKS server**  
 10 **created?**  
 11 MR. KING: Objection, form.  
 12 THE WITNESS: Yes.  
 13 **Q. BY MR. LIN: So for each new application**  
 14 **request a separate connection is made to the SOCKS server;**  
 15 **is that correct?**  
 16 A. Correct.  
 17 **Q. After Aventail Connect makes a connection to**  
 18 **the SOCKS server, does the SOCKS server then make a new**  
 19 **connection to the remote host?**  
 20 A. Yes.  
 21 **Q. If Application A sends data on a specific**  
 22 **connection to the SOCKS server, then will the data always go**  
 23 **on -- to the same remote host?**  
 24 A. Application A.  
 25 MR. KING: Objection, form.

(Pages 113 to 116)



Page 117

1 THE WITNESS: Repeat that, please.  
 2 **Q. BY MR. LIN: If an application sends data on**  
 3 **a specific connection to the SOCKS server, will the data**  
 4 **always go to the same remote host?**  
 5 A. Yes.  
 6 **Q. Can it ever go anywhere else?**  
 7 A. No.  
 8 **Q. If another application -- let's call it**  
 9 **Application --**  
 10 A. Let me -- I need to clarify that. Can a  
 11 UDP --  
 12 No, no. That's true. Never mind. The  
 13 answer was correct.  
 14 **Q. Okay.**  
 15 **If another application, let's call it**  
 16 **Application B, sends data on another specific connection to**  
 17 **the SOCKS server, will that data always go to the same**  
 18 **remote host?**  
 19 A. I believe so.  
 20 Let -- let me see if I got that right. So if  
 21 the application initiates a connection with a different  
 22 target --  
 23 **Q. If a different application.**  
 24 A. If a different -- even the same, but -- if an  
 25 application initiates with a different target, will it

Page 118

1 always go over the same SOCKS connection and the associated  
 2 same proxy connection to that --  
 3 **Q. Go ahead, answer that question.**  
 4 A. Yes.  
 5 **Q. So if you have a second application that has**  
 6 **another specific connection to a SOCKS server, and it's**  
 7 **always -- it's routing data to a remote host, will the data**  
 8 **from Application B always go to the same remote host?**  
 9 A. To Target B?  
 10 **Q. Yeah.**  
 11 A. Yes.  
 12 **Q. Okay.**  
 13 **So would you agree with me that there's no**  
 14 **routing occurring -- occurring in the SOCKS server?**  
 15 A. Yes.  
 16 **Q. Does Aventail Connect require any special**  
 17 **functionality on the target computer?**  
 18 A. No.  
 19 **Q. Are there any specific capabilities that the**  
 20 **target computer must have?**  
 21 MR. KING: Objection, form.  
 22 THE WITNESS: None that I'm aware of.  
 23 **Q. BY MR. LIN: Does Aventail Connect require**  
 24 **the target computer to be able to perform encryption?**  
 25 A. No.

Page 119

1 **Q. Does Aventail Connect require the target**  
 2 **computer to be able to perform decryption?**  
 3 A. No.  
 4 **Q. Does Aventail Connect require the target**  
 5 **computer to be able to form part of a VPN?**  
 6 A. No.  
 7 **Q. Are you familiar with the concept of a**  
 8 **tunnel?**  
 9 A. Yes.  
 10 **Q. And what is your understanding of what a**  
 11 **tunnel is?**  
 12 A. A tunnel is used in different contexts. In a  
 13 routed context, it's used to encapsulate packets that are  
 14 going through to be routed. In a proxy context, it's  
 15 designed to encapsulate data one to one with a target.  
 16 **Q. And we've already established that Aventail**  
 17 **is not in a routed context; is that correct?**  
 18 A. That is correct, with Connect and SOCKS.  
 19 **Q. Does Aventail Connect tunnel IP packets**  
 20 **within IP packets?**  
 21 A. Yes.  
 22 **Q. Can you explain that?**  
 23 A. The SOCKS encapsulation is flowing over  
 24 TCP/IP. Then the application traffic, which also has IP,  
 25 could be TCP or UDP, is being transmitted as packets

Page 120

1 encapsulated within SOCKS. So IP in IP is true.  
 2 **Q. Does Aventail Connect tunnel network layer --**  
 3 A. You know what, let me -- actually, let --  
 4 hold on a second. Let me think about that a little more.  
 5 No, I answered that wrong. I'm sorry. I was  
 6 thinking of tunneling technology.  
 7 **Q. Can I ask that question again?**  
 8 A. Yes, please answer it again -- ask it again.  
 9 **Q. Does Aventail Connect tunnel IP packets**  
 10 **within IP packets?**  
 11 A. No.  
 12 **Q. Does Aventail Connect tunnel network layer**  
 13 **packets within network layer packets?**  
 14 A. No.  
 15 MS. BUCKNER: Counsel, can I just clarify  
 16 exactly what you're talking about in terms of the product  
 17 that you're asking about currently?  
 18 MR. LIN: We're talking about Aventail  
 19 Connect.  
 20 MS. BUCKNER: And the version is?  
 21 MR. LIN: Version 3.1.  
 22 MS. BUCKNER: Okay. Because currently  
 23 SonicWALL has a product which is called the Tunnel --  
 24 Aventail Tunnel.  
 25 MR. LIN: Okay.

(Pages 117 to 120)

Page 121

1 MS. BUCKNER: I don't even know if we're  
 2 branding it Aventail Connect Tunnel now, but I just want to  
 3 make sure that we're not currently talking about SonicWALL's  
 4 product, we're talking about the previous --  
 5 MR. LIN: Right.  
 6 MS. BUCKNER: And would you restate, I guess,  
 7 the version that you're asking about specifically?  
 8 MR. LIN: Sure. We're asking about Aventail  
 9 Connect Version 3.1.  
 10 MS. BUCKNER: Thank you.  
 11 MR. LIN: Thanks for the clarification.  
 12 Appreciate it.  
 13 **Q. And you understand that we've been talking**  
 14 **about Aventail Connect Version 3.1; is that correct?**  
 15 A. Yes. I -- I was thinking of one of our other  
 16 products which does that, but that's the reason I had to  
 17 retract that.  
 18 **Q. Thank you.**  
 19 **In the Aventail version -- in Aventail**  
 20 **Connect Version 3.1, what is being encapsulated within the**  
 21 **packets?**  
 22 A. The payload of the application traffic.  
 23 **Q. Is there anything else?**  
 24 A. Well, and it's also framed with, you know,  
 25 the encryption.

Page 122

1 **Q. So the payload packet has encryption**  
 2 **information and the actual encrypted content; is that**  
 3 **correct?**  
 4 MR. KING: Objection, form.  
 5 THE WITNESS: Yes. The payload is  
 6 encapsulated in SOCKS, and within SOCKS encryption  
 7 optionally, although typically employed, is also present  
 8 with, you know, the necessary cryptography wrapper.  
 9 **Q. BY MR. LIN: So an Aventail connection with**  
 10 **the SOCKS server is not always encrypted; is that correct?**  
 11 A. It's possible to configure it for non --  
 12 nonencryption.  
 13 **Q. So it's correct that the connections between**  
 14 **Aventail Connect and a SOCKS server are not always**  
 15 **encrypted?**  
 16 A. That is correct.  
 17 **Q. Do all connections made with Aventail Connect**  
 18 **via the SOCKS server require authorization?**  
 19 A. Yes.  
 20 (Discussion off the record.)  
 21 **Q. BY MR. LIN: Actually, let me just turn back**  
 22 **to something I was asking you about earlier, and was about**  
 23 **the tunneling in Aventail Connect Version 3.1. Now, in the**  
 24 **packets that are being sent between Aventail Connect and**  
 25 **SOCKS, is the payload -- excuse me -- is the packet that's**

Page 123

1 **being encapsulated the same as the packet that's being**  
 2 **encapsulated between the SOCKS server and the target**  
 3 **computer?**  
 4 MR. KING: Objection, form.  
 5 THE WITNESS: The application payload is the  
 6 same.  
 7 **Q. BY MR. LIN: Is -- if encryption is used**  
 8 **between the Aventail Connect software and the SOCKS server,**  
 9 **is the information being transmitted between the SOCKS**  
 10 **server and the target computer also encrypted?**  
 11 A. It's -- it's the -- whatever the plain text  
 12 of the data was is being transmitted.  
 13 **Q. So it's been encrypted; is that correct?**  
 14 A. It's -- yes. The VPN decryption is done at  
 15 the SOCKS server.  
 16 **Q. So the payload between Aventail Connect and**  
 17 **the SOCKS server is not the same as the payload between the**  
 18 **SOCKS server and the remote host; is that correct?**  
 19 A. The TCP payload is not the same between the  
 20 SOCKS server and the SOCKS client. The application payload  
 21 that's encapsulated inside it is encrypted normally.  
 22 **Q. This is between the SOCKS client and the**  
 23 **SOCKS server?**  
 24 A. Correct.  
 25 **Q. But it's not encrypted between the SOCKS**

Page 124

1 **server and the remote host; is that correct?**  
 2 A. Not unless the application encrypted it.  
 3 **Q. Okay.**  
 4 **What happens to the source and destination**  
 5 **information between the two connections? And by "two**  
 6 **connections" I mean between the SOCKS client, the SOCKS**  
 7 **server, and between the SOCKS server and the remote host.**  
 8 A. At the network layer, at the IP layer?  
 9 **Q. Yes.**  
 10 A. The source and destination IP addresses are  
 11 the actual IP address of the client, the real adapter  
 12 address, whichever it's gone out on --  
 13 **Q. Mm-hmm.**  
 14 A. -- and the IP address that the SOCKS client  
 15 contacted the SOCKS server on.  
 16 **Q. Okay.**  
 17 A. And between the SOCKS server and the target  
 18 server, it is the IP address of the adapter that we are  
 19 initiating from on the SOCKS server and the IP address of  
 20 the target server.  
 21 **Q. Okay. Thank you.**  
 22 **So I'd like to --**  
 23 **Is the Aventail Connect source information**  
 24 **transmitted to the target?**  
 25 A. No.

(Pages 121 to 124)

Page 125	Page 127
<p>1 MR. KING: Objection, form.</p> <p>2 <b>Q. BY MR. LIN: So I believe earlier you</b></p> <p>3 <b>testified that all connections made with Aventail Connect</b></p> <p>4 <b>via the SOCKS server require authorization; is that correct?</b></p> <p>5 A. That is correct.</p> <p>6 <b>Q. Can you please turn to Exhibit 2, Bates</b></p> <p>7 <b>No. AVEN 0000052.</b></p> <p>8 <b>Actually, I may have given you the wrong</b></p> <p>9 <b>page.</b></p> <p>10 <b>Right. So that's Page 48 of Exhibit 2,</b></p> <p>11 <b>correct?</b></p> <p>12 A. Yes, administrator's guide 48.</p> <p>13 <b>Q. Do you see the table at the very top?</b></p> <p>14 A. Yes.</p> <p>15 <b>Q. Do you see in the second row, second column,</b></p> <p>16 <b>it states, "&lt;Null Auth&gt; indicates no authentication module</b></p> <p>17 <b>will be used"?</b></p> <p>18 A. Yes.</p> <p>19 <b>Q. Is this consistent with your testimony that</b></p> <p>20 <b>all connections made with Aventail Connect via the SOCKS</b></p> <p>21 <b>server require authorization?</b></p> <p>22 A. Yes.</p> <p>23 <b>Q. And how -- how is this consistent with what's</b></p> <p>24 <b>shown on Page 48?</b></p> <p>25 A. This is authentication. Authentication is</p>	<p>1 A. Oh, wait a second. This is the --</p> <p>2 Oh, it won't be in this document.</p> <p>3 <b>Q. Is there another -- would it be in Exhibit 3?</b></p> <p>4 A. Yes.</p> <p>5 <b>Q. Can you show me where in Exhibit 3 access</b></p> <p>6 <b>controls are discussed?</b></p> <p>7 A. Yeah, the first example's going to be on</p> <p>8 AVEN 00000143. There's a row that says "Deny, Anywhere,</p> <p>9 Anywhere, Anyone, Times Any." That would be an access</p> <p>10 control rule.</p> <p>11 That would be a pretty Draconian one</p> <p>12 but . . .</p> <p>13 <b>Q. Okay. Thank you.</b></p> <p>14 <b>In the context of Aventail Connect</b></p> <p>15 <b>Version 3.1, what is a channel?</b></p> <p>16 A. Where did you see that?</p> <p>17 <b>Q. It's not in the documents. That's just the</b></p> <p>18 <b>question.</b></p> <p>19 A. My understanding of the channel would be the</p> <p>20 TCP connection, but that -- that's how I've heard of it</p> <p>21 referred to.</p> <p>22 <b>Q. Is the TCP connection between the client and</b></p> <p>23 <b>the SOCKS server?</b></p> <p>24 A. Yes.</p> <p>25 <b>Q. In this context and based on your</b></p>
Page 126	Page 128
<p>1 authenticating identity. Authorization is authorizing it to</p> <p>2 pass to a target.</p> <p>3 <b>Q. And how does -- how does Aventail Connect</b></p> <p>4 <b>require authorization to connect to the target?</b></p> <p>5 A. The SOCKS server enforces the authorization</p> <p>6 through access control rules.</p> <p>7 MS. BUCKNER: I think there might be some</p> <p>8 movement now where we might be going into some SonicWALL</p> <p>9 confidential information.</p> <p>10 MR. LIN: Okay.</p> <p>11 MS. BUCKNER: So I've just appraised Gary of</p> <p>12 noting to me when there are pieces that may be in our</p> <p>13 current product.</p> <p>14 MR. LIN: Okay.</p> <p>15 MS. BUCKNER: And he's just notified me that</p> <p>16 as we're moving forward --</p> <p>17 THE WITNESS: We might be.</p> <p>18 MS. BUCKNER: -- this might be a time where</p> <p>19 that may be at issue.</p> <p>20 MR. LIN: Okay. I understand.</p> <p>21 I'll try to restrict my questions to the</p> <p>22 document.</p> <p>23 MS. BUCKNER: Thank you.</p> <p>24 <b>Q. BY MR. LIN: Can you show me where in this</b></p> <p>25 <b>document the access controls are described?</b></p>	<p>1 <b>understanding, is a channel a network?</b></p> <p>2 A. No, it's a secure pathway over a network.</p> <p>3 <b>Q. Okay.</b></p> <p>4 <b>And you understand that different people</b></p> <p>5 <b>might have different interpretations of what a VPN is?</b></p> <p>6 A. Yes.</p> <p>7 <b>Q. Do you understand that different people might</b></p> <p>8 <b>have different interpretations of what a tunnel is?</b></p> <p>9 A. Yes.</p> <p>10 <b>Q. And do you understand that your definition of</b></p> <p>11 <b>a VPN might be different than someone else's definition of a</b></p> <p>12 <b>VPN?</b></p> <p>13 A. Yes.</p> <p>14 <b>Q. Do you understand that your definition of a</b></p> <p>15 <b>tunnel might be different from someone else's definition of</b></p> <p>16 <b>a tunnel?</b></p> <p>17 A. Yes.</p> <p>18 <b>Q. Okay.</b></p> <p>19 <b>If I could have you turn back to Exhibit 2.</b></p> <p>20 <b>If you could flip to Bates No. AVEN 0000120.</b></p> <p>21 A. 5120?</p> <p>22 <b>Q. I'm sorry. 120. 0000120.</b></p> <p>23 A. Okay.</p> <p>24 Yes, I'm there.</p> <p>25 <b>Q. Do you see the definition of "Virtual Private</b></p>

(Pages 125 to 128)

Page 129

1 **Network" at the top?**  
 2 A. I do.  
 3 **Q. Is this Aventail's definition of a virtual**  
 4 **private network?**  
 5 A. It is.  
 6 **Q. Is this also your definition of a virtual**  
 7 **private network?**  
 8 A. Yes.  
 9 Can I clarify that once?  
 10 **Q. Yeah, please.**  
 11 A. Yes, with respect to this -- with Connect  
 12 V3.1.  
 13 **Q. So you think this definition of VPN on**  
 14 **Page 116 of Exhibit 2 is a correct definition of VPN with**  
 15 **respect to this Aventail Connect 3.1?**  
 16 A. I do.  
 17 **Q. Do you believe that is an accurate definition**  
 18 **of VPN for other products other than Aventail Connect 3.1?**  
 19 A. In principle, yes.  
 20 **Q. Now, you testified earlier --**  
 21 **Strike that last question.**  
 22 **Is your previous testimony about what a**  
 23 **channel is consistent with "channel" as it's used in the**  
 24 **definition of VPN on Page 116 of Exhibit 2?**  
 25 A. I believe it is.

Page 130

1 **Q. Is the DNS server part of the Aventail**  
 2 **product line?**  
 3 A. No.  
 4 **Q. Is the DNS mentioned in the Aventail Connect**  
 5 **documents, such as Exhibit 2 and Exhibit 3, a DNS server**  
 6 **that's produced by Aventail?**  
 7 A. No.  
 8 **Q. Is the DNS that's mentioned in Exhibits 2 and**  
 9 **3 simply any standard DNS service?**  
 10 A. Yes, with respect to meeting IETF standard  
 11 protocol.  
 12 **Q. Yes.**  
 13 **Is a DNS proxy server part of the Aventail**  
 14 **product line?**  
 15 MR. KING: Objection, form.  
 16 THE WITNESS: Let me think of that.  
 17 No, not a general-purpose DNS proxy server.  
 18 **Q. BY MR. LIN: Is it reasonable to identify**  
 19 **some part of Aventail Connect as a DNS proxy server?**  
 20 A. Yes.  
 21 **Q. And which part would that be?**  
 22 A. The part that translates them into fake  
 23 entries.  
 24 **Q. And this runs on the client computer; is that**  
 25 **correct?**

Page 131

1 A. Correct.  
 2 **Q. It does not run on the target computer?**  
 3 A. It does not.  
 4 **Q. And it does not run on the SOCKS server**  
 5 **computer; is that correct?**  
 6 A. Well, actually, I can't ask for the target  
 7 computer, but -- it does not run on the SOCKS server.  
 8 **Q. And the redirection rules reside on the DNS**  
 9 **proxy server; is that correct?**  
 10 A. They reside on the client.  
 11 **Q. Okay.**  
 12 **And which is --**  
 13 A. The -- they reside as a component of Connect.  
 14 **Q. Is the DNS proxy server functionality**  
 15 **separate from the redirection rules?**  
 16 A. You're referring to the DNS resolution  
 17 Connect does?  
 18 **Q. Yes?**  
 19 MR. KING: Objection, form.  
 20 THE WITNESS: No, the redirection rules  
 21 are -- are part of the spoof translations that it operates  
 22 on.  
 23 **Q. BY MR. LIN: And, sir, what is your**  
 24 **definition of a tunnel in the context of Aventail Connect**  
 25 **Version 3.1?**

Page 132

1 A. It's -- it's a form of a channel.  
 2 **Q. Any particular --**  
 3 A. It's a one-to-one mapping of an application  
 4 connection to a proxied connection to a target server.  
 5 **Q. Okay.**  
 6 **Is it possible for an application to send a**  
 7 **nonstandard domain name to Aventail Connect?**  
 8 A. Yes.  
 9 **Q. And how does Aventail Connect respond to a**  
 10 **nonstandard domain name?**  
 11 A. It looks to see if it's a WINS name, which is  
 12 a Microsoft proprietary resolver, and it attempts to resolve  
 13 it via WINS.  
 14 **Q. Okay.**  
 15 **Aside from a WINS name, can Aventail Connect**  
 16 **respond to any other nonstandard domain name?**  
 17 A. No.  
 18 **Q. And can you explain further what Aventail**  
 19 **Connect Version 3.1 does with a WINS name?**  
 20 **Maybe we should start, what is a WINS name?**  
 21 A. Microsoft has its own proprietary name  
 22 service, called WINS. It's integrated with their networking  
 23 system. And the WINS name is forwarded to the SOCKS server,  
 24 just like a DNS name would be. And the SOCKS server is the  
 25 one who tries to discriminate it as being WINS.

(Pages 129 to 132)

Page 133

1 **Q. So in what context would an application use a**  
 2 **WINS request?**  
 3 A. A file share.  
 4 **Q. Is there anything else?**  
 5 A. Mostly it's Microsoft applications and older  
 6 ones that use it. I'm not familiar with all of them.  
 7 **Q. Okay.**  
 8 **Does the fact that Aventail Connect is**  
 9 **processing a WINS name mean that Aventail Connect is going**  
 10 **to create a secure connection to the SOCKS server?**  
 11 A. Yes.  
 12 **Q. Is that set forth in a redirection rule?**  
 13 A. WINS can be part of a redirection rule.  
 14 **Q. Is it necessarily part of a redirection rule?**  
 15 A. It doesn't have to be.  
 16 **Q. So WINS could be a request on the local**  
 17 **domain; is that correct?**  
 18 A. Correct.  
 19 **Q. And in that context, the connection is not**  
 20 **proxied by the SOCKS server; is that correct?**  
 21 A. That's correct.  
 22 **Q. Okay.**  
 23 **Could we go off the record, please.**  
 24 THE VIDEOGRAPHER: Going off record. The  
 25 time is 2:41 p.m.

Page 134

1 (Discussion off the record.)  
 2 (Short recess.)  
 3 THE VIDEOGRAPHER: This marks the beginning  
 4 of Tape No. 3. Back on the record. The time is 2:56 p.m.  
 5 MS. BUCKNER: Counsel, I wanted to state for  
 6 the record that the source code was provided to defendant's  
 7 counsel in response to the subpoena just this week, at the  
 8 same time that plaintiff's counsel did receive a carbon copy  
 9 of the letter that was sent to defendant's counsel  
 10 requesting him to share the source code with plaintiff's  
 11 counsel.  
 12 MR. LIN: Thank you.  
 13 MS. BUCKNER: Mm-hmm.  
 14 **Q. BY MR. LIN: Now, if I told you that a VPN**  
 15 **required routing, would Aventail Connect 3.1 still be part**  
 16 **of a VPN?**  
 17 MR. KING: Objection, form.  
 18 THE WITNESS: Boy.  
 19 Routing -- where is the routing done?  
 20 **Q. BY MR. LIN: The routing is done by the SOCKS**  
 21 **server.**  
 22 A. Yes.  
 23 **Q. You testified earlier that the SOCKS server**  
 24 **did not route connections from Aventail Connect. Do you**  
 25 **recall that testimony?**

Page 135

1 A. I do. The reason I said yes is that we have  
 2 routing on the server, it can route -- I mean, we can  
 3 establish routes for the outbound connection to the target  
 4 using routing. It's not routing packets through the VPN.  
 5 **Q. So your testimony is that the SOCKS server**  
 6 **does not route packets through VPN?**  
 7 A. That is correct.  
 8 **Q. So if the V -- definition of VPN stated that**  
 9 **packets need to be routed through the VPN, would Aventail**  
 10 **Connect 3.1 still form part of a VPN?**  
 11 A. No.  
 12 **Q. And throughout your testimony we've been**  
 13 **talking about Aventail Connect 3.1. I also understand that**  
 14 **Exhibit 2 covers Aventail Connect Version 2.6.**  
 15 A. Yes.  
 16 **Q. What are the key distinctions between**  
 17 **Aventail Version -- Aventail Connect Version 2.6 and**  
 18 **Aventail Connect Version 3.1?**  
 19 A. I do not know that.  
 20 **Q. Would you turn to Exhibit 2, Page 10.**  
 21 A. Yes.  
 22 **Q. Do you see the third paragraph from the**  
 23 **bottom?**  
 24 A. Third, "For those platforms"?  
 25 **Q. Excuse me. Third paragraph from the bottom,**

Page 136

1 **where it says, "The Aventail Connect 2.6."**  
 2 A. Oh, excuse me, yeah. I didn't notice it was  
 3 a paragraph.  
 4 Yes.  
 5 **Q. Does that refresh your recollection as to**  
 6 **what the differences between Aventail Connect 2.6 and**  
 7 **Aventail Connect 3.1 might be?**  
 8 A. Yes, I know what that means. So I -- if I  
 9 see that I -- I would -- I'd have to speculate, but I -- I  
 10 know what MultiProxy means.  
 11 **Q. Okay.**  
 12 **So is it your testimony that what you**  
 13 **testified to earlier would also apply to Aventail Connect**  
 14 **Version 2.6?**  
 15 A. I believe so.  
 16 **Q. Okay.**  
 17 **Can you also look at Page 11 for me.**  
 18 A. Yes.  
 19 **Q. Do you see the third column of the table at**  
 20 **the top, it says "Aventail Connect Version Installed"?**  
 21 A. Yes.  
 22 **Q. And Aventail Connect 2.6 is applied to**  
 23 **operating systems that support WinSock 1.1.**  
 24 A. Yes.  
 25 **Q. Does that -- does that refresh your**

(Pages 133 to 136)

Page 137

1 recollection as to any other differences there might be  
 2 between Aventail Connect 3.1 and 2.6?  
 3 A. Well, I don't know the limitations of the  
 4 WinSock 1.1. I'm not as familiar with WinSock 1.1 as  
 5 WinSock 2. I can't answer that.  
 6 **Q. Okay.**  
 7 **Do you know whether WinSock 1.1 also supports**  
 8 **encryption?**  
 9 A. Well, the Win -- the WinSock library itself  
 10 doesn't have a notion of encryption. 1.1 or 2.0.  
 11 **Q. Okay.**  
 12 **So while you were working at Novell with --**  
 13 **and you were experimenting with some of the Aventail Connect**  
 14 **products, did you ever use WINS names as part of your**  
 15 **testing?**  
 16 A. I don't believe so.  
 17 **Q. And can I ask you to turn to Exhibit 4,**  
 18 **please.**  
 19 A. Yes.  
 20 **Q. Did you prepare this document?**  
 21 A. I did not.  
 22 **Q. Have you seen this document before?**  
 23 A. Yes.  
 24 **Q. When is the first time you saw this document?**  
 25 A. When we were acquiring information for the

Page 138

1 subpoena.  
 2 **Q. Was that in 2007?**  
 3 A. Yes.  
 4 **Q. So is it your testimony that you had not seen**  
 5 **this document prior to 2007?**  
 6 A. I may have seen it earlier, as -- but, you  
 7 know, I don't -- I don't really recall.  
 8 **Q. Do you have any personal knowledge as to who**  
 9 **maintained custody of this document from the time it was**  
 10 **created until the time you joined Aventail?**  
 11 A. I only know who had it when I joined.  
 12 **Q. So you had no personal knowledge as to who**  
 13 **maintained custody of this document from when it was**  
 14 **created --**  
 15 A. I do not.  
 16 **Q. -- until it was -- until you joined Aventail;**  
 17 **is that correct?**  
 18 A. No.  
 19 **Q. Okay.**  
 20 **Do you have any personal knowledge as to when**  
 21 **this document was published?**  
 22 A. I do not.  
 23 **Q. Can you personally vouch for the accuracy of**  
 24 **Exhibit 4?**  
 25 A. Not completely by myself.

Page 139

1 **Q. Did you undertake to ensure that Exhibit 4**  
 2 **was complete and accurate?**  
 3 A. Yes.  
 4 **Q. And what did you do?**  
 5 A. We used the same strategy as with the other  
 6 two. We had a developer go through it, match it up.  
 7 I don't know all the criteria he used.  
 8 **Q. Okay.**  
 9 **Did you review Exhibit 4 on a page-by-page**  
 10 **basis and compare the features discussed therein with the**  
 11 **source code?**  
 12 A. I -- I did not. I sampled it only.  
 13 **Q. And how long did you undertake to compare the**  
 14 **contents of Exhibit 4 with what's in the source code?**  
 15 A. This was less than a day.  
 16 **Q. Okay.**  
 17 **And do you have any personal knowledge of any**  
 18 **sales of the product described in Exhibit 4?**  
 19 A. I don't. It's the same question as  
 20 Exhibit 5.  
 21 **Q. Okay.**  
 22 A. I mean, 2. Excuse me.  
 23 **Q. So is it your testimony that Exhibit 4**  
 24 **corresponds to the same product as Exhibit 2?**  
 25 A. To the best of my knowledge.

Page 140

1 **Q. Okay.**  
 2 **I'd direct your attention to Exhibit 6,**  
 3 **please.**  
 4 A. Yes.  
 5 **Q. And Exhibit 6 is the same as Exhibit 7; is**  
 6 **that correct?**  
 7 A. I -- I believe so. I can't do a diff here  
 8 but it looks like it is.  
 9 **Q. Okay.**  
 10 **Have you seen this document before today,**  
 11 **Exhibit 6?**  
 12 A. I -- I might have. I don't -- I don't recall  
 13 if we went through this particular part of the source.  
 14 **Q. Did you write the source code that is in**  
 15 **Exhibit 6?**  
 16 A. No, I did not.  
 17 **Q. Do you know what language the source code is**  
 18 **written in?**  
 19 A. Yes, C++.  
 20 **Q. Do you have any experience developing C++**  
 21 **code?**  
 22 A. I do.  
 23 **Q. So you can read C++ code?**  
 24 A. Not as well as I used to. Still somewhat.  
 25 **Q. When was the last time that you personally**

(Pages 137 to 140)

Page 141

1 developed C++ code?  
 2 A. 2001.  
 3 **Q. Did you develop any source code for Aventail**  
 4 **Connect Version 3.1 prior to February 15th, 2000?**  
 5 A. No.  
 6 **Q. And earlier we were talking about the concept**  
 7 **of a tunnel. Does a tunnel exist between the SOCKS server**  
 8 **and the target computer?**  
 9 A. No.  
 10 MR. LIN: Okay. That's all I have.  
 11 MR. KING: All right. Let me ask a few  
 12 follow-up questions, then.  
 13 THE WITNESS: Okay.  
 14  
 15 FURTHER EXAMINATION  
 16 BY MR. KING:  
 17 **Q. I want to talk to you for a few minutes about**  
 18 **your time at Novell.**  
 19 A. Okay.  
 20 **Q. Do you recall testifying that information**  
 21 **exchanged between Novell and Aventail was done pursuant to**  
 22 **nondisclosure agreements?**  
 23 A. I was not a party to -- to the NDAs, but I  
 24 believe they were in place, as we clearly were conveying  
 25 confidential information.

Page 142

1 **Q. Okay.**  
 2 **Did Aventail -- how did you obtain a copy**  
 3 **of -- of the Aventail -- the Aventail product that worked**  
 4 **with WinSock 2?**  
 5 A. We exchanged our products directly with each  
 6 other, development organization to development organization.  
 7 **Q. How -- can you tell me more? How did that**  
 8 **work?**  
 9 A. I think they probably came on CDs, you know,  
 10 that they would ship to us. I don't -- I'm trying to  
 11 remember. I don't think we were transferring them over the  
 12 Internet in that day, but we would take interim -- you know,  
 13 interim builds.  
 14 I was not part of QA itself so I'm not sure  
 15 what -- what happened after we thought it worked.  
 16 **Q. Did you -- so did you personally use these --**  
 17 **these interim builds that arrived on CD?**  
 18 A. I used -- yes, occasionally.  
 19 **Q. Okay.**  
 20 A. I mean, this wasn't a primary objective of  
 21 mine, but yes. I was part of working with Aventail.  
 22 **Q. Did you receive final builds from Aventail of**  
 23 **their product?**  
 24 **Strike that.**  
 25 **Let me ask you a question. Did you receive**

Page 143

1 **the -- the Aventail -- the final build of the Aventail**  
 2 **product that was com -- that was capable of using WinSock 2?**  
 3 A. No, I don't -- I actually don't remember.  
 4 MR. LIN: Object to form.  
 5 **Q. BY MR. KING: Okay.**  
 6 **When Aventail provided you with these interim**  
 7 **builds, were -- was Novell supposed to keep the interim**  
 8 **build confidential?**  
 9 A. Yes.  
 10 **Q. Do you have any sense as to when the first**  
 11 **Aventail product that was -- Aventail VPN product that was**  
 12 **compatible with WinSock 2 was actually released to the**  
 13 **public?**  
 14 MR. LIN: Object to form.  
 15 THE WITNESS: Compatible with WinSock 2.  
 16 WinSock 2 is a client --  
 17 Oh. Any Novell product or with Aventail?  
 18 **Q. BY MR. KING: Let me ask the question again.**  
 19 A. Okay.  
 20 **Q. This is sort of -- this is -- part of the**  
 21 **problem is that it's -- it's a little bit clunky to refer to**  
 22 **the first Aventail product that was compatible with**  
 23 **WinSock 2, so maybe --**  
 24 **Let me ask you a question. Do you know the**  
 25 **name of the first Aventail product that was compatible with**

Page 144

1 **WinSock 2?**  
 2 MR. LIN: Object to form.  
 3 THE WITNESS: I don't recall if it was 2.6 or  
 4 3.1.  
 5 **Q. BY MR. KING: Okay.**  
 6 **Was it one of those two products, though?**  
 7 MR. LIN: Object to form.  
 8 THE WITNESS: Well, we were compatible in  
 9 1997 at an interoperable level with some version of  
 10 Aventail.  
 11 **Q. BY MR. KING: Okay.**  
 12 A. I don't know which one.  
 13 **Q. Okay.**  
 14 **Was it public knowledge that Aventail --**  
 15 **Strike that.**  
 16 **Was it public knowledge in 1999 that Aventail**  
 17 **was building a Win -- WinSock 2 capable VPN client?**  
 18 MR. LIN: Object to form.  
 19 THE WITNESS: I -- I believe that it was. I  
 20 believe it was available, you know, public -- publicly  
 21 disclosed on their Web sites, but I -- I cannot, you know,  
 22 attest with absolute certainty that's true.  
 23 **Q. BY MR. KING: Why do you -- why do you**  
 24 **believe that it was publicly disclosed on their Web site?**  
 25 MR. LIN: Object to form.

(Pages 141 to 144)

Page 145

1 THE WITNESS: In working with our biz dev  
 2 people. I mean, you know, I don't -- I just recall it being  
 3 like a product that they were going out and co -- well,  
 4 doing whatever reference things with.  
 5 **Q. BY MR. KING: When you -- you're talking**  
 6 **about your interactions with your Novell biz dev people,**  
 7 **right?**  
 8 A. Yes.  
 9 MR. LIN: Objection. Leading.  
 10 **Q. BY MR. KING: Do you recall -- I'm going to**  
 11 **change subjects here for a second. Do you recall testifying**  
 12 **that Aventail Connect 3.1 does not create a direct**  
 13 **connection between the client and the ultimate target**  
 14 **computer?**  
 15 A. I do.  
 16 **Q. What would you call -- if it's not a direct**  
 17 **connection, what would you call the link between the client**  
 18 **computer and the target computer?**  
 19 MR. LIN: Objection. Leading, and form.  
 20 THE WITNESS: It's an indirect through a  
 21 proxy.  
 22 **Q. BY MR. KING: Can you describe that indirect**  
 23 **link through a proxy for me?**  
 24 MR. LIN: Objection to form.  
 25 THE WITNESS: Calls an intermediate system,

Page 146

1 who in turn calls the final target, and then links the two  
 2 together through a forwarding relationship.  
 3 **Q. BY MR. KING: Okay.**  
 4 **And is the VP -- is the SOCKS server the**  
 5 **intermediate system that you just referred to?**  
 6 A. Yes.  
 7 **Q. Where does the VPN -- where is the VPN**  
 8 **created in this scenario?**  
 9 MR. LIN: Object to form.  
 10 THE WITNESS: It is created between the  
 11 SOCKS -- I mean, the Connect client and the Connect server.  
 12 **Q. BY MR. KING: So logically there is a VPN**  
 13 **that sits between the Connect client and the target**  
 14 **computer, even though the VPN doesn't actually connect to**  
 15 **the target computer; is that right?**  
 16 MR. LIN: Objection. Leading and form.  
 17 THE WITNESS: Yes, that is true.  
 18 **Q. BY MR. KING: Let's take a look at Exhibit 2,**  
 19 **the very last page, where the glossary resides.**  
 20 A. Yes.  
 21 **Q. It's Page 25 of -- of the glossary.**  
 22 **Actually, you know what, I think I have the**  
 23 **wrong document. Let's take a look at Page 25 --**  
 24 A. Of which --  
 25 MR. LIN: It's also in this document.

Page 147

1 MR. KING: All right. I see my problem.  
 2 **Q. It's Page 116 of Exhibit 2.**  
 3 A. Okay. Thank you.  
 4 **Q. Too many glossaries in this world.**  
 5 **Do you see that -- the definition of VPN as**  
 6 **"a secure channel used to transmit data over a public**  
 7 **network"?**  
 8 A. I do.  
 9 **Q. Is any secure channel that transmits data**  
 10 **over a public network a VPN?**  
 11 A. No.  
 12 **Q. Why not?**  
 13 A. I would say that one is -- that is terminated  
 14 by the two end points on the public network as the ultimate  
 15 terminus is not a VPN.  
 16 **Q. Can you give me some examples of that?**  
 17 MR. LIN: Object to form.  
 18 THE WITNESS: Yes. For example, if you're  
 19 doing e-commerce with a Web site directly, I would say  
 20 that's not a VPN.  
 21 **Q. BY MR. KING: Can you give me some other --**  
 22 **some other examples?**  
 23 A. I think anytime applications are directly  
 24 communicating with each other, right, not going through some  
 25 kind of a secure intermediary, they're not a VPN.

Page 148

1 **Q. What about a voiceover IP connection that's**  
 2 **encrypted, would that be a VPN?**  
 3 MR. LIN: Object to form.  
 4 THE WITNESS: If it's direct to the -- the  
 5 other party, no.  
 6 **Q. BY MR. KING: Okay.**  
 7 **Okay, that's -- that's all that I have for**  
 8 **now.**  
 9 MR. LIN: All right. We're good.  
 10 MR. KING: Okay. I think we're finished.  
 11 Thank you very much.  
 12 MR. LIN: Thank you so much for your time.  
 13 THE WITNESS: Thank you, gentlemen.  
 14 THE VIDEOGRAPHER: This marks the end of  
 15 Videotape No. 3 in the deposition of Gary Tomlinson. Going  
 16 off the record. The time is 3:17 p.m.  
 17 (The videotape deposition of Gary  
 18 Tomlinson was concluded at  
 19 3:17 p.m.)  
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(Pages 145 to 148)



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AFFIDAVIT

STATE OF WASHINGTON )  
                                  ) ss.  
COUNTY OF KING        )

I have read my within deposition, taken  
on Friday, February 27, 2009, and the same is true and  
correct, save and except for changes and/or corrections,  
if any, as indicated by me on the "CORRECTIONS" flyleaf  
page hereof.

\_\_\_\_\_  
GARY TOMLINSON

SUBSCRIBED AND SWORN to before me  
this \_\_\_\_\_ day of \_\_\_\_\_, 2009.

\_\_\_\_\_  
NOTARY PUBLIC in and for  
the State of Washington,  
residing at \_\_\_\_\_.  
My commission expires  
\_\_\_\_\_.

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CERTIFICATE

STATE OF WASHINGTON )  
                                  ) ss.  
COUNTY OF KING        )

I, the undersigned officer of the Court, under  
my commission as a Notary Public in and for the State of  
Washington, hereby certify that the foregoing deposition  
upon oral examination of the witness named herein was taken  
stenographically before me and thereafter transcribed under  
my direction;

That the witness before the examination was  
first duly sworn by me to testify truthfully; that the  
transcript of the deposition is a full, true and correct  
transcript of the testimony, including questions and answers  
and all objections, motions, and exceptions of counsel made  
and taken at the time of the foregoing examination;

That I am neither attorney for nor a relative  
or employee of any of the parties to the action; further,  
that I am not a relative or employee of any attorney or  
counsel employed by the parties hereto, nor financially  
interested in its outcome.

IN WITNESS WHEREOF, I have hereunto set my hand  
and seal this 13th day of March, 2009.

\_\_\_\_\_  
NOTARY PUBLIC in and for  
the State of Washington,  
residing at Redmond. My  
commission expires 04-6-10.

(Pages 149 to 150)

A				
<b>ability (3)</b> 6:10 8:13 73:15	<b>added (1)</b> 14:18	141:22	110:21,23,25	<b>archives (9)</b> 29:14 29:18,18,23 30:2 37:6 40:25 41:13 92:18
<b>able (5)</b> 25:22 40:13 118:24 119:2,5	<b>adding (1)</b> 12:10	<b>Ah (2)</b> 46:16 109:6	111:1,21,24 113:6	<b>area (4)</b> 12:6 19:4 24:24 25:4
<b>absence (3)</b> 106:16 107:4,19	<b>additional (1)</b> 65:18	<b>ahead (2)</b> 113:16 118:3	113:7,20,25 114:1	<b>areas (3)</b> 12:8 24:18,19
<b>absolute (1)</b> 144:22	<b>additionally (1)</b> 18:24	<b>Air (1)</b> 11:2	114:10 116:1,8,13	<b>Army (1)</b> 11:1
<b>Absolutely (1)</b> 36:7	<b>address (44)</b> 76:16	<b>alias (1)</b> 111:4	116:21,24 117:2,8	<b>ARPA (1)</b> 11:22
<b>acceleration (1)</b> 15:22	76:17,18 77:4,9	<b>allocated (1)</b> 111:6	117:9,15,16,21,23	<b>ARPANET (2)</b> 10:17 11:23
<b>access (10)</b> 15:20	81:17,19,22,24	<b>allow (4)</b> 25:16 44:2 83:8 85:8	117:25 118:5,8	<b>arrived (1)</b> 142:17
21:21 95:7,8,9	82:7,8,10,15,15	<b>allowed (1)</b> 114:11	119:24 121:22	<b>arrow (1)</b> 74:2
104:5 126:6,25	82:20 84:1,9	<b>amount (1)</b> 24:3	123:5,20 124:2	<b>ASAP (2)</b> 21:21 22:4
127:5,9	107:10,11 108:3	<b>analysis (1)</b> 91:22	132:3,6 133:1	<b>Aside (1)</b> 132:15
<b>account (1)</b> 67:18	109:14 110:7,12	<b>and/or (1)</b> 149:7	<b>applications (13)</b> 1:5 4:8 26:20	<b>asked (5)</b> 42:13 88:1,4 103:14,15
<b>accuracy (7)</b> 31:21	110:14,17,19	<b>answer (10)</b> 6:15	27:6,12 57:23	<b>asking (9)</b> 6:8 35:16 46:4 87:11
31:24 88:25 89:8	111:4,12,14,16,18	27:18 34:13,15	70:6 77:5,16 83:8	102:23 120:17
89:18 97:22	111:21 112:1,13	59:23 94:16	84:14 133:5	121:7,8 122:22
138:23	112:15 113:8,12	117:13 118:3	147:23	<b>associate (2)</b> 5:2 111:20
<b>accurate (2)</b> 129:17 139:2	113:15 114:1	120:8 137:5	<b>applied (2)</b> 45:13 136:22	<b>associated (11)</b> 98:15 111:16,18
<b>accurately (3)</b> 32:4 32:6 100:5	124:11,12,14,18	<b>answered (1)</b> 120:5	<b>apply (1)</b> 136:13	112:3,5,7,10,16
<b>ACLs (1)</b> 15:15	124:19	<b>answering (1)</b> 6:9	<b>appraised (1)</b> 126:11	112:22 115:13 118:1
<b>acquired (4)</b> 14:5 17:9 32:23 95:3	<b>addresses (5)</b> 77:6	<b>answers (1)</b> 150:11	<b>Appreciate (1)</b> 121:12	<b>associates (1)</b> 113:15
<b>acquirer (1)</b> 5:3	109:12,12 112:2	<b>Antelope (1)</b> 8:19	<b>approximated (1)</b> 95:1	<b>Associate's (1)</b> 8:20
<b>acquiring (1)</b> 137:25	124:10	<b>anybody (1)</b> 85:25	<b>approximately (5)</b> 91:15 92:21 98:14	<b>asterisks (2)</b> 58:4,8
<b>acquisition (1)</b> 38:13	<b>administration (1)</b> 8:24	<b>anymore (3)</b> 11:19 55:11,19	99:12 109:22	<b>Attachment (4)</b> 7:20,21,23,24
<b>action (3)</b> 1:7 106:15 150:13	<b>administrator (6)</b> 70:19 71:2 79:21	<b>anytime (1)</b> 147:23	<b>approximates (1)</b> 108:18	<b>attachments (1)</b> 3:9
<b>active (1)</b> 42:17	80:7 83:4 115:20	<b>anyway (1)</b> 16:8	<b>April (1)</b> 17:10	<b>attempt (1)</b> 82:4
<b>actively (1)</b> 55:11	<b>administrators (1)</b> 69:14	<b>API (4)</b> 73:21,21 74:3,7	<b>architect (4)</b> 18:9 18:11,20 55:24	<b>attempts (1)</b> 132:12
<b>activities (1)</b> 56:18	<b>administrator's (...)</b> 3:11,13,15 29:6	<b>apologize (1)</b> 37:13	<b>architectural (1)</b> 74:23	<b>attention (5)</b> 19:12 90:8 96:23 108:6 140:2
<b>actual (12)</b> 45:16 45:19 63:2 81:19	30:25 36:20 37:3	<b>Appears (1)</b> 64:16	<b>architecture (6)</b> 18:22 25:15 26:12	<b>attest (3)</b> 94:25 95:1 144:22
82:6 99:22 110:12	54:14 69:11	<b>appliance (5)</b> 16:12 18:5 19:9,14 21:20	74:1,13,23	
110:19 112:16,20	125:12	<b>appliances (1)</b> 18:5	<b>archival (3)</b> 33:5 42:18 44:3	
122:2 124:11	<b>advanced (4)</b> 14:1 14:8,11 34:11	<b>applicable (1)</b> 16:5	<b>archive (12)</b> 29:25 33:4 40:8 41:4	
<b>adapter (2)</b> 124:11 124:18	<b>advancing (1)</b> 35:21	<b>application (67)</b> 21:4 26:25 29:7	42:16,17,24 43:20	
	<b>afford (1)</b> 32:7	68:2,11,12 69:22	55:14 56:7 66:2	
	<b>afternoon (1)</b> 59:8	73:17 74:1,6,15	94:12	
	<b>ago (1)</b> 21:13	76:7,11,15,18,25	<b>archived (1)</b> 30:21	
	<b>agree (1)</b> 118:13	77:7,20 78:24		
	<b>agreement (1)</b> 95:11	79:3 80:1 81:20		
	<b>agreements (1)</b>	82:11,12 85:1,5		
		85:11 106:16		
		107:2,5,19,24		

<b>attorney (2)</b> 150:13 150:14	50:3,9,10,17 52:21 54:13 55:3	142:2,3,3,21,22 143:1,1,6,11,11	<b>basic (1)</b> 15:12	98:25 99:8,11
<b>attorneys (1)</b> 103:8	55:8 57:15 61:10	143:17,22,25	<b>basically (4)</b> 17:6 20:22,23 82:16	<b>bit (7)</b> 10:17 11:25 24:21 25:2 35:16 71:23 143:21
<b>attributes (4)</b> 45:7 45:9,11,14	67:23,25 68:4,9 68:18,24 69:5,13	144:10,14,16 145:12	<b>basis (2)</b> 72:13 139:10	<b>biz (2)</b> 145:1,6
<b>audience (1)</b> 16:5	69:15 71:17,22	<b>Aventail's (26)</b>	<b>Bates (4)</b> 108:7,13 125:6 128:20	<b>bleeding (1)</b> 24:25
<b>August (1)</b> 59:6	72:6,16 74:8,11	21:15 22:6,7,20	<b>becoming (1)</b>	<b>block (1)</b> 74:1
<b>Auth (1)</b> 125:16	74:16,18 75:4,5	23:15 28:21 31:23	111:13	<b>Boggan (2)</b> 88:16 97:14
<b>authenticating (1)</b> 126:1	76:19 77:16 78:5 78:23 79:1,6,24	32:2 34:18,24 38:2,5,11 39:6	<b>began (7)</b> 9:5 13:19 13:21 14:14 15:3 36:2 100:21	<b>Border (7)</b> 14:18 15:8,10,23 16:3,8 23:2
<b>authentication (8)</b> 70:13,15,19 71:2 84:15 125:16,25 125:25	80:7,11,13,17 81:9 82:7,25 83:7 84:8 85:25 86:4 88:13,15,19 89:12	40:15 43:5,7,8,12 46:6 56:9,12,18 75:3 95:21 129:3	<b>beginning (6)</b> 19:16 26:17 75:25 108:14,14 134:3	<b>bottom (4)</b> 69:13 84:13 135:23,25
<b>authorization (6)</b> 122:18 125:4,21 126:1,4,5	89:14 90:2 91:13 94:24 95:4,7,11 95:15,20 96:3,6,9 96:16,20 97:12,17 98:10 100:14,17	<b>Avenue (4)</b> 1:15 2:9,17 4:17	<b>beginnings (1)</b> 14:24	<b>bought (1)</b> 101:2
<b>authorizing (1)</b> 126:1	100:21,25 101:16 101:21,22 102:2 103:21,23 104:21	<b>AVN (1)</b> 72:12	<b>begins (1)</b> 4:5	<b>bound (2)</b> 110:13 111:13
<b>automatically (3)</b> 69:16,24 70:7	104:24 105:2,5,18 106:1,8,9,12,15 106:21 107:5,7,18 108:1,17,21	<b>AVPN (2)</b> 20:12,14	<b>behalf (3)</b> 4:21,23 6:1	<b>box (5)</b> 20:7,7,10 73:17,24
<b>AutoSOCKS (10)</b> 22:12,16 28:15 49:15,22 52:16,17 57:20,21 61:11	109:20,24 114:4,9 114:12,15,18,24 115:3,7,13,16,23 116:17 118:16,23 119:1,4,16,19	<b>AVPN/ExtraNet ...</b> 21:2	<b>believe (42)</b> 8:8 13:2 14:19 22:14 23:8 28:15,23 38:24 52:3,24,25 53:23 54:16,18 67:10 90:6 91:3 93:6 95:8,13 100:19 103:1,5 104:3,13,17 109:2 110:8,19 111:5 113:5 117:19 125:2 129:17,25 136:15 137:16 140:7 141:24 144:19,20,24	<b>Boy (2)</b> 21:17 134:18
<b>available (4)</b> 11:21 14:19 23:9 144:20	120:2,9,12,18,24 121:2,8,14,19,19 122:9,14,17,23,24 123:8,16 124:23 125:3,20 126:3 127:14 129:15,18 130:1,4,6,13,19 131:24 132:7,9,15 132:18 133:8,9 134:15,24 135:9 135:13,14,17,17 135:18 136:1,6,7 136:13,20,22 137:2,13 138:10 138:16 141:3,21	<b>aware (7)</b> 43:10 82:23 84:9 85:25 86:5 92:6 118:22	<b>begins (1)</b> 4:5	<b>branch (12)</b> 52:2,6 53:11,16 61:4,15 62:5,9,10,13 63:11,14
<b>Ave (1)</b> 24:12		<b>awhile (1)</b> 45:21	<b>behalf (3)</b> 4:21,23 6:1	<b>branched (1)</b> 62:5
<b>Aven (6)</b> 23:12 68:18 108:8 125:7 127:8 128:20		<b>a.m (6)</b> 4:2,12 36:9 36:12 41:21 42:1	<b>believe (42)</b> 8:8 13:2 14:19 22:14 23:8 28:15,23 38:24 52:3,24,25 53:23 54:16,18 67:10 90:6 91:3 93:6 95:8,13 100:19 103:1,5 104:3,13,17 109:2 110:8,19 111:5 113:5 117:19 125:2 129:17,25 136:15 137:16 140:7 141:24 144:19,20,24	<b>branches (3)</b> 61:23 62:4,8
<b>Aventail (248)</b> 3:10 3:12,14,16 4:6 5:3 17:13 18:2,5,9,19 19:1,19,25 21:21 23:1,4,7,12,19,23 24:2,5,12 26:3,8 26:11 27:2,8,21 27:23 28:6 29:7 29:19,20,22 30:23 31:14 32:14,22,23 33:11 35:3,9,20 36:15,20 38:16,21 38:25 39:10,15,19 40:7,25 41:7,8 42:8 43:19,20		<hr/> <b>B (5)</b> 7:23,24 117:16 118:8,9	<b>beginning (6)</b> 19:16 26:17 75:25 108:14,14 134:3	<b>branding (1)</b> 121:2
		<b>Bachelor (1)</b> 8:23	<b>beginnings (1)</b> 14:24	<b>break (5)</b> 36:6 41:18 42:3 75:20 86:9
		<b>back (31)</b> 10:15 16:18 19:11 29:14 29:17 34:16 36:11 36:13 41:12,16,25 51:9 61:15,24 62:1,16 65:10 66:4,6 67:21 76:1 82:8,10 85:16 87:5 111:21 112:4 112:14 122:21 128:19 134:4	<b>begins (1)</b> 4:5	<b>breakdown (1)</b> 98:18
		<b>background (4)</b> 8:16 10:16 15:5 18:4	<b>behalf (3)</b> 4:21,23 6:1	<b>briefed (1)</b> 27:9
		<b>based (3)</b> 29:24 71:1 127:25	<b>believe (42)</b> 8:8 13:2 14:19 22:14 23:8 28:15,23 38:24 52:3,24,25 53:23 54:16,18 67:10 90:6 91:3 93:6 95:8,13 100:19 103:1,5 104:3,13,17 109:2 110:8,19 111:5 113:5 117:19 125:2 129:17,25 136:15 137:16 140:7 141:24 144:19,20,24	<b>briefly (2)</b> 11:17 103:1
			<b>best (4)</b> 6:9 8:13 73:15 139:25	<b>Bright (7)</b> 2:8 4:22 4:22 72:21 73:1,3 73:7
			<b>beta (1)</b> 22:2	<b>bringing (2)</b> 18:21 18:23
			<b>better (2)</b> 12:7 20:15	<b>broad (2)</b> 12:16,19
			<b>biggest (1)</b> 16:2	<b>broadly (1)</b> 16:5
			<b>Bill (13)</b> 47:19,21 47:21 54:24 55:1 55:6 98:6,7,21,23	<b>brought (1)</b> 9:11
				<b>Brown (4)</b> 61:8,9

61:12 65:18 <b>Bryan (15)</b> 47:19 47:21 51:2,3,9,13 53:6 89:10,11,14 91:18,19,20 92:3 92:25 <b>Buckner (17)</b> 2:17 5:1,1 36:5 120:15 120:20,22 121:1,6 121:10 126:7,11 126:15,18,23 134:5,13 <b>build (6)</b> 26:12 55:13,15 56:3 143:1,8 <b>building (3)</b> 11:7 23:3 144:17 <b>builds (4)</b> 142:13 142:17,22 143:7 <b>built (1)</b> 12:4 <b>bullet (3)</b> 75:11,12 109:19 <b>bunch (1)</b> 49:18 <b>business (8)</b> 8:24 9:13,25 23:3 32:16 56:9,12,18 <b>buy (1)</b> 32:9	145:16,17 <b>called (17)</b> 5:18 12:6 15:25 16:21 20:3,11 21:21 22:8,11 28:15 39:19 49:14,17 62:7 77:3 120:23 132:22 <b>calls (2)</b> 145:25 146:1 <b>cancel (1)</b> 46:13 <b>capabilities (6)</b> 15:20 20:20 25:21 26:25 93:17 118:19 <b>capable (3)</b> 95:20 143:2 144:17 <b>carbon (1)</b> 134:8 <b>career (1)</b> 9:5 <b>case (5)</b> 3:8 4:10 77:10 81:23 113:18 <b>cases (1)</b> 76:16 <b>cbright@mwe.co...</b> 2:10 <b>CCR (1)</b> 1:22 <b>CD (1)</b> 142:17 <b>CDs (1)</b> 142:9 <b>Center (4)</b> 3:16 42:8 54:14 55:3 <b>centered (1)</b> 12:5 <b>centralized (1)</b> 24:20 <b>centric (1)</b> 16:4 <b>certain (3)</b> 93:25 93:25 100:2 <b>Certainly (1)</b> 39:14 <b>certainty (1)</b> 144:22 <b>certify (1)</b> 150:7 <b>cetera (1)</b> 62:18 <b>chain (1)</b> 45:12 <b>challenge (3)</b> 19:6 25:2 70:23 <b>challenged (1)</b> 83:5 <b>challenges (2)</b>	70:14,16 <b>challenging (1)</b> 24:18 <b>change (5)</b> 23:22 65:23 66:11 75:19 145:11 <b>changes (4)</b> 45:20 61:24 62:1 149:7 <b>channel (9)</b> 69:2 127:15,19 128:1 129:23,23 132:1 147:6,9 <b>checked (3)</b> 58:20 59:19 65:17 <b>check-ins (1)</b> 60:18 <b>chief (5)</b> 16:25 18:9 18:11,19 55:24 <b>chose (1)</b> 71:2 <b>chosen (1)</b> 70:19 <b>Chris (2)</b> 4:13,22 <b>CHRISTOPHE...</b> 2:8,21 <b>cipher (1)</b> 25:5 <b>circa (1)</b> 106:24 <b>Cisco (1)</b> 16:11 <b>City (1)</b> 9:6 <b>Civil (2)</b> 1:7 3:8 <b>clarification (1)</b> 121:11 <b>clarifications (1)</b> 103:13 <b>clarify (8)</b> 5:16 102:17 103:8 106:19 110:10 117:10 120:15 129:9 <b>clarifying (1)</b> 103:2 <b>classic (1)</b> 16:4 <b>clean (1)</b> 85:7 <b>clear (2)</b> 6:22 72:21 <b>clearly (1)</b> 141:24 <b>click (2)</b> 90:21,24 <b>client (58)</b> 13:22 22:6,7,7 23:7,16 26:12 27:6 49:10 49:13 52:4,11	53:24 54:5 68:2,5 68:7,11 69:24 74:6 80:21 82:6,7 82:10,12 83:3,21 83:23 84:8 85:1 91:11 95:18 105:3 105:7 106:2,8 107:2,5,14 109:3 111:20 112:16 115:13,17 123:20 123:22 124:6,11 124:14 127:22 130:24 131:10 143:16 144:17 145:13,17 146:11 146:13 <b>clients (3)</b> 19:5 20:19 68:22 <b>client's (1)</b> 111:18 <b>clock (1)</b> 45:2 <b>close (2)</b> 66:5,9 <b>clunky (1)</b> 143:21 <b>code (98)</b> 3:17,18 11:9 26:24 29:23 30:16 42:7,12,15 42:16 43:2,5,7,8 44:3,18,23 45:20 45:23,24,25 46:1 47:22 49:9,11,13 50:20 51:10,16 52:2,5,6,9,10,11 52:20,20 53:25 54:5,18 55:2 56:13,17 57:4,19 57:19 59:23 60:19 62:13 89:2,19,20 89:25 90:1 91:12 92:4,8,20,24 93:8 94:5,12 95:7,9 97:24 98:5,10,18 98:21,23 99:1,6 99:10,13,17,19 100:1 101:21,25 103:21,21,24,25 104:1,6,8,11,15 134:6,10 139:11	139:14 140:14,17 140:21,23 141:1,3 <b>codified (1)</b> 25:3 <b>coding (1)</b> 65:24 <b>coexist (1)</b> 74:14 <b>collected (1)</b> 47:10 <b>College (1)</b> 8:20 <b>column (2)</b> 125:15 136:19 <b>com (1)</b> 143:2 <b>combination (1)</b> 14:9 <b>combined (1)</b> 13:5 <b>come (6)</b> 7:17 16:2 16:18 30:7 78:6 81:20 <b>comes (3)</b> 78:8 79:22 111:24 <b>coming (8)</b> 57:23 79:7,9,25 80:24 81:16 111:17 113:17 <b>command (1)</b> 65:24 <b>comment (4)</b> 58:12 58:14 61:23 65:19 <b>comments (3)</b> 58:9 58:25 60:10 <b>commercial (2)</b> 11:15 101:15 <b>commercialized (...)</b> 14:3,4 <b>commercially (3)</b> 14:20 23:9 101:2 <b>commission (3)</b> 149:22 150:6,23 <b>commit (1)</b> 65:25 <b>committed (1)</b> 65:23 <b>committing (1)</b> 66:2 <b>common (4)</b> 34:6 34:12 44:7 52:9 <b>communi (1)</b> 11:21 <b>communicating (2)</b> 95:21 147:24
<b>C</b>				
<b>C (9)</b> 2:1 43:25 90:13 140:19,20 140:23 141:1 150:1,1 <b>cached (1)</b> 108:4 <b>CacheFlow (2)</b> 17:9,10 <b>caches (2)</b> 16:17 107:20 <b>caching (2)</b> 15:25 17:5 <b>Cal (1)</b> 9:1 <b>California (6)</b> 2:5 2:10,13 4:15 8:22 11:10 <b>call (7)</b> 9:17 20:5 74:15 117:8,15				

<b>communication (4)</b> 9:12 11:3 85:4 105:20	114:1 115:1,5,9 115:14,18 118:17 118:20,24 119:2,5	81:21,22 82:7,13 82:25 83:7,8 84:8 85:6 89:13 90:2	113:1,7,13,22,25 114:25 115:4,8 116:2,9,14,17,19 116:22 117:3,16	<b>context (8)</b> 119:13 119:14,17 127:14 127:25 131:24 133:1,19
<b>communications ...</b> 11:21 12:2 24:5 69:2 79:7 83:9,15	123:3,10 130:24 131:2,5,7 141:8 145:14,18,18 146:14,15	91:5,13 95:20 96:3,6,9 103:11 104:21,24 105:2,5 105:18 106:1,8,15 106:21 107:5,7,18 108:1,17,21 109:20,24 111:15 111:25,25 113:8 113:11,17 114:4,9 114:12,15,18 115:13,16,23 116:17 118:16,23 119:1,4,18,19 120:2,9,12,19 121:2,9,14,20 122:14,17,23,24 123:8,16 124:23 125:3,20 126:3,4 127:14 129:11,15 129:18 130:4,19 131:13,17,24 132:7,9,15,19 133:8,9 134:15,24 135:10,13,14,17 135:18 136:1,6,7 136:13,20,22 137:2,13 141:4 145:12 146:11,11 146:13,14	117:21 118:1,2,6 122:9 127:20,22 132:4,4 133:10,19 135:3 145:13,17 148:1	<b>contexts (1)</b> 119:12 <b>continues (1)</b> 62:14 <b>continuum (2)</b> 62:6 62:11 <b>contracted (1)</b> 4:14 <b>contracts (1)</b> 11:1 <b>contributor (1)</b> 14:9 <b>control (5)</b> 15:20 29:23 42:17 126:6 127:10 <b>controls (2)</b> 126:25 127:6 <b>conversation (1)</b> 103:20 <b>convert (4)</b> 76:15 76:17 77:4 81:24 <b>conveying (1)</b> 141:24 <b>Cook (2)</b> 1:21 5:6 <b>cooperate (1)</b> 95:19 <b>copy (5)</b> 31:3,3 65:8 134:8 142:2 <b>copyright (6)</b> 33:18 34:19 35:1,3,12 35:17 <b>copyrights (3)</b> 34:7 35:21,21 <b>core (1)</b> 13:20 <b>CORP (1)</b> 1:5 <b>corporate (1)</b> 22:20 <b>corporation (5)</b> 1:8 4:8,21 5:3 33:11 <b>correct (72)</b> 6:3 20:25 23:13 29:12 63:16 65:6 66:16 84:1 87:19 91:17 93:15 95:4 97:8,9 101:4,10,14,17 102:1 104:21,23 105:1,2,5,18,25 106:6,7,10,11,14
<b>Community (1)</b> 8:20	<b>concept (2)</b> 119:7 141:6 <b>concluded (1)</b> 148:18 <b>confidential (8)</b> 5:4 42:7 69:3 95:7,9 126:9 141:25 143:8 <b>configuration (14)</b> 80:20 92:15 93:4 93:12,14,20,24 94:6,10,11 99:21 99:23,25 100:1 <b>configure (3)</b> 93:17 115:17 122:11 <b>configured (1)</b> 107:13 <b>configuring (1)</b> 115:22 <b>confirm (6)</b> 88:25 89:18 92:18 93:8 94:3,5 <b>confirmed (1)</b> 92:20 <b>confused (1)</b> 35:16 <b>connect (162)</b> 3:10 3:14 22:9,12,19 29:7 39:19 40:1 40:13 41:7 49:24 50:9,10,17 52:21 67:23,25 68:5,11 68:18,24 69:5,13 69:15,23 70:12,23 71:18,22 72:6 74:9,11,17,18 75:5,5 76:19 77:5 77:6,17 78:6,23 79:1,6,24 80:7,11 80:13,17 81:9,19	109:20,24 111:15 111:25,25 113:8 113:11,17 114:4,9 114:12,15,18 115:13,16,23 116:17 118:16,23 119:1,4,18,19 120:2,9,12,19 121:2,9,14,20 122:14,17,23,24 123:8,16 124:23 125:3,20 126:3,4 127:14 129:11,15 129:18 130:4,19 131:13,17,24 132:7,9,15,19 133:8,9 134:15,24 135:10,13,14,17 135:18 136:1,6,7 136:13,20,22 137:2,13 141:4 145:12 146:11,11 146:13,14	<b>connections (9)</b> 20:18 105:25 122:13,17 124:5,6 125:3,20 134:24 <b>connector (1)</b> 74:20 <b>Connect's (3)</b> 114:24 115:3,7 <b>consider (2)</b> 19:14 71:8 <b>considerable (2)</b> 11:13 18:4 <b>considerably (2)</b> 24:2 91:10 <b>consistent (5)</b> 75:4 98:4 125:19,23 129:23 <b>consultant (1)</b> 18:8 <b>consulting (2)</b> 17:25 18:7 <b>consume (1)</b> 73:19 <b>consuming (1)</b> 18:7 <b>contacted (4)</b> 85:6 102:3,6 124:15 <b>contain (2)</b> 110:9 113:22 <b>contained (10)</b> 36:2 49:5,11,20 53:21 55:2 61:17 80:21 93:7,13 <b>contains (1)</b> 49:13 <b>content (2)</b> 15:15 122:2 <b>contents (9)</b> 88:25 89:9,18,23 92:7 97:23 98:4,10 139:14	<b>contracted (1)</b> 4:14 <b>contracts (1)</b> 11:1 <b>contributor (1)</b> 14:9 <b>control (5)</b> 15:20 29:23 42:17 126:6 127:10 <b>controls (2)</b> 126:25 127:6 <b>conversation (1)</b> 103:20 <b>convert (4)</b> 76:15 76:17 77:4 81:24 <b>conveying (1)</b> 141:24 <b>Cook (2)</b> 1:21 5:6 <b>cooperate (1)</b> 95:19 <b>copy (5)</b> 31:3,3 65:8 134:8 142:2 <b>copyright (6)</b> 33:18 34:19 35:1,3,12 35:17 <b>copyrights (3)</b> 34:7 35:21,21 <b>core (1)</b> 13:20 <b>CORP (1)</b> 1:5 <b>corporate (1)</b> 22:20 <b>corporation (5)</b> 1:8 4:8,21 5:3 33:11 <b>correct (72)</b> 6:3 20:25 23:13 29:12 63:16 65:6 66:16 84:1 87:19 91:17 93:15 95:4 97:8,9 101:4,10,14,17 102:1 104:21,23 105:1,2,5,18,25 106:6,7,10,11,14
<b>companies (1)</b> 16:1 <b>company (6)</b> 5:18 13:6 17:11 22:11 30:19 100:19 <b>compare (6)</b> 99:10 99:13,17,18 139:10,13 <b>compared (1)</b> 99:24 <b>comparing (1)</b> 98:9 <b>compatibility (1)</b> 74:4 <b>compatible (5)</b> 143:12,15,22,25 144:8 <b>complete (2)</b> 85:9 139:2 <b>completed (1)</b> 84:23 <b>completely (1)</b> 138:25 <b>complies (5)</b> 46:12 48:20 49:4 90:14 90:20 <b>component (2)</b> 79:2 131:13 <b>composed (1)</b> 73:12 <b>comprehensive (1)</b> 14:18 <b>computer (48)</b> 9:17 13:23 41:18 46:11 46:15 66:7 69:6 70:10 83:9 84:5,9 90:11 104:22 105:3,7,11 106:3 106:3,9,13 110:7 110:7,17,17,24	<b>concept (2)</b> 119:7 141:6 <b>concluded (1)</b> 148:18 <b>confidential (8)</b> 5:4 42:7 69:3 95:7,9 126:9 141:25 143:8 <b>configuration (14)</b> 80:20 92:15 93:4 93:12,14,20,24 94:6,10,11 99:21 99:23,25 100:1 <b>configure (3)</b> 93:17 115:17 122:11 <b>configured (1)</b> 107:13 <b>configuring (1)</b> 115:22 <b>confirm (6)</b> 88:25 89:18 92:18 93:8 94:3,5 <b>confirmed (1)</b> 92:20 <b>confused (1)</b> 35:16 <b>connect (162)</b> 3:10 3:14 22:9,12,19 29:7 39:19 40:1 40:13 41:7 49:24 50:9,10,17 52:21 67:23,25 68:5,11 68:18,24 69:5,13 69:15,23 70:12,23 71:18,22 72:6 74:9,11,17,18 75:5,5 76:19 77:5 77:6,17 78:6,23 79:1,6,24 80:7,11 80:13,17 81:9,19	<b>connected (1)</b> 115:23 <b>connecting (1)</b> 112:1 <b>connection (61)</b> 69:25 77:20 80:24 82:14 83:23,25 84:5,23 85:1,2 92:8 99:6 102:4,7 102:10,14 105:6,9 106:2,8,12,16 107:15,24 108:2 110:12,24 111:14 111:17 112:4	<b>connections (9)</b> 20:18 105:25 122:13,17 124:5,6 125:3,20 134:24 <b>connector (1)</b> 74:20 <b>Connect's (3)</b> 114:24 115:3,7 <b>consider (2)</b> 19:14 71:8 <b>considerable (2)</b> 11:13 18:4 <b>considerably (2)</b> 24:2 91:10 <b>consistent (5)</b> 75:4 98:4 125:19,23 129:23 <b>consultant (1)</b> 18:8 <b>consulting (2)</b> 17:25 18:7 <b>consume (1)</b> 73:19 <b>consuming (1)</b> 18:7 <b>contacted (4)</b> 85:6 102:3,6 124:15 <b>contain (2)</b> 110:9 113:22 <b>contained (10)</b> 36:2 49:5,11,20 53:21 55:2 61:17 80:21 93:7,13 <b>contains (1)</b> 49:13 <b>content (2)</b> 15:15 122:2 <b>contents (9)</b> 88:25 89:9,18,23 92:7 97:23 98:4,10 139:14	<b>context (8)</b> 119:13 119:14,17 127:14 127:25 131:24 133:1,19 <b>contexts (1)</b> 119:12 <b>continues (1)</b> 62:14 <b>continuum (2)</b> 62:6 62:11 <b>contracted (1)</b> 4:14 <b>contracts (1)</b> 11:1 <b>contributor (1)</b> 14:9 <b>control (5)</b> 15:20 29:23 42:17 126:6 127:10 <b>controls (2)</b> 126:25 127:6 <b>conversation (1)</b> 103:20 <b>convert (4)</b> 76:15 76:17 77:4 81:24 <b>conveying (1)</b> 141:24 <b>Cook (2)</b> 1:21 5:6 <b>cooperate (1)</b> 95:19 <b>copy (5)</b> 31:3,3 65:8 134:8 142:2 <b>copyright (6)</b> 33:18 34:19 35:1,3,12 35:17 <b>copyrights (3)</b> 34:7 35:21,21 <b>core (1)</b> 13:20 <b>CORP (1)</b> 1:5 <b>corporate (1)</b> 22:20 <b>corporation (5)</b> 1:8 4:8,21 5:3 33:11 <b>correct (72)</b> 6:3 20:25 23:13 29:12 63:16 65:6 66:16 84:1 87:19 91:17 93:15 95:4 97:8,9 101:4,10,14,17 102:1 104:21,23 105:1,2,5,18,25 106:6,7,10,11,14

108:23 109:25	111:4 112:13	<b>D (3)</b> 2:8 3:1 149:1	43:16 63:5	119:15
110:17 112:19	116:3,10 138:10	<b>data (14)</b> 31:11	<b>degree (2)</b> 8:21,21	<b>designing (2)</b> 17:2
113:2,8,9,20,21	138:14 146:8,10	113:20 116:21,22	<b>degrees (1)</b> 22:25	17:3
114:2 116:15,16	<b>creates (1)</b> 109:24	117:2,3,16,17	<b>Dell (1)</b> 16:1	<b>destination (4)</b>
117:13 119:17,18	<b>creating (1)</b> 31:14	118:7,7 119:15	<b>deltas (1)</b> 45:13	20:25 109:20
121:14 122:3,10	<b>criteria (1)</b> 139:7	123:12 147:6,9	<b>Deny (1)</b> 127:8	124:4,10
122:13,16 123:13	<b>CRR (1)</b> 1:22	<b>database (5)</b> 30:8	<b>depart (1)</b> 89:14	<b>determine (7)</b>
123:18,24 124:1	<b>crypt (1)</b> 83:18	30:11 32:15,25	<b>departed (1)</b> 89:15	64:10 80:14,17
125:4,5,11 129:14	<b>cryptographic (3)</b>	33:4	<b>department (3)</b>	81:9,16 92:13
130:25 131:1,5,9	71:3,8,12	<b>date (16)</b> 1:19 4:11	11:1,13 37:20	98:3
133:17,18,20,21	<b>cryptographicall...</b>	34:19 35:1,4,12	<b>depends (1)</b> 70:18	<b>dev (2)</b> 145:1,6
135:7 138:17	68:13 79:5 83:18	35:16 44:22 45:5	<b>deponent (1)</b> 5:10	<b>develop (1)</b> 141:3
140:6 149:7	83:22	59:18 66:12,19	<b>deposition (16)</b>	<b>developed (8)</b>
150:10	<b>cryptography (7)</b>	67:2,8,9,14	1:11 4:6,16 6:5	13:20 14:22 18:4
<b>corrections (2)</b>	12:12,13 69:23,24	<b>dated (1)</b> 3:8	7:5 8:4 28:25	21:23 55:6 86:1
149:7,8	70:2,7 122:8	<b>dates (1)</b> 66:12	36:22 39:20 41:23	92:21 141:1
<b>correctly (2)</b> 40:17	<b>CTO (2)</b> 17:4,11	<b>day (11)</b> 6:20 15:2	56:24 148:15,17	<b>developer (11)</b> 9:10
92:16	<b>current (5)</b> 21:15	26:18 74:3 89:24	149:5 150:7,10	10:12 13:20 51:13
<b>correspond (4)</b>	34:8 65:17,21	98:12,13 139:15	<b>depth (3)</b> 91:24,25	53:4 54:21,23
50:9,19 54:13	126:13	142:12 149:17	92:1	61:12,22 89:13
110:6	<b>currently (6)</b> 39:17	150:16	<b>Derek (5)</b> 61:8,9,12	139:6
<b>corresponded (2)</b>	62:2 87:6 120:17	<b>days (2)</b> 16:7 18:3	65:17,23	<b>developers (5)</b>
81:1 93:9	120:22 121:3	<b>DB (1)</b> 61:6	<b>derivatives (1)</b> 36:3	31:13,20 44:10
<b>corresponds (6)</b>	<b>custody (7)</b> 88:11	<b>December (4)</b> 89:4	<b>derive (1)</b> 20:25	49:21 89:1
51:10 52:20 54:19	88:15,18 97:11,16	98:2 104:10,12	<b>describe (8)</b> 42:23	<b>developing (6)</b>
55:2 90:19 139:24	138:9,13	<b>decide (1)</b> 74:17	53:21 71:22 89:17	10:25 44:10 56:17
<b>counsel (17)</b> 4:18	<b>customer (2)</b>	<b>decided (1)</b> 74:18	95:14 102:25	85:17 99:1 140:20
5:2 6:6,13,13,16	100:18,21	<b>decrypted (1)</b>	109:19 145:22	<b>development (9)</b>
36:6 42:7 102:22	<b>customers (3)</b>	123:13	<b>described (15)</b>	10:17 14:10 23:4
120:15 134:5,7,8	19:14 32:9 38:22	<b>decryption (2)</b>	52:21 80:4 90:2	31:21 44:8 62:2
134:9,11 150:11	<b>cut (1)</b> 14:3	119:2 123:14	92:2,10,14,17	101:16 142:6,6
150:14	<b>CVS (47)</b> 29:24	<b>Defendant (2)</b> 1:9	93:9,13 94:1,7,11	<b>diff (1)</b> 140:7
<b>COUNTY (2)</b>	42:16,23 43:1,20	2:12	103:10 126:25	<b>differences (2)</b>
149:3 150:4	43:25 44:2,5,9,13	<b>defendant's (2)</b>	139:18	136:6 137:1
<b>couple (3)</b> 21:6	44:18,22 45:6,15	134:6,9	<b>describes (3)</b> 93:14	<b>different (24)</b>
71:20 104:19	45:17,19,22,25	<b>Defense (1)</b> 11:13	94:20 100:5	17:20 24:21,21
<b>course (6)</b> 23:6	47:10,11,16 55:9	<b>defined (2)</b> 79:2	<b>describing (4)</b>	29:22 37:12 38:25
27:10 32:15,16	56:5,13 58:15,17	103:18	45:20 73:25	46:21,23 50:5
56:9 113:14	58:19,21 59:3,7	<b>Definitely (1)</b> 22:16	108:16 113:6	67:15 70:21 80:12
<b>court (5)</b> 1:1 4:9	59:18 60:15 61:5	<b>definition (16)</b> 21:9	<b>DESCRIPTION ...</b>	85:24 117:21,23
5:5 6:20 150:6	62:3,4,17 63:2	68:9 128:10,11,14	3:7	117:24,25 119:12
<b>covers (1)</b> 135:14	64:6,7,9,21 65:12	128:15,25 129:3,6	<b>descriptions (1)</b>	128:4,5,7,8,11,15
<b>create (5)</b> 110:13	65:13,16 67:15	129:13,14,17,24	89:21	<b>dinking (1)</b> 25:6
111:8,12 133:10	92:18 101:24	131:24 135:8	<b>design (1)</b> 95:10	<b>direct (12)</b> 80:18
145:12		147:5	<b>designed (5)</b> 25:25	90:8 92:3 96:23
<b>created (9)</b> 38:25		<b>definitively (2)</b>	26:1,18 105:19	100:9 105:8 106:2
	<b>D</b>			

108:6 140:2 145:12,16 148:4 <b>direction (2)</b> 47:22 150:8 <b>directly (8)</b> 26:1 74:1 77:5 83:8 105:6 142:5 147:19,23 <b>director (2)</b> 14:6 55:24 <b>directories (5)</b> 47:5 47:8,9,11,16 <b>directory (20)</b> 46:19,25 48:19,22 49:3,6,14,17 50:8 51:19,24 52:1,12 52:15 53:19,22 54:1,6 90:13,15 <b>directs (1)</b> 6:16 <b>disable (1)</b> 114:18 <b>disclosed (2)</b> 144:21,24 <b>disclosure (1)</b> 100:25 <b>disclosures (2)</b> 96:16,19 <b>discriminate (1)</b> 132:25 <b>discuss (2)</b> 24:13 24:14 <b>discussed (3)</b> 103:12 127:6 139:10 <b>discussing (1)</b> 26:7 <b>Discussion (6)</b> 7:4 29:2 41:22 75:23 122:20 134:1 <b>discussions (1)</b> 103:20 <b>distinctions (1)</b> 135:16 <b>District (4)</b> 1:1,2 4:9,9 <b>disturbance (1)</b> 80:10 <b>divert (1)</b> 82:16	<b>Division (2)</b> 1:3 4:10 <b>DNS (49)</b> 76:12,15 76:17 77:3,7,10 77:12 78:23 79:8 79:11 80:14,15 82:2 107:8 108:17 109:2,15,16,24 110:2,6,22 112:18 112:20,22 114:4,7 114:9,11,12,15,18 114:21,21,24 115:3,7 130:1,4,5 130:8,9,13,17,19 131:8,14,16 132:24 <b>doc (1)</b> 57:14 <b>document (49)</b> 3:8 3:10,12,14 7:8 29:3,8,9,11,25 35:4,23 36:19 37:5,14,19 39:19 39:22,24 40:3,6 40:10,12,24 41:3 41:6 57:7 72:16 87:22,25 88:18,22 88:24 89:21 93:13 97:16 126:22,25 127:2 137:20,22 137:24 138:5,9,13 138:21 140:10 146:23,25 <b>documentation (...)</b> 30:4,13,20,22,23 35:8 37:20 38:2,6 38:13,17 41:3,4 <b>documented (2)</b> 12:7,8 <b>documents (8)</b> 7:11 7:15 31:19 32:25 57:15 95:10 127:17 130:5 <b>DOD (1)</b> 12:8 <b>doing (12)</b> 10:24 11:4 13:21 16:2 17:25 20:23 23:14	24:9 65:24 80:3 145:4 147:19 <b>domain (9)</b> 77:3 108:20 109:1,2 113:23 132:7,10 132:16 133:17 <b>Draconian (1)</b> 127:11 <b>driving (1)</b> 18:23 <b>duly (2)</b> 5:11 150:10 <b>duration (1)</b> 33:19 <b>DVD (8)</b> 3:16 46:10 46:17,19 47:13 50:20 51:17 52:20 <hr/> <b>E</b> <hr/> <b>E (9)</b> 2:1,1 3:1 5:21 87:8 141:15,15 150:1,1 <b>earlier (10)</b> 22:14 41:8 61:25 122:22 125:2 129:20 134:23 136:13 138:6 141:6 <b>early (1)</b> 19:12 <b>early-day (1)</b> 15:18 <b>earnest (1)</b> 12:21 <b>Eastern (2)</b> 1:2 4:9 <b>economically (1)</b> 27:4 <b>ecosystem (1)</b> 24:13 <b>edge (1)</b> 24:25 <b>edit (1)</b> 31:1 <b>edits (1)</b> 31:3 <b>education (1)</b> 8:17 <b>eight (1)</b> 14:21 <b>either (10)</b> 6:12 14:20 20:6 59:6 73:20 74:5 81:16 81:18 82:14 109:16 <b>element (1)</b> 93:22 <b>elements (1)</b> 93:13 <b>else's (2)</b> 128:11,15	<b>emerging (1)</b> 15:1 <b>Emery (4)</b> 2:3,8 4:23,25 <b>employed (3)</b> 72:16 122:7 150:14 <b>employee (4)</b> 56:21 89:12 150:13,14 <b>enable (1)</b> 27:13 <b>encapsulate (4)</b> 21:11 24:23 119:13,15 <b>encapsulated (7)</b> 85:3 120:1 121:20 122:6 123:1,2,21 <b>encapsulation (1)</b> 119:23 <b>encoding (1)</b> 20:25 <b>encountered (1)</b> 50:2 <b>encrypted (11)</b> 69:14,15 83:24 122:2,10,15 123:10,21,25 124:2 148:2 <b>encryption (7)</b> 118:24 121:25 122:1,6 123:7 137:8,10 <b>enforces (1)</b> 126:5 <b>engineering (3)</b> 14:7 18:14 55:25 <b>ensure (2)</b> 94:13 139:1 <b>enter (3)</b> 70:10 71:3,12 <b>Entera (6)</b> 16:21,24 16:25 17:8,9,22 <b>entered (1)</b> 51:19 <b>entire (5)</b> 52:3 53:23 76:19 84:15 92:6 <b>entirely (1)</b> 49:20 <b>entitled (6)</b> 3:8,10 3:12,14,16 36:20 <b>entries (1)</b> 130:23 <b>entry (5)</b> 109:25	110:2,6 111:3 112:22 <b>epoch (1)</b> 92:19 <b>era (9)</b> 9:20 11:12 14:19,25 16:6 22:14 81:4 86:6 106:24 <b>error (1)</b> 65:8 <b>essentially (6)</b> 18:21 25:19 82:2 82:18 103:3 111:4 <b>establish (6)</b> 69:1 69:14,15 82:14 106:2 135:3 <b>established (2)</b> 106:12 119:16 <b>establishes (2)</b> 106:8 113:13 <b>establishing (1)</b> 85:3 <b>et (1)</b> 62:18 <b>ethernet (1)</b> 74:21 <b>evolution (1)</b> 24:1 <b>Ex (8)</b> 3:8,10,12,14 3:16,17,18 20:14 <b>exact (4)</b> 21:8 94:25 98:18 110:3 <b>exactly (5)</b> 13:3 34:23 88:5 91:7 120:16 <b>examination (5)</b> 1:11 3:2 150:7,9 150:12 <b>examine (1)</b> 59:23 <b>examined (1)</b> 5:12 <b>example (3)</b> 109:14 110:21 147:18 <b>examples (4)</b> 77:22 79:18 147:16,22 <b>example's (1)</b> 127:7 <b>exceptions (1)</b> 150:11 <b>exchanged (2)</b> 141:21 142:5 <b>excuse (15)</b> 34:14
---	---	---	---	---

48:16 51:20,20 76:13 90:1,18 93:11 94:4 100:12 101:7 122:25 135:25 136:2 139:22 <b>exhibit (139)</b> 3:7 7:3,5 28:24,25 30:7,10 32:9 34:25 35:11 36:13 36:19,22,24 37:2 37:23 38:1,7 39:15,18,20 41:23 42:4,5 46:25 50:9 50:12,16,19,21 51:11,17 52:21 53:12 54:13,13,19 55:2,4 57:5,7,8,18 58:24 59:2 60:7 61:18 62:16 63:11 64:5,13,15,16,25 65:3,10,14 66:4,6 67:16,21,22 69:11 73:9 75:6 76:2 87:17,20,23 88:3 88:8,12,25 89:9 89:18,23 90:3,8 91:23 92:3,8,10 92:11,14,21,25 93:5,8,9,14 94:1,7 94:11,14,20 96:24 96:25 97:2,4,7,11 97:20,23 98:4,10 99:6,9,13,17,18 100:5 108:7 125:6 125:10 127:3,5 128:19 129:14,24 130:5,5 135:14,20 137:17 138:24 139:1,9,14,18,20 139:23,24 140:2,5 140:5,11,15 146:18 147:2 <b>exhibits (5)</b> 56:23 56:24 57:3 101:12 130:8	<b>exist (1)</b> 141:7 <b>existence (1)</b> 19:20 <b>existing (2)</b> 19:5,17 <b>expanding (1)</b> 11:5 <b>expense (1)</b> 19:15 <b>experience (3)</b> 35:9 101:24 140:20 <b>experimental (1)</b> 13:25 <b>experimenting (1)</b> 137:13 <b>expert (1)</b> 25:11 <b>expires (2)</b> 149:22 150:23 <b>explain (9)</b> 15:8 26:15 73:14 76:21 76:21 79:12,14 119:22 132:18 <b>explaining (2)</b> 78:21,22 <b>Explorer (4)</b> 46:14 66:11 78:4 79:23 <b>extending (2)</b> 11:9 11:12 <b>extensions (2)</b> 12:3 24:17 <b>extensive (1)</b> 10:16 <b>extent (6)</b> 12:16 19:4 92:7 94:22 95:14 98:25 <b>extract (1)</b> 45:25 <b>extracted (1)</b> 46:1 <b>ExtraNet (11)</b> 3:16 20:12,15 21:12,16 37:4 42:8 54:13 55:3,7 103:11 <b>ExtraWeb (15)</b> 3:12 20:13,21 36:20 98:11,15 99:1 100:8,14,17 100:21,25 101:4,9 103:12 <b>Eyes (1)</b> 42:7 <b>e-commerce (1)</b> 147:19 <b>E-n-t-e-r-a (1)</b>	16:22 <hr/> <b>F</b> <b>F (4)</b> 141:15 149:1 149:1 150:1 <b>fabricated (1)</b> 113:12 <b>fact (1)</b> 133:8 <b>factor (1)</b> 19:13 <b>fair (6)</b> 6:10,17,22 48:9 71:22 94:9 <b>fairly (1)</b> 14:6 <b>fake (8)</b> 82:8,9,15 110:14,14 111:20 112:15 130:22 <b>false (8)</b> 109:24 110:2,6,11 111:3 112:2,22 113:8 <b>familiar (25)</b> 6:7 12:13,15 22:20 23:16 25:1,10 26:11,14 27:2,8 31:7 40:21 41:8 49:18,23 50:24 57:14 67:1,6 74:22 111:9 119:7 133:6 137:4 <b>familiarity (1)</b> 78:5 <b>far (2)</b> 41:12,16 <b>fast (2)</b> 14:17 51:21 <b>faulty (1)</b> 110:18 <b>feature (1)</b> 92:2 <b>features (1)</b> 139:10 <b>February (17)</b> 1:19 4:1,11 18:8 59:4,6 61:2 64:4 66:22 67:9 87:1 95:12 96:20 101:9,14 141:4 149:6 <b>feel (2)</b> 73:1,2 <b>fifth (1)</b> 61:2 <b>figure (2)</b> 73:8,14 <b>file (22)</b> 44:6,16 45:20 59:17 63:11 64:5 66:9 80:20 90:18 91:13,14	92:5,5,16 93:4,8 93:12,15,24 94:6 94:10 133:3 <b>files (21)</b> 44:13 45:8 57:4 59:19 66:13 67:1 89:25 90:1,5,7 91:1,2,15 92:24 98:14,20,23 99:21,23,25 100:1 <b>filtering (1)</b> 79:25 <b>final (3)</b> 142:22 143:1 146:1 <b>financially (1)</b> 150:14 <b>find (3)</b> 34:10 63:10 66:19 <b>fine (2)</b> 71:25 72:2 <b>finished (2)</b> 35:13 148:10 <b>firewall (4)</b> 15:6,12 15:13,15 <b>first (37)</b> 5:11 9:7 14:19 21:24 22:25 25:17 27:23 33:7 33:7 51:22 58:3 58:12,24 59:13 62:16,17 88:12,14 97:4,13,16,20 101:3,6 102:3 104:8,15 108:19 108:19 109:19 110:9 127:7 137:24 143:10,22 143:25 150:10 <b>firsthand (5)</b> 24:2 52:23 81:4 96:13 97:21 <b>fix (1)</b> 65:7 <b>flip (1)</b> 128:20 <b>flow (2)</b> 80:10 85:8 <b>flowing (1)</b> 119:23 <b>flyleaf (1)</b> 149:8 <b>folded (3)</b> 9:25 10:2 10:5 <b>folder (7)</b> 48:1 54:4 54:9,12 90:19,22	91:1 <b>folks (1)</b> 18:2 <b>following (1)</b> 76:20 <b>follows (1)</b> 5:13 <b>follow-up (2)</b> 36:14 141:12 <b>Force (1)</b> 11:2 <b>foregoing (2)</b> 150:7 150:12 <b>form (146)</b> 15:21 17:14,16 19:13 22:2,22 26:6 27:25 28:8,11 29:10 31:8,16 32:1,5,10,17 33:2 33:15,23 34:21 35:6,25 36:2 37:15,25 38:3,8 38:18 39:2,11 40:11,18,23 41:1 41:10,14 42:21 43:9,14,21 44:4 44:11,14,19 45:1 47:1 48:4 49:7 50:4,22 51:1,6,8 51:12 52:7,13,22 53:3 54:2,15,20 55:5 56:14,19 57:9,16 59:21 61:19 62:24 65:1 65:15 66:21 67:4 67:17,24 68:8,20 68:25 69:19 70:3 70:11,17,22 71:6 71:14 72:11,25 73:5,10 74:25 75:7 76:23 77:18 77:25 78:7,19,25 79:16 80:19 81:2 81:11 83:1,11,16 84:6,10,21 85:13 85:22 86:3 94:15 96:10 101:1 106:4 106:17,22 107:11 109:15 111:25 115:10,19 116:11
--	--	---	--	--



116:25 118:21 119:5 122:4 123:4 125:1 130:15 131:19 132:1 134:17 135:10 143:4,14 144:2,7 144:18,25 145:19 145:24 146:9,16 147:17 148:3 <b>formatted (1)</b> 114:10 <b>former (1)</b> 89:12 <b>formerly (2)</b> 20:12 29:20 <b>forms (2)</b> 15:17 70:21 <b>forth (1)</b> 133:12 <b>forward (5)</b> 15:19 18:24 82:3 84:1 126:16 <b>forwarded (2)</b> 74:20 132:23 <b>forwarding (1)</b> 146:2 <b>forwards (1)</b> 107:14 <b>found (3)</b> 37:9,9 92:11 <b>foundation (1)</b> 72:17 <b>founders (2)</b> 61:10 99:4 <b>four (1)</b> 9:7 <b>Fourth (3)</b> 1:15 2:17 4:17 <b>four-year (1)</b> 8:21 <b>frame (9)</b> 14:22 29:24 38:10,19,21 46:2 78:12 94:13 96:11 <b>framed (1)</b> 121:24 <b>Francisco (1)</b> 4:14 <b>Friday (5)</b> 1:19 4:1 4:11 87:1 149:6 <b>friendliest (1)</b> 30:17	<b>friends (1)</b> 9:22 <b>front-end (1)</b> 9:18 <b>FTP (1)</b> 78:1 <b>full (3)</b> 6:24,25 150:10 <b>fully (2)</b> 42:24 109:16 <b>function (1)</b> 100:2 <b>functionality (2)</b> 118:17 131:14 <b>further (2)</b> 132:18 150:13 <hr/> <b>G</b> <hr/> <b>Gary (7)</b> 1:13 5:10 5:17 126:11 148:15,17 149:12 <b>gather (1)</b> 104:8 <b>Gee (1)</b> 103:16 <b>general (8)</b> 5:2 21:3 31:23 32:2 38:5 38:12 39:6 40:15 <b>general-purpose ...</b> 130:17 <b>generate (3)</b> 65:13 65:18 82:8 <b>generator (1)</b> 71:1 <b>gentlemen (1)</b> 148:13 <b>getting (2)</b> 19:13 61:5 <b>give (8)</b> 6:24 19:19 77:22 79:17 82:8 82:9 147:16,21 <b>given (5)</b> 32:9 42:3 49:20 104:5 125:8 <b>glossaries (1)</b> 147:4 <b>glossary (2)</b> 146:19 146:21 <b>go (44)</b> 9:3,21 10:4 13:8 16:19 17:22 17:24 27:6 41:13 51:16 53:11 61:14 62:16 63:17,18 64:13 65:10 66:4 67:21,21 69:10,10	71:16 75:9 78:16 80:11 82:10 83:9 83:12,15 90:12 91:14,15 92:5 113:16 116:22 117:4,6,17 118:1 118:3,8 133:23 139:6 <b>goes (1)</b> 6:20 <b>going (49)</b> 6:8 11:13 22:23 24:14 27:17 28:24 36:5 36:8,19 39:18 41:20 56:23 58:4 62:7 63:12,18 65:25 66:6 67:12 69:7 70:6 73:18 73:19,20,22 75:21 77:7 80:2 81:20 81:20,25 84:18 85:2,16 86:10 87:10 108:7 110:13 111:13,15 119:14 126:8 127:7 133:9,24 145:3,10 147:24 148:15 <b>good (5)</b> 5:23,24 19:6 64:1 148:9 <b>Gotshal (2)</b> 2:12 4:21 <b>Government (1)</b> 11:23 <b>graduate (1)</b> 8:25 <b>graduation (1)</b> 9:4 <b>greater (1)</b> 24:3 <b>grew (1)</b> 18:7 <b>ground (1)</b> 6:5 <b>group (14)</b> 14:1 18:16 30:13,15,20 30:23 31:6 35:5,8 36:15 38:2,6,13 38:17 <b>groups (1)</b> 18:14 <b>group's (1)</b> 35:10 <b>guess (9)</b> 11:2	13:15 14:12 20:14 25:19 29:13 60:9 65:8 121:6 <b>guide (11)</b> 3:11,13 3:15 29:6 36:21 37:3 39:19 40:1 54:14 69:11 125:12 <b>guides (2)</b> 30:25 31:1 <b>guys (1)</b> 91:8 <hr/> <b>H</b> <hr/> <b>H (1)</b> 141:15 <b>half (1)</b> 58:3 <b>hand (1)</b> 150:16 <b>handed (1)</b> 57:3 <b>handle (4)</b> 20:17,18 107:20 108:4 <b>handshake (1)</b> 85:9 <b>handshaking (1)</b> 84:16 <b>happened (1)</b> 142:15 <b>happening (1)</b> 82:24 <b>happens (5)</b> 109:23 111:3 113:6,10 124:4 <b>hard (1)</b> 6:19 <b>head (1)</b> 90:4 <b>header (9)</b> 58:12,24 62:17 64:6,7,9,22 65:18 67:15 <b>headers (1)</b> 60:1 <b>hear (1)</b> 34:15 <b>heard (1)</b> 127:20 <b>heavy (1)</b> 78:9 <b>held (1)</b> 85:5 <b>hereof (1)</b> 149:9 <b>hereto (1)</b> 150:14 <b>hereunto (1)</b> 150:16 <b>high (1)</b> 8:18 <b>history (4)</b> 22:21 44:6 60:16,17	<b>hlin@mwe.com (1)</b> 2:6 <b>Hmm (1)</b> 21:17 <b>hold (2)</b> 51:7 120:4 <b>Hong (2)</b> 2:3 4:24 <b>hooking (1)</b> 11:2 <b>host (19)</b> 76:17 81:1 105:7,11 108:20 109:14,20 112:17 113:3,7 116:19,23 117:4 117:18 118:7,8 123:18 124:1,7 <b>hosted (1)</b> 19:11 <b>hostname (2)</b> 76:16 78:17 <b>hour (1)</b> 36:6 <b>huh (1)</b> 64:3 <b>humans (1)</b> 19:11 <hr/> <b>I</b> <hr/> <b>IBM (1)</b> 16:1 <b>ICS (1)</b> 15:25 <b>idea (1)</b> 64:1 <b>identification (6)</b> 7:6 29:1 36:23 39:21 41:24 56:25 <b>identified (2)</b> 92:2 99:16 <b>identify (4)</b> 4:18 112:25 113:3 130:18 <b>identifying (1)</b> 108:13 <b>identity (1)</b> 126:1 <b>IETF (4)</b> 21:9 24:25 114:21 130:10 <b>imaginary (1)</b> 112:12 <b>imagine (2)</b> 23:13 39:4 <b>immediately (1)</b> 73:24 <b>impersonating (1)</b> 82:2
--	--	---	---	---

<b>implemented (1)</b> 74:12	<b>infrastructure (5)</b> 16:16 17:7 25:23 26:2,24	<b>interesting (1)</b> 14:13	124:19 148:1	29:3,17 31:12,22
<b>include (10)</b> 12:11 43:11 46:20 102:21 103:20 107:24 110:16 114:25 115:4,8	<b>initials (2)</b> 61:6,7 <b>initiate (4)</b> 69:22 69:24 70:2 110:23 <b>initiates (3)</b> 111:25 117:21,25	<b>interface (3)</b> 73:20 74:4 99:22	<b>IPSEC (2)</b> 14:24 15:18	32:2,8,12,24 33:6 33:17,25 34:9,15 34:18,24 35:9,18 36:4,7,13,24 37:17 38:1,5,11 38:20 39:5,14,18 39:22 40:15,20,24
<b>included (1)</b> 46:7	<b>initiating (5)</b> 77:20 114:25 115:4,8 124:19	<b>interfaces (1)</b> 10:25	<b>Irvine (1)</b> 2:10	41:6,12,17 42:2 42:23 43:4,11,18 43:24 44:9,13,17 44:20 45:4 47:4 48:6,15 49:12 50:7,25 51:3,9,15 52:11,16,25 53:6 54:5,12,17,23 55:8 56:16,22 57:2,13,18 59:24 61:21 62:25 63:10 65:4,20 66:24 67:7,14,20 68:4 68:17,23 69:4 70:1,9,15,20 71:10,16 72:13,19 72:24 73:2,4,8,13 74:22 75:2,9 76:2 77:1,22 78:3,11 78:15,20 79:10 80:13,25 81:5,14 83:7,14 84:3,8,12 85:15,23 86:4 94:15 96:10 106:4 106:17,22 115:10 115:19 116:11,25 118:21 122:4 123:4 125:1 130:15 131:19 134:17 141:11,16 143:5,18 144:5,11 144:23 145:5,10 145:22 146:3,12 146:18 147:1,21 148:6,10 149:3 150:4
<b>includes (3)</b> 43:15 46:21 114:1	<b>inputs (1)</b> 44:13	<b>interim (5)</b> 142:12 142:13,17 143:6,7	<b>ISPs (1)</b> 16:10	
<b>including (3)</b> 84:15 102:22 150:11	<b>input (2)</b> 44:18,23	<b>intermediary (1)</b> 147:25	<b>issue (1)</b> 126:19	
<b>incorporate (1)</b> 26:21	<b>insecure (1)</b> 68:15	<b>intermediate (4)</b> 26:1,23 145:25 146:5	<b>I.D (1)</b> 3:7	
<b>Incorporated (2)</b> 4:7 6:1	<b>inside (6)</b> 49:24 79:6,21 82:4 84:2 123:21	<b>internal (1)</b> 20:22	<b>J</b>	
<b>incorrect (2)</b> 105:21,22	<b>inspect (1)</b> 74:17	<b>internally (1)</b> 22:16	<b>job (1)</b> 16:23	
<b>independent (1)</b> 17:25	<b>installed (5)</b> 68:19 68:21 69:5 74:10 136:20	<b>international (3)</b> 1:5 4:8 12:1	<b>Jobs (1)</b> 13:24	
<b>indicate (4)</b> 33:13 33:21 58:8,14	<b>instance (2)</b> 62:5 69:22	<b>Internet (8)</b> 14:15 15:25 16:15 18:5 66:11 78:4 79:23 142:12	<b>join (1)</b> 88:15	
<b>indicated (1)</b> 149:8	<b>instantiated (1)</b> 70:7	<b>interoperability (...)</b> 23:14 25:2 95:17	<b>joined (17)</b> 17:13 18:9,19 19:2 20:1 21:16 36:15 39:1 50:2 88:13 97:12 97:14,17 100:19 138:10,11,16	
<b>indicates (1)</b> 125:16	<b>insurance (1)</b> 9:23	<b>interoperable (2)</b> 23:15 144:9	<b>joint (1)</b> 23:11	
<b>indication (1)</b> 64:24	<b>integrated (1)</b> 132:22	<b>interpose (1)</b> 6:13	<b>July (1)</b> 28:18	
<b>indirect (2)</b> 145:20 145:22	<b>intended (1)</b> 40:13	<b>interpret (3)</b> 34:1,2 34:6	<b>June (1)</b> 13:16	
<b>Indirectly (2)</b> 93:16 111:14	<b>intent (1)</b> 92:23	<b>interpretation (2)</b> 61:20 69:21	<b>K</b>	
<b>individual (3)</b> 14:9 33:24 84:25	<b>interact (2)</b> 94:6 100:1	<b>interpretations (2)</b> 128:5,8	<b>Karman (1)</b> 2:9	
<b>industry (1)</b> 27:14	<b>interacting (1)</b> 94:23	<b>interprets (1)</b> 107:9	<b>keep (2)</b> 69:3 143:7	
<b>information (33)</b> 5:4 8:24 29:14,15 29:16 37:7 38:22 42:8 43:16 45:6 45:11 47:10 60:15 68:14 71:4,13 81:7 88:2,4 95:7,9 97:5 102:24 103:16,17 122:2 123:9 124:5,23 126:9 137:25 141:20,25	<b>interactions (2)</b> 24:5 145:6	<b>intervene (1)</b> 79:19	<b>key (1)</b> 135:16	
	<b>intercept (5)</b> 79:8 80:2,9 81:24 82:14	<b>involved (1)</b> 19:11	<b>kind (29)</b> 11:4 13:19 14:9,25 15:3,15 16:4,12 17:2 18:4,23 19:10 21:3 22:4 23:21 24:12,17,25 29:18 62:6,11 69:23 70:18 77:10 82:9 103:17 110:13 111:6 147:25	<b>83:7,14 84:3,8,12 85:15,23 86:4 94:15 96:10 106:4 106:17,22 115:10 115:19 116:11,25 118:21 122:4 123:4 125:1 130:15 131:19 134:17 141:11,16 143:5,18 144:5,11 144:23 145:5,10 145:22 146:3,12 146:18 147:1,21 148:6,10 149:3 150:4</b>
	<b>intercepted (1)</b> 79:4	<b>involvement (1)</b> 99:1	<b>kinds (2)</b> 24:8 103:16	
	<b>intercepts (1)</b> 113:11	<b>IP (33)</b> 11:3,4 12:5 12:6 76:16,17,18 77:4,8 82:8 84:1,9 108:3,22 109:12 109:12 111:4 112:13 113:12 119:19,20,24 120:1,1,9,10 124:8,10,11,14,18	<b>King (172)</b> 2:12 3:3 3:4 4:20,20 5:15 5:22 7:2,7 17:20 24:4 26:7 27:20 28:3,10,13,24	<b>knew (4)</b> 18:2 23:25 26:11

103:10	97:10,15,19 100:4	<b>left (2)</b> 28:7 74:3	57:9,16 59:21	<b>LiveLink (22)</b>
<b>know (135)</b> 11:4,19	100:6,7,10,13,16	<b>Legal (1)</b> 4:14	61:19 62:24 65:1	29:25 30:1,3,7,11
12:9,10 15:4,14	100:20,24 101:13	<b>letter (1)</b> 134:9	65:15 66:21 67:4	30:18 32:15,25
16:6,9,11 18:23	101:20 138:8,12	<b>let's (37)</b> 6:21 7:2	67:12,17,24 68:8	33:3 37:8,14,18
18:25 19:9,10,14	138:20 139:17,25	9:5 14:12 15:12	68:20,25 69:19	37:19 39:7,10,15
20:15,19 21:3,8	144:14,16	19:25 33:7 41:18	70:3,11,17 71:6	40:8,25 41:4,9,13
21:10 22:3 23:8,9	<b>known (7)</b> 14:18	51:16 53:11 57:6	71:14 72:10,15,20	92:18
23:20,21,25 24:2	15:23 20:12 22:12	59:4 60:6 61:14	73:10,22 74:25	<b>loaded (1)</b> 80:22
24:11,13,14,16,20	22:16 26:13 27:1	62:16 63:12 64:13	75:7 76:23 77:18	<b>local (4)</b> 108:20
24:25 25:1,5,6,7	<b>knows (4)</b> 76:18	65:10 66:4 67:21	77:25 78:7,19,25	109:1 111:12
25:12 27:3,4,4,4	77:8 110:11	69:10 71:16 72:3	79:16 80:19 81:2	133:16
27:11,14,20,23	111:15	72:3 75:9,14	81:11 83:1,11,16	<b>located (2)</b> 37:19
28:4,10 31:17,21		77:12 78:16 79:19	84:6,10,21 85:13	68:12
32:7 36:17 37:23	<b>L</b>	79:22 80:5 110:21	85:22 86:3 87:9	<b>lodge (2)</b> 72:10,23
38:9 41:12,15,16	<b>L (2)</b> 1:21 5:6	111:25 117:8,15	94:16 96:12 106:7	<b>log (4)</b> 60:12 70:5
43:16,19,22 44:7	<b>labeled (2)</b> 7:24	146:18,23	106:20,25 115:12	70:10 83:6
44:17 45:16 46:23	51:11	<b>level (3)</b> 50:1 74:10	115:22 116:13	<b>logged (1)</b> 70:6
47:2 49:22 51:3	<b>labs (1)</b> 14:5	144:9	117:2 118:23	<b>logging (1)</b> 71:4
51:10 52:19,23	<b>Lacks (1)</b> 72:17	<b>leveraged (2)</b> 27:3	120:18,21,25	<b>logically (1)</b> 146:12
55:1 59:5,23	<b>Lake (1)</b> 9:6	27:4	121:5,8,11 122:9	<b>long (4)</b> 13:10 17:8
61:18 63:8 64:18	<b>language (1)</b>	<b>libraries (1)</b> 25:15	122:21 123:7	49:9 139:13
65:16 67:19 70:24	140:17	<b>library (2)</b> 26:23	125:2 126:10,14	<b>look (14)</b> 7:9 16:11
77:9 78:22 80:9	<b>large (2)</b> 14:6 16:7	137:9	126:20,24 130:18	24:16 48:7 59:6
81:3 83:5 84:2	<b>larger (2)</b> 27:15	<b>limit (1)</b> 27:7	131:23 134:12,14	79:8 80:8,23
85:7 88:7,9,11,14	91:10	<b>limitations (1)</b>	134:20 141:10	93:16 99:25 112:3
88:15 90:4 91:7	<b>large-scale (1)</b> 9:17	137:3	143:4,14 144:2,7	136:17 146:18,23
93:22 98:14,17,24	<b>Laurel (4)</b> 2:17 5:1	<b>limited (1)</b> 21:3	144:18,25 145:9	<b>looked (5)</b> 45:22
99:3,21 100:18	47:13 103:18	<b>Lin (167)</b> 2:3 3:3	145:19,24 146:9	49:9 57:11 92:15
101:3,6,8 102:3,6	<b>layer (8)</b> 11:3 12:6	4:24,24 17:14,16	146:16,25 147:17	109:7
102:13,23 103:4	15:14 120:2,12,13	17:18 22:22 26:6	148:3,9,12	<b>looking (12)</b> 15:15
103:13,16 104:3,5	124:8,8	27:17,25 28:8,11	<b>line (6)</b> 9:13 58:4,8	24:11 37:6 45:23
104:15 110:3,18	<b>layered (14)</b> 25:21	29:10 31:8,16	59:13 130:2,14	64:5 65:12 76:25
120:3 121:1,24	26:4,8,19 27:9,24	32:1,5,10,17 33:2	<b>lined (1)</b> 92:16	93:18 103:3,8,19
122:8 135:19	28:6,21,21 57:22	33:15,23 34:4,13	<b>lines (1)</b> 18:22	107:10
136:8,10 137:3,7	74:9,12 85:18	34:21 35:6,14,25	<b>link (3)</b> 26:23	<b>looks (6)</b> 64:3 65:2
138:7,11 139:7	86:1	37:15,25 38:3,8	145:17,23	108:3 112:15
140:17 142:9,12	<b>layperson (1)</b> 79:15	38:18 39:2,11	<b>links (1)</b> 146:1	132:11 140:8
143:24 144:12,20	<b>lbuckner@sonic...</b>	40:11,18,23 41:1	<b>lion's (1)</b> 91:2	<b>lookup (4)</b> 76:12,15
144:21 145:2	2:19	41:10,14 42:21,25	<b>litigation (5)</b> 5:6	76:17 78:24
146:22	<b>lead (1)</b> 13:19	43:9,14,21 44:4	102:4,7,10,14	<b>loosely (1)</b> 25:18
<b>knowledge (37)</b>	<b>Leading (3)</b> 145:9	44:11,14,19 45:1	<b>little (13)</b> 11:25	<b>lot (2)</b> 19:12,18
22:18 38:4 39:3	145:19 146:16	47:1 48:4,14 49:7	21:18 23:25 24:21	<b>LSP (2)</b> 79:6 95:18
45:21 58:21 72:18	<b>leave (3)</b> 13:5 28:16	50:4,22 51:1,6,12	25:6 35:15 44:20	<b>LSPs (1)</b> 74:10
81:4 88:17,21	28:17	52:7,13,22 53:3	51:21 71:23	<b>lunch (1)</b> 86:9
94:19,21,22 96:2	<b>leaving (4)</b> 9:21	54:2,8,10,15,20	110:10,18 120:4	<b>luncheon (1)</b> 86:12
96:5,8,15,19	16:20 17:22,23	55:5 56:14,19	143:21	

<b>M</b>				
<b>M (3)</b> 5:21 87:8 141:15	<b>marginally (2)</b> 12:7 12:14	85:11 93:19 109:4 109:15 112:5,9	89:6 102:3,6,9,13 102:20,22 103:7,8	58:16 59:1,24 60:20 61:21 65:5
<b>magnitude (1)</b> 99:3	<b>mark (8)</b> 7:2 28:24 34:19,25 35:11	124:6 133:9 135:2 139:22 142:20	104:2,5,12,16 114:13,16,19	65:20 67:7 69:4 70:20 71:10 73:16
<b>mail (1)</b> 78:1	36:19 39:18 56:23	145:2 146:11	132:12,21 133:5	77:1,15,24 81:5 81:14 84:3,12
<b>main (1)</b> 61:24	<b>marked (10)</b> 7:5 28:25 36:22 39:20	<b>meaning (1)</b> 79:7	<b>Microsoft's (4)</b> 25:25 42:11 45:24	111:19 124:13 134:13
<b>mainframes (1)</b> 9:18	41:23 42:4 50:20 56:25 59:3 87:17	<b>means (13)</b> 48:5 58:9 67:10 68:10	104:9	<b>mod (1)</b> 67:8
<b>maintain (3)</b> 29:19 35:20 42:17	<b>market (2)</b> 16:8 21:24	69:18,21 76:22 77:14 79:12 84:20	<b>middle (1)</b> 74:8	<b>model (2)</b> 74:23 75:4
<b>maintained (8)</b> 29:22 30:1 33:5	<b>marketed (2)</b> 22:15 22:16	109:6 136:8,10	<b>Middlefield (1)</b> 2:4	<b>modeled (2)</b> 25:18 25:20
88:11,18 101:21 138:9,13	<b>marketing (6)</b> 20:13 22:18 31:2	<b>mechanism (1)</b> 27:5	<b>mid-2002 (3)</b> 24:3 30:24 31:19	<b>modern (1)</b> 74:3
<b>maintaining (5)</b> 55:9,14 56:5,7	31:5,6 68:1	<b>mechanisms (1)</b> 26:21	<b>Mike (1)</b> 91:16	<b>modification (1)</b> 27:13
60:15	<b>marks (3)</b> 75:25 134:3 148:14	<b>media (2)</b> 17:4,6	<b>military (1)</b> 11:24	<b>modifications (1)</b> 62:8
<b>maintains (1)</b> 44:5	<b>Mary (1)</b> 37:22	<b>meeting (3)</b> 102:25 103:4 130:10	<b>Millnet (1)</b> 10:25	<b>modified (5)</b> 44:23 66:13,20 67:2,9
<b>major (1)</b> 61:4	<b>master (3)</b> 55:13,15 56:3	<b>meetings (1)</b> 102:13	<b>mind (14)</b> 7:18 16:2 42:4 46:10	<b>modify (1)</b> 114:12
<b>making (1)</b> 26:25	<b>match (5)</b> 93:22 99:21 108:21	<b>member (2)</b> 109:2 109:3	47:24 48:18,21 51:23 53:18 76:5	<b>module (1)</b> 125:16
<b>manage (1)</b> 18:25	109:4 139:6	<b>members (1)</b> 31:5	78:21,22,22 117:12	<b>monitor (1)</b> 4:12
<b>managed (2)</b> 19:7,8	<b>matched (4)</b> 89:20 92:11,14,17	<b>memory (1)</b> 23:13	<b>mine (2)</b> 9:22 142:21	<b>months (1)</b> 104:19
<b>management (5)</b> 29:25 30:5 31:20	107:13,14 108:4 108:20 109:21	<b>memory's (1)</b> 110:18	<b>minicomputer (1)</b> 9:19	<b>morning (2)</b> 5:23 5:24
43:2,3	<b>matches (9)</b> 80:1 107:13,14 108:4	<b>Menlo (1)</b> 2:5	<b>minimal (1)</b> 20:19	<b>motions (1)</b> 150:11
<b>manager (8)</b> 14:19 15:8,10,23 16:3,9	108:20 109:21 110:22 116:1,8	<b>mentioned (7)</b> 11:16 12:23 21:5	<b>Minimally (2)</b> 26:10,10	<b>moved (5)</b> 11:4 13:21,25 17:10
23:2 37:20	<b>material (5)</b> 30:19 31:2 33:18 36:2	21:5,12 130:4,8	<b>minute (1)</b> 75:14	23:18
<b>managing (2)</b> 17:2 17:3	99:22	<b>merely (1)</b> 84:16	<b>minutes (4)</b> 8:16 21:12 71:20	<b>movement (1)</b> 126:8
<b>Manges (2)</b> 2:12 4:21	<b>matriculated (1)</b> 8:22	<b>merge (1)</b> 62:10	141:17	<b>moving (3)</b> 19:7 23:18 126:16
<b>manner (1)</b> 94:6	<b>matter (1)</b> 4:7	<b>merged (2)</b> 61:24 62:1	<b>mm-hmm (64)</b> 6:18 10:7,13	<b>multifactor (1)</b> 70:24
<b>manual (9)</b> 33:14 34:20 35:11,12	<b>McDermott (4)</b> 2:3 2:8 4:22,24	<b>merger (4)</b> 10:9 12:24 13:2 41:4	11:11 15:7 17:12 18:1,10,15 20:8	<b>multiform (1)</b> 71:11
39:9 40:10 51:10 55:3 75:5	<b>mean (36)</b> 9:16 19:9,24 20:6,9	<b>Merrill (1)</b> 4:14	22:10,13 24:10 28:3 29:21 30:14	<b>Multiple (1)</b> 74:10
<b>manually (1)</b> 69:14	21:9 26:10,23 27:14 30:16 33:4	<b>messed (1)</b> 20:5	31:12,22 33:9,20 33:25 34:9 39:5	<b>multiplex (1)</b> 84:25
<b>manuals (14)</b> 31:13 31:24 32:3,8,14	35:23 43:8 45:10 48:3,10 49:19	<b>met (2)</b> 19:15 23:11	40:9 42:19 43:4 43:18 45:4,18	<b>MultiProxy (1)</b> 136:10
34:19,25 38:7,14 38:17,25 39:7	58:18 59:15 65:22 67:8 68:7 71:8	<b>meta-attributes (1)</b> 45:8	46:5 47:18 49:1 50:14,15 51:15	<b>M.V (1)</b> 2:17
40:16 50:10		<b>method (1)</b> 111:25	54:17 55:12 56:16 57:2,13,25 58:10	<b>N</b>
<b>mapping (1)</b> 132:3		<b>Mi (1)</b> 28:16		<b>N (8)</b> 2:1 3:1 5:21
<b>March (1)</b> 150:16		<b>Microsoft (27)</b> 1:8 4:8,21 25:15,17 25:19 42:13 73:12		

5:21 87:8,8 141:15,15 <b>name (59)</b> 9:6 22:15,18 28:13 53:8 68:1 70:22 70:25,25 71:4 76:18,25 77:3,4,7 77:9,9 79:8,11,20 79:20,20 80:6,24 81:1,16,18,18,21 81:21,23,25 82:4 82:5 91:17 107:10 107:11 108:20,22 109:6,7,9,15,15 109:20 112:11 113:23 132:7,10 132:11,15,16,19 132:20,21,23,24 133:9 143:25 <b>named (3)</b> 21:19 47:3 150:7 <b>names (7)</b> 19:19 22:17 77:5 109:11 109:13,16 137:14 <b>namespace (2)</b> 82:16 111:5 <b>name's (1)</b> 114:8 <b>narrative (1)</b> 27:18 <b>NAT (2)</b> 111:9,9 <b>NDA's (1)</b> 141:23 <b>necessarily (2)</b> 110:16 133:14 <b>necessary (3)</b> 73:1 73:2 122:8 <b>need (5)</b> 62:9 75:19 81:15 117:10 135:9 <b>needed (2)</b> 19:8 61:24 <b>needs (2)</b> 19:15 81:25 <b>negotiated (1)</b> 85:6 <b>negotiation (3)</b> 84:15,16,24 <b>neither (1)</b> 150:13 <b>net (1)</b> 15:4	<b>NetWare (6)</b> 13:20 13:21 14:4 15:11 16:4,10 <b>NetWareisms (1)</b> 16:13 <b>network (19)</b> 12:15 12:18 15:4 25:22 68:15 82:5 95:18 120:2,12,13 124:8 128:1,2 129:1,4,7 147:7,10,14 <b>networking (4)</b> 14:24 26:2 73:12 132:22 <b>networks (4)</b> 15:2 15:18 16:6 68:14 <b>net2 (1)</b> 111:5 <b>never (3)</b> 14:2 105:8 117:12 <b>new (13)</b> 17:3 18:24 21:20,22 23:5 24:6 25:5,5 113:13 116:2,9,13 116:18 <b>newer (1)</b> 73:21 <b>nineteen (1)</b> 14:20 <b>ninety (2)</b> 14:20 78:13 <b>non (2)</b> 109:16 122:11 <b>nondisclosure (3)</b> 24:8 95:11 141:22 <b>nonencryption (1)</b> 122:12 <b>nonprogrammer...</b> 30:17 <b>nonresponsive (2)</b> 27:19 34:14 <b>nonstandard (3)</b> 132:7,10,16 <b>non-code-related...</b> 30:19 <b>normally (1)</b> 123:21 <b>Northridge (2)</b> 8:23 9:1	<b>Notary (3)</b> 149:21 150:6,21 <b>notations (1)</b> 67:2 <b>note (3)</b> 51:18 73:4 73:7 <b>NotePad (1)</b> 63:25 <b>notice (2)</b> 65:19 136:2 <b>notified (1)</b> 126:15 <b>noting (1)</b> 126:12 <b>notion (1)</b> 137:10 <b>Novell (37)</b> 13:9,10 13:18 14:5,16 16:4,6,7,20 18:3 23:1,4,15,20,24 24:9 26:9 27:8,10 28:7,17 74:24 78:10 85:16,17,17 94:23 95:3,6,12 95:15 137:12 141:18,21 143:7 143:17 145:6 <b>November (1)</b> 103:5 <b>nowadays (2)</b> 10:22 12:6 <b>NT (1)</b> 49:18 <b>Null (1)</b> 125:16 <b>number (7)</b> 12:8 16:1,10 22:4 70:25 75:11 108:13 <b>numbers (1)</b> 75:11 <hr/> <b>O</b> <hr/> <b>o (5)</b> 5:21 86:14 87:8 141:15 148:20 <b>oath (2)</b> 5:11 87:13 <b>object (117)</b> 17:14 22:22 26:6 27:17 27:25 28:8,11 29:10 31:8,16 32:1,5,10,17 33:2 33:15,23 34:13,21 35:6,25 37:15,25	38:3,8,18 39:2,11 40:11,18,23 41:1 41:10,14 42:21 43:9,14,21 44:4 44:11,14,19 45:1 47:1 48:4,14 49:7 50:4,22 51:1,6,8 51:12 52:7,13,22 53:3 54:2,15,20 55:5 56:14,19 57:9,16 59:21 61:19 62:24 65:1 65:15 66:21 67:4 67:12,12,17,24 68:8,20,25 69:19 70:3,11,17 71:6 71:14 73:10,22 74:25 75:7 76:23 77:18,25 78:7,19 78:25 79:16 80:19 81:2,11 83:1,11 83:16 84:6,10,21 85:13,22 86:3 143:4,14 144:2,7 144:18,25 146:9 147:17 148:3 <b>objecting (3)</b> 17:16 17:17 22:23 <b>objection (31)</b> 34:4 35:14 42:25 54:8 54:10 72:11,14,22 72:23,24 73:5 94:15 96:10 106:4 106:17,22 115:10 115:19 116:11,25 118:21 122:4 123:4 125:1 130:15 131:19 134:17 145:9,19 145:24 146:16 <b>objections (2)</b> 6:14 150:11 <b>objective (1)</b> 142:20 <b>obligation (1)</b> 6:15 <b>obtain (2)</b> 67:2	142:2 <b>obviously (3)</b> 24:8 27:3 49:17 <b>occasionally (1)</b> 142:18 <b>occurred (1)</b> 13:2 <b>occurring (2)</b> 118:14,14 <b>October (1)</b> 3:8 <b>oddball (1)</b> 11:25 <b>oddly (1)</b> 9:23 <b>OEM (1)</b> 16:1 <b>offer (1)</b> 100:10 <b>offered (1)</b> 16:13 <b>offering (1)</b> 19:8 <b>offers (2)</b> 96:6 100:14 <b>officer (1)</b> 150:6 <b>oh (20)</b> 11:18 19:21 21:8 22:1 48:16 51:20 66:22 76:13 76:13,13 80:1,8 81:25 91:18 92:10 112:15 127:1,2 136:2 143:17 <b>okay (132)</b> 7:13,24 8:2,14 12:22 13:14 16:18 17:19 18:17 24:16 25:9 28:19 33:6 35:18 36:4,18 37:11 41:17 43:24 46:9 46:18 47:14 48:9 49:16,25 50:7 52:18 53:10 54:25 56:1,8,22 58:2,22 59:11 60:4 62:15 63:17,20 64:2 65:9 66:3,8,18 67:20 69:9 72:19 72:22 73:3 75:17 75:18 76:13,13,14 78:15 79:22 80:4 86:7 87:15 88:10 90:17 91:4,9 93:2 94:18 96:1,14,22
--	--	---	---	--

99:15 101:19	131:21	<b>ooo (2)</b> 4:3 87:3	130:21,22 131:21	67:11
104:20 105:10,15	<b>operating (9)</b> 9:11		133:13,14 134:15	<b>period (3)</b> 10:11
105:17,24 106:20	13:25 14:2 15:11	<b>P</b>	135:10 137:14	40:21 43:20
107:3,12,17	67:2 114:13,16,19	<b>P (2)</b> 2:1,1	140:13 142:14,21	<b>periodically (1)</b>
108:11,15 109:17	136:23	<b>packet (4)</b> 15:13	143:20	22:23
110:15,20 111:7	<b>operation (1)</b> 67:11	122:1,25 123:1	<b>partial (1)</b> 84:14	<b>Perry (9)</b> 47:19,21
111:11,22 116:7	<b>operational (1)</b>	<b>packets (13)</b>	<b>partially (1)</b> 49:20	54:24 55:1,6 98:6
117:14 118:12	19:15	119:13,19,20,25	<b>partic (1)</b> 7:17	98:7,21,23
120:22,25 124:3	<b>operations (1)</b> 80:3	120:9,10,13,13	<b>participates (1)</b>	<b>Perry's (1)</b> 98:25
124:16,21 126:10	<b>operator (1)</b> 4:13	121:21 122:24	114:6	<b>person (2)</b> 6:21
126:14,20 127:13	<b>opportunity (1)</b>	135:4,6,9	<b>particular (10)</b>	50:23
128:3,18,23	27:15	<b>packet-switched ...</b>	20:7 30:1 44:16	<b>personal (28)</b> 72:17
131:11 132:5,14	<b>opposed (4)</b> 21:2	11:18	50:6 62:9 63:8	88:17,21 94:19,21
133:7,22 136:11	80:5,15 105:16	<b>page (46)</b> 3:2 7:18	69:7 114:10 132:2	94:22 96:2,5,8,15
136:16 137:6,11	<b>opposite (1)</b> 77:8	7:20 8:6 33:7,8	140:13	96:19 97:10,15,19
138:19 139:8,16	<b>option (1)</b> 25:5	58:3 60:8 62:16	<b>parties (2)</b> 150:13	100:4,6,7,10,13
139:21 140:1,9	<b>optionally (1)</b>	69:10 71:16,21,21	150:14	100:16,20,24
141:10,13,19	122:7	71:21 72:4,5,5,8	<b>partner (1)</b> 24:12	101:13,20 138:8
142:1,19 143:5,19	<b>options (3)</b> 11:14	73:8 75:9,10 76:3	<b>party (3)</b> 104:4	138:12,20 139:17
144:5,11,13 146:3	12:6,10	76:8,9,9 84:13,17	141:23 148:5	<b>personally (3)</b>
147:3 148:6,7,10	<b>oral (2)</b> 1:11 150:7	84:18 108:7,9,14	<b>pass (9)</b> 12:11	138:23 140:25
<b>old (2)</b> 58:21 61:5	<b>order (4)</b> 14:7	109:18,18,19	70:13,16 74:16	142:16
<b>older (2)</b> 73:20	37:18 59:7 70:10	125:9,10,24	82:22 105:23	<b>physical (2)</b> 74:20
133:5	<b>ordinary (4)</b> 32:15	129:14,24 135:20	112:14 113:17	83:23
<b>once (5)</b> 47:11	32:16 34:18 56:9	136:17 146:19,21	126:2	<b>picked (2)</b> 8:20,23
74:18 85:7 113:16	<b>organization (4)</b>	146:23 147:2	<b>passed (1)</b> 74:19	<b>picking (1)</b> 10:15
129:9	14:10 31:18 142:6	149:9	<b>passes (2)</b> 108:21	<b>picture (1)</b> 72:8
<b>ones (2)</b> 98:24	142:6	<b>pages (3)</b> 60:9	113:14	<b>piece (5)</b> 20:7,9
133:6	<b>organizations (1)</b>	75:15 99:12	<b>passive (2)</b> 115:24	29:16 30:1 68:10
<b>one-third (2)</b> 99:14	34:7	<b>page-by-page (4)</b>	115:25	<b>pieces (1)</b> 126:12
99:15	<b>oriented (2)</b> 17:5	91:22 99:5,7	<b>password (2)</b> 70:22	<b>PIN (1)</b> 70:25
<b>one-to-one (1)</b>	20:11	139:9	71:5	<b>place (7)</b> 4:16
132:3	<b>original (3)</b> 11:22	<b>paper (1)</b> 31:10	<b>path (1)</b> 63:4	43:23 103:4 112:4
<b>ongoing (1)</b> 23:20	22:15 61:11	<b>paragraph (8)</b>	<b>pathway (1)</b> 128:2	112:19,20 141:24
<b>onward (1)</b> 39:6	<b>originate (1)</b> 107:1	69:12 76:3,22	<b>payload (9)</b> 121:22	<b>placed (1)</b> 69:25
<b>Ooh (2)</b> 59:4 63:23	<b>originated (1)</b>	78:16,22 135:22	122:1,5,25 123:5	<b>plain (1)</b> 123:11
<b>op (1)</b> 19:10	64:18	135:25 136:3	123:16,17,19,20	<b>plaintiff (3)</b> 1:6
<b>open (9)</b> 25:20 43:1	<b>ourself (1)</b> 23:3	<b>Park (1)</b> 2:5	<b>people (12)</b> 14:7	4:23,25
46:13,17 49:2	<b>outbound (1)</b> 135:3	<b>Parkway (1)</b> 2:13	15:1 20:15 23:4	<b>Plaintiffs (1)</b> 2:3
53:14 63:24 90:18	<b>outcome (1)</b> 150:15	<b>parse (1)</b> 12:10	23:19,23 44:15	<b>plaintiff's (2)</b> 134:8
90:19	<b>Outlook (1)</b> 78:1	<b>part (29)</b> 14:4	47:17 128:4,7	134:10
<b>opening (4)</b> 47:24	<b>outside (3)</b> 16:5	19:12 21:20 22:4	145:2,6	<b>Platform (1)</b> 21:22
48:18 51:23 53:18	42:7 71:8	31:18 32:12,15	<b>percent (1)</b> 16:8	<b>platforms (1)</b>
<b>operate (3)</b> 38:23	<b>overall (1)</b> 18:22	55:6 57:22 58:1	<b>perform (3)</b> 100:2	135:24
40:17 105:19	<b>overloaded (1)</b>	114:13,16,19	118:24 119:2	<b>please (15)</b> 4:18 5:7
<b>operates (2)</b> 109:11	20:6	119:5 130:1,13,19	<b>performed (1)</b>	8:17 46:13 49:2

90:13,18 102:18 117:1 120:8 125:6 129:10 133:23 137:18 140:3 <b>plug (1)</b> 25:22 <b>plug-in (1)</b> 25:15 <b>point (10)</b> 6:12 18:9 31:10 68:16 72:11 83:25 84:14 107:21 108:16,19 <b>points (3)</b> 75:11,12 147:14 <b>poor (1)</b> 10:22 <b>popular (1)</b> 16:9 <b>populated (1)</b> 110:8 <b>portal (1)</b> 30:4 <b>portion (2)</b> 99:16 99:18 <b>position (2)</b> 9:8 14:6 <b>positive (1)</b> 103:6 <b>possible (4)</b> 27:12 83:19 122:11 132:6 <b>possibly (2)</b> 22:15 103:12 <b>practice (16)</b> 31:23 32:3 34:7,12,19 34:25 35:11,19,19 35:20 38:6,12 39:7 40:16 44:7 56:12 <b>precise (2)</b> 88:8 105:4 <b>precisely (2)</b> 107:7 108:1 <b>predates (1)</b> 31:18 <b>Premiere (1)</b> 5:6 <b>prepare (9)</b> 38:6,14 38:17 40:16 72:15 87:19,21 96:25 137:20 <b>prepared (5)</b> 8:11 94:14 97:11,13,17 <b>present (5)</b> 2:21	21:1 55:10 93:22 122:7 <b>presented (1)</b> 7:12 <b>presume (1)</b> 6:6 <b>pretty (2)</b> 67:5 127:11 <b>previous (4)</b> 73:22 96:18 121:4 129:22 <b>previously (2)</b> 37:5 87:16 <b>primarily (13)</b> 5:3 9:16 17:7 18:16 19:3 47:19 52:8 52:14 53:25 54:3 54:6 79:3 92:16 <b>primary (2)</b> 19:4 142:20 <b>principle (1)</b> 129:19 <b>printed (2)</b> 67:16 67:16 <b>prior (14)</b> 18:2 39:1 43:5 70:5 88:3,18 96:16,20 97:7 101:9,13,21 138:5 141:4 <b>private (6)</b> 14:23 15:2,18 128:25 129:4,7 <b>probably (17)</b> 12:20 23:12,17 26:19 27:13 28:23 30:5 46:15 61:25 63:6,12,21,21 64:1 77:13 98:16 142:9 <b>problem (2)</b> 143:21 147:1 <b>process (4)</b> 6:7,12 85:3 113:5 <b>processing (1)</b> 133:9 <b>processors (1)</b> 9:18 <b>produce (4)</b> 88:1,4 103:25 104:1	<b>produced (15)</b> 11:23 13:23,23 14:1,16 29:15 30:12 35:22 40:4 58:15,17 88:12,15 93:4 130:6 <b>producing (3)</b> 18:6 23:8,10 <b>product (58)</b> 13:20 16:3,14,15,16 18:6,22 23:2 24:6 26:3 27:24 28:7 28:14,21 30:21 31:24 32:3,8,9 33:13,21 34:19 38:14,17,25 39:7 39:9 41:3,9 43:12 46:22,24 50:6 52:4 53:24 62:1,5 68:1 72:17 94:20 100:5 120:16,23 121:4 126:13 130:2,14 139:18 139:24 142:3,23 143:2,11,11,17,22 143:25 145:3 <b>production (2)</b> 7:15 104:9 <b>products (24)</b> 15:23 17:3,4 18:24 19:1 22:6 23:21 27:5 31:7 31:15 32:4 38:23 46:7 75:3 78:10 101:13 103:10,11 103:14 121:16 129:18 137:14 142:5 144:6 <b>program (2)</b> 83:3 109:9 <b>programmed (3)</b> 77:11 80:6 109:7 <b>programmer (3)</b> 10:19,20,22 <b>programs (1)</b> 77:23 <b>promoted (1)</b> 14:6	<b>properties (2)</b> 44:2 90:24 <b>Property (1)</b> 42:6 <b>proprietary (3)</b> 25:19 132:12,21 <b>protect (1)</b> 5:4 <b>protected (4)</b> 68:13 79:5 83:18,22 <b>protocol (5)</b> 11:18 11:20 72:9 73:19 130:11 <b>provide (6)</b> 26:3 27:14 29:13 38:22 64:24 104:14 <b>provided (7)</b> 20:10 29:16 74:4 104:12 104:16 134:6 143:6 <b>provider (18)</b> 9:17 26:4,20,22 27:24 28:7,21 57:22 74:5,9,12,17 80:12 82:22 85:18 86:1 95:19 108:24 <b>providers (4)</b> 25:21 26:8 27:9 74:14 <b>proxied (2)</b> 132:4 133:20 <b>proxy (33)</b> 14:17 15:16,19,19,20 20:21 22:9,12,19 23:3 29:7 40:2,13 49:24 69:24 79:24 80:14,17 85:6 110:12 111:15,16 113:4,11 118:2 119:14 130:13,17 130:19 131:9,14 145:21,23 <b>public (23)</b> 17:6 22:3 33:14,22 80:6 96:9,16,19 96:21 100:17,25 101:17,18 143:13 144:14,16,20 147:6,10,14	149:21 150:6,21 <b>publicly (2)</b> 144:20 144:24 <b>published (5)</b> 34:20 35:13 88:22 97:20 138:21 <b>pull (2)</b> 47:21 50:12 <b>pulled (5)</b> 47:10,11 49:21 92:10,13 <b>pulling (1)</b> 97:5 <b>purpose (2)</b> 39:1 112:25 <b>purposes (1)</b> 33:5 <b>pursuant (1)</b> 141:21 <b>put (12)</b> 14:23,25 25:21 35:4,7 43:22 45:19 47:13 58:19 59:18 77:12 83:17 <b>puts (1)</b> 59:7 <b>putting (3)</b> 15:5 24:17 46:10 <b>p.m (10)</b> 75:22 76:1 86:11,13 87:2,6 133:25 134:4 148:16,19
<b>Q</b>				
<b>QA (1)</b> 142:14				
<b>qualified (1)</b> 109:16				
<b>query (1)</b> 108:22				
<b>question (21)</b> 17:21 27:18 34:15,23 37:13 39:13 47:25 64:12 67:13 72:23 73:23 85:24 96:18 118:3 120:7 127:18 129:21 139:19 142:25 143:18,24				
<b>questioning (1)</b> 5:15				
<b>questions (12)</b> 6:8 6:9,16 36:14				

42:13 72:11 85:16 86:8 87:11 126:21 141:12 150:11 <b>quick (2)</b> 41:18 75:20 <b>quite (3)</b> 10:17,23 16:7 <b>quote (1)</b> 16:11	140:12 141:20 144:3 145:2,10,11 <b>receive (3)</b> 134:8 142:22,25 <b>received (1)</b> 78:23 <b>receiving (2)</b> 89:5 108:2 <b>recess (4)</b> 36:10 75:24 86:12 134:2 <b>recognize (6)</b> 29:3 29:8 47:4,7 110:5 112:2 <b>recollection (2)</b> 136:5 137:1 <b>record (31)</b> 5:16,17 6:14,22 7:4 29:2 34:17 36:8,12 41:20,22,25 42:5 44:5 51:18 63:1 73:6 75:21,23 76:1,5 78:21 86:10 87:5 122:20 133:23,24 134:1,4 134:6 148:16 <b>redirect (4)</b> 68:2 82:21 83:21 113:1 <b>redirected (5)</b> 20:24 79:5 82:15 106:1 114:8 <b>redirection (26)</b> 79:9,11 80:7,9,22 80:25 82:21 107:13 108:5,21 109:5,8,9,21 110:22 115:12,17 115:23 116:2,9 131:8,15,20 133:12,13,14 <b>redirector (2)</b> 57:20,21 <b>redirects (1)</b> 57:24 <b>REDIR.CPP (4)</b> 63:21 66:20 67:15 67:16 <b>Redmond (1)</b> 150:22	<b>Redwood (2)</b> 2:13 2:13 <b>refer (9)</b> 20:15 48:24 60:14,24,25 61:7 62:23 105:10 143:21 <b>reference (1)</b> 145:4 <b>referrals (1)</b> 52:9 <b>referred (2)</b> 127:21 146:5 <b>referring (5)</b> 36:13 63:6 76:2 104:24 131:16 <b>refers (3)</b> 48:25 49:15 73:17 <b>reflect (1)</b> 32:4 <b>reflected (1)</b> 93:25 <b>refresh (2)</b> 136:5 136:25 <b>regarding (2)</b> 72:12 103:23 <b>regards (1)</b> 103:7 <b>registered (1)</b> 79:21 <b>relationship (1)</b> 146:2 <b>relative (3)</b> 50:6 150:13,14 <b>relatively (2)</b> 16:9 21:22 <b>release (2)</b> 28:6 32:3 <b>released (11)</b> 22:2 27:23 33:14,22 34:3 72:17 94:20 95:2,4 100:5 143:12 <b>relevant (1)</b> 92:3 <b>reman (1)</b> 90:11 <b>remarkably (1)</b> 64:3 <b>remember (12)</b> 13:3 16:6 21:8,10 28:20 46:6,8 59:7 82:9 103:12 142:11 143:3	<b>Remerge (1)</b> 61:15 <b>remote (15)</b> 69:2 82:5 105:7,11 111:14,18 116:19 116:23 117:4,18 118:7,8 123:18 124:1,7 <b>remove (1)</b> 114:15 <b>renumbered (1)</b> 21:19 <b>repackaged (1)</b> 16:12 <b>repeat (3)</b> 115:6 116:4 117:1 <b>repetition (1)</b> 37:13 <b>rephrase (3)</b> 39:12 44:21 94:4 <b>report (2)</b> 55:17,20 <b>reported (3)</b> 1:21 55:23 56:2 <b>reporter (6)</b> 5:5,7 6:20 32:19,21 54:11 <b>repositories (1)</b> 29:23 <b>repository (3)</b> 30:16 63:3 101:25 <b>represent (5)</b> 4:19 7:14 20:22 57:4 64:20 <b>representation (1)</b> 73:11 <b>representative (2)</b> 7:16 102:19 <b>representatives (1)</b> 102:21 <b>represented (1)</b> 6:6 <b>representing (1)</b> 5:18 <b>request (34)</b> 78:24 79:22 80:9,14 81:16,20 82:3,13 85:5 107:4,8,9,15 107:19,21,23,24 108:2,17 110:22 113:11,22,25	114:9,21,22,25 115:4,8 116:1,8 116:14 133:2,16 <b>requested (1)</b> 29:15 <b>requesting (4)</b> 7:15 7:16 106:16 134:10 <b>requests (9)</b> 57:23 80:24 83:21 106:24 107:1,1 113:6 114:5,7 <b>require (12)</b> 26:13 69:13 114:9 115:16 118:16,23 119:1,4 122:18 125:4,21 126:4 <b>required (2)</b> 25:6 134:15 <b>requirement (1)</b> 26:18 <b>requires (1)</b> 115:20 <b>reserved (1)</b> 33:11 <b>reside (4)</b> 115:13 131:8,10,13 <b>resides (1)</b> 146:19 <b>residing (2)</b> 149:22 150:22 <b>resolution (8)</b> 108:22 110:5 112:7,9,18,20 114:6 131:16 <b>resolve (5)</b> 82:4 111:23 112:12,23 132:12 <b>resolved (4)</b> 82:1,5 107:16 108:4 <b>resolver (1)</b> 132:12 <b>resources (2)</b> 69:2 70:6 <b>respect (7)</b> 14:15 89:2,19 97:23 129:11,15 130:10 <b>respond (4)</b> 106:21 114:4 132:9,16 <b>responding (1)</b> 42:11
---	---	--	--	--



<b>responds (3)</b> 82:6 106:23,24	112:1,11,13 117:20 121:5	25:25 26:1 83:19 131:2,4,7	71:11,12 146:8	87:25 92:16 97:4 108:3 117:20
<b>response (13)</b> 45:24 70:23 89:5 104:9 107:8,20 108:2,17 113:19 114:24 115:3,7 134:7	125:10 141:11 145:7 146:15 147:1,24 148:9	<b>running (3)</b> 41:19 73:18 100:19	<b>scenes (1)</b> 82:24	125:13,15 127:16 128:25 132:11 135:22 136:9,19 147:1,5
<b>responsibilities (3)</b> 13:18 17:1 18:19	<b>rights (1)</b> 33:11	<b>runs (3)</b> 104:22 105:3 130:24	<b>school (2)</b> 8:18,18	<b>seeing (1)</b> 63:7
<b>responsible (7)</b> 18:21 31:6,14 44:16 55:9,13 56:5	<b>right-hand (1)</b> 59:12	<b>S</b>	<b>schools (1)</b> 8:19	<b>seen (33)</b> 7:7,10,11 8:6,6,9 29:9,11 36:24 37:5 39:22 39:24 40:3,4 47:7 57:6,7,8,10,14 60:1,1 72:1 87:22 87:24 88:3 97:2,7 102:9 137:22 138:4,6 140:10
<b>responsibilities (3)</b> 13:18 17:1 18:19	<b>RMR (1)</b> 1:22	<b>S (2)</b> 2:1,3	<b>Science (4)</b> 1:5 4:7 8:21,23	<b>sees (2)</b> 79:19,24
<b>rest (2)</b> 81:12 108:12	<b>Road (1)</b> 2:4	<b>sake (1)</b> 6:20	<b>scientist (1)</b> 16:25	<b>select (1)</b> 99:9
<b>restate (3)</b> 100:12 101:7 121:6	<b>role (4)</b> 10:10 17:11 18:7 19:4	<b>sale (3)</b> 96:6 100:14 101:15	<b>scope (3)</b> 46:3 71:8 103:18	<b>selected (1)</b> 99:11
<b>restrict (1)</b> 126:21	<b>roles (1)</b> 87:10	<b>sales (4)</b> 9:24 96:3 100:7 139:18	<b>Scott (2)</b> 88:16 97:14	<b>sell (2)</b> 19:25 27:5
<b>retract (1)</b> 121:17	<b>Ronald (2)</b> 1:21 5:6	<b>Salt (1)</b> 9:6	<b>seal (1)</b> 150:16	<b>selling (1)</b> 27:16
<b>returned (1)</b> 10:6	<b>rooms (1)</b> 19:11	<b>sample (1)</b> 99:13	<b>search (3)</b> 37:18 42:12,15	<b>send (3)</b> 81:10 113:18 132:6
<b>reverse (6)</b> 15:20 20:21 76:17 77:11 77:12,13	<b>root (2)</b> 90:12,15	<b>sampled (1)</b> 139:12	<b>Seattle (6)</b> 1:16 2:18 4:1,17 23:18 87:1	<b>sending (1)</b> 113:20
<b>reversed (1)</b> 87:10	<b>roughly (5)</b> 26:19 31:3 98:17 99:14 103:13	<b>samplings (2)</b> 99:7 99:9	<b>second (8)</b> 50:12 69:12 118:5 120:4 125:15,15 127:1 145:11	<b>sends (3)</b> 116:21 117:2,16
<b>review (6)</b> 31:23 91:12 92:7 98:20 99:5 139:9	<b>route (3)</b> 134:24 135:2,6	<b>San (1)</b> 4:14	<b>secure (9)</b> 21:21 69:2 81:1,8 128:2 133:10 147:6,9,25	<b>sense (3)</b> 62:12 110:11 143:10
<b>reviewed (9)</b> 31:13 31:20 88:8,9,24 89:1 93:3 94:9,12	<b>routed (5)</b> 84:2 119:13,14,17 135:9	<b>Sauve (11)</b> 47:20 51:2 53:9,10 89:10,11,14 91:16 91:20 92:3,25	<b>securely (3)</b> 21:11 68:10,14	<b>sent (5)</b> 7:15 80:14 102:10 122:24 134:9
<b>revision (5)</b> 30:21 60:16,17,21 61:3	<b>router (1)</b> 16:11	<b>save (1)</b> 149:7	<b>security (9)</b> 12:15 12:19 14:14,15,18 15:5,21 16:14 24:19	<b>sentence (4)</b> 69:13 84:14,17,20
<b>rewriting (1)</b> 20:23	<b>routes (1)</b> 135:3	<b>saw (3)</b> 67:15 88:1 137:24	<b>security-oriented...</b> 16:15	<b>separate (5)</b> 65:19 85:1 106:11 116:14 131:15
<b>Richard (1)</b> 4:6	<b>routing (10)</b> 84:2 118:7,14 134:15 134:19,19,20 135:2,4,4	<b>saying (8)</b> 74:11 77:6 80:5 82:19 92:22 105:13 112:18 113:7	<b>see (54)</b> 7:2 8:3 9:5 14:12 15:12 33:10 33:12 35:15 47:25 58:3 59:4,12 60:12,21,25 61:1 61:14 62:17 63:6 63:10,12,19 64:21 65:4,7 69:12 71:17 72:8,9 75:10,12,13 76:3 76:11 78:16 79:8 79:11 84:13,19	<b>September (2)</b> 13:7 89:15
<b>right (39)</b> 8:10 10:2 11:25 20:23,25 24:22 27:5 36:18 50:17 62:12 63:15 63:22 64:8 65:8 66:15 67:20 68:5 74:2,9 76:14 80:6 81:22,25 86:8 90:21 111:2,14	<b>row (2)</b> 125:15 127:8	<b>says (29)</b> 7:23 8:3 33:10 35:23 42:6 48:1 49:24 58:12 59:13 60:12,21 61:14 62:17,20 66:22 67:8 71:17 72:5 73:25 74:8 74:10 76:11 78:17 80:1 108:19 112:15 127:8 136:1,20	<b>server (134)</b> 3:12 13:22 19:5,13,24 19:25 20:6,12,13 20:13,14,16,21 21:1,12,16,23 22:5 23:8,14	
	<b>rule (15)</b> 80:1,23 82:16 107:14 108:21 109:5,21 110:22 114:8 116:2,9 127:10 133:12,13,14	<b>scalable (1)</b> 14:17		
	<b>rules (13)</b> 6:5 15:6 79:2 80:22,25 81:17 115:12,17 115:23 126:6 131:8,15,20	<b>scaling (3)</b> 15:22 16:16 17:6		
	<b>rule-based (1)</b> 15:14	<b>scenario (4)</b> 71:5		
	<b>run (8)</b> 23:4 25:23			

36:20 37:4 45:2 48:25 49:10,13,17 49:18 52:4,5,8 53:24,25 54:4,16 55:7 68:3,12 70:13 80:15 82:3 82:4,6 83:10,13 83:15,24,25 84:4 85:2,6 91:3,10 95:17,22 98:11,15 99:2 100:8,14,17 105:16 106:1,9,12 107:15 108:4 110:11 111:15,15 112:4,12,15,19,21 112:23 113:1,13 113:14,14 116:2,9 116:14,18,18,22 117:3,17 118:6,14 122:10,14,18 123:2,8,10,15,17 123:18,20,23 124:1,7,7,15,17 124:18,19,20 125:4,21 126:5 127:23 130:1,5,13 130:17,19 131:4,7 131:9,14 132:4,23 132:24 133:10,20 134:21,23 135:2,5 141:7 146:4,11	19:21 20:5 <b>set (15)</b> 6:5 50:6 52:3 79:2,9,12 80:9,23 82:21 93:22 107:14 108:5 114:8 133:12 150:16 <b>sets (1)</b> 45:12 <b>setup (1)</b> 94:24 <b>seven (1)</b> 14:20 <b>several-year (1)</b> 33:19 <b>shape (1)</b> 19:6 <b>share (4)</b> 16:8 91:3 133:3 134:10 <b>shared (1)</b> 98:19 <b>SharePoint (1)</b> 30:6 <b>sharing (1)</b> 95:10 <b>sheets (1)</b> 31:11 <b>ship (1)</b> 142:10 <b>Shores (2)</b> 2:13,13 <b>Short (3)</b> 36:10 75:24 134:2 <b>show (3)</b> 73:9 126:24 127:5 <b>showing (3)</b> 34:3 34:20 35:12 <b>shown (7)</b> 46:24 48:22 52:1 53:16 65:13 75:4 125:24 <b>shows (4)</b> 23:5 52:3 66:12 73:14 <b>side (14)</b> 14:10 19:5 22:5,6 58:5 59:12 68:11,12 77:12 91:3,6 111:12,20 112:16 <b>sides (3)</b> 13:22 25:7 49:19 <b>significance (1)</b> 66:25 <b>similar (5)</b> 30:5 50:1,6 64:3 94:11 <b>simple (1)</b> 15:14 <b>simply (1)</b> 130:9	<b>simultaneous (1)</b> 95:19 <b>single (2)</b> 91:12,14 <b>Siple (1)</b> 37:22 <b>sir (2)</b> 87:19 131:23 <b>sit (1)</b> 91:8 <b>site (3)</b> 81:8 144:24 147:19 <b>sites (7)</b> 100:18,21 101:1,3,6,8 144:21 <b>sits (1)</b> 146:13 <b>sitting (1)</b> 79:24 <b>skilled (1)</b> 10:23 <b>skills (1)</b> 10:15 <b>skipped (1)</b> 76:19 <b>slash (2)</b> 58:4,7 <b>slightly (2)</b> 13:15 37:12 <b>snapshots (1)</b> 62:7 <b>Sockets (1)</b> 25:18 <b>SOCKS (119)</b> 14:25 15:16 20:18 21:5,6,23 23:3,7,7 23:14,15 24:19,21 24:24 26:12,17,21 26:24,25 27:7,13 27:16 48:23,24,25 49:2,6 51:19,22 51:23 52:1 53:17 53:18,22 63:6 82:17 83:10,13,15 83:19,20,24 84:15 84:23,24 85:3,4 90:21 95:17,21,21 106:1,9,12 107:15 107:15 112:4,12 112:14,19,21,23 113:1,13,13 116:2 116:9,14,18,18,22 117:3,17 118:1,6 118:14 119:18,23 120:1 122:6,6,10 122:14,18,25 123:2,8,9,15,17 123:18,20,20,22	123:23,25 124:6,6 124:7,14,15,17,19 125:4,20 126:5 127:23 131:4,7 132:23,24 133:10 133:20 134:20,23 135:5 141:7 146:4 146:11 <b>socks5 (2)</b> 62:22 62:23 <b>socksification (3)</b> 26:13,14 27:1 <b>socksify (1)</b> 27:6 <b>sockss5 (2)</b> 62:20 62:25 <b>SOCKS-based (2)</b> 20:16 68:3 <b>software (22)</b> 18:14 20:7,9 21:21 40:17 44:8,9,10 55:24 61:12,22 68:10 95:4,15,16 104:22 106:9,13 114:12,15,19 123:8 <b>Solutions (1)</b> 4:14 <b>somewhat (4)</b> 6:7 24:14 25:19 140:24 <b>SonicWALL (23)</b> 2:16 5:2,19 6:1 7:15,17 18:12 32:18 35:20 41:5 42:6 55:9 89:12 89:15 98:7 102:4 102:7,10,14 104:1 104:6 120:23 126:8 <b>SonicWALL's (2)</b> 5:4 121:3 <b>sorry (10)</b> 19:22 32:19 51:20 62:25 66:6 76:9 80:16 116:6 120:5 128:22 <b>sort (13)</b> 14:2 23:22	23:25 24:4,7 30:18 62:6 70:15 73:25 77:16 79:18 103:12 143:20 <b>source (103)</b> 3:17 3:18 29:23 30:16 42:7,9,12,15,16 43:2,2,5,7,8,20 44:3,17,22 45:20 45:23,24,25 46:1 47:22 49:11,23,24 50:1,2,20 51:10 51:16 52:2,3,6,9 52:20,20 53:23 54:18 55:2 56:13 56:17 57:4,11,19 57:19 59:16,23 89:2,19,20,25 90:1 91:12 92:4,5 92:5,8,9,12,14,20 92:24 93:8 94:5 94:12 95:7,8 97:23 98:4,10,20 98:23 99:1,6,10 99:13,17,18 100:1 101:21,25 103:21 103:21,23,25 104:1,6,8,11,15 124:4,10,23 134:6 134:10 139:11,14 140:13,14,17 141:3 <b>space (3)</b> 11:15 15:1 18:5 <b>spanning (2)</b> 33:18 36:3 <b>speak (3)</b> 30:24 89:8 98:3 <b>special (1)</b> 118:16 <b>specialized (1)</b> 9:20 <b>specific (7)</b> 59:16 116:5,21 117:3,16 118:6,19 <b>specifically (5)</b> 12:5 103:11 105:19 107:10
---	--	--	--	---

121:7 <b>specified (1)</b> 46:2 <b>specify (1)</b> 80:25 <b>speculate (1)</b> 136:9 <b>Speculating (1)</b> 39:4 <b>spend (3)</b> 71:20 89:22 98:9 <b>spent (3)</b> 9:24 23:19 98:12 <b>Sperry (9)</b> 9:5,9,13 9:21 10:6,11,15 12:23 13:5 <b>splitting (1)</b> 17:5 <b>spoof (1)</b> 131:21 <b>spring (1)</b> 22:3 <b>SRC (1)</b> 3:16 <b>ss (2)</b> 149:3 150:3 <b>SSL (5)</b> 24:20,20 24:22,24 82:17 <b>SSL-encrypted (1)</b> 83:20 <b>stack (5)</b> 11:5,8 72:9 74:19 108:22 <b>stacks (1)</b> 73:12 <b>stamp (6)</b> 45:19 58:19,23 65:12,13 66:1 <b>stamped (1)</b> 108:8 <b>stamps (2)</b> 59:19 94:12 <b>standard (15)</b> 11:14,20,22,25 12:1 21:9 25:20 35:11 56:18 114:4 114:7,11,21 130:9 130:10 <b>standards (1)</b> 25:20 <b>standing (2)</b> 72:10 72:22 <b>standpoint (3)</b> 24:1 25:3 26:2 <b>stands (3)</b> 21:6 49:22 52:16 <b>start (12)</b> 9:3 12:18	19:25 38:20 40:20 50:11 57:6 58:11 64:21 72:3 75:14 132:20 <b>started (5)</b> 10:14 19:20 21:24 43:20 101:4 <b>starting (5)</b> 8:17 43:8 58:21 76:6,7 <b>startup (4)</b> 9:22 10:5 16:21 23:5 <b>state (11)</b> 4:18 5:16 8:22 9:1 63:5 134:5 149:2,21 150:3,6,22 <b>stated (1)</b> 135:8 <b>stateful (1)</b> 15:13 <b>statement (1)</b> 61:17 <b>states (5)</b> 1:1 4:9 41:6 50:16 125:16 <b>stating (2)</b> 61:23 73:5 <b>stayed (1)</b> 10:8 <b>stenographically ...</b> 150:8 <b>step (3)</b> 75:11 76:19 110:23 <b>steps (2)</b> 81:13 89:17 <b>Steve (1)</b> 13:24 <b>stint (1)</b> 9:7 <b>stole (1)</b> 111:6 <b>store (6)</b> 30:15,18 32:14 39:7 41:2 56:13 <b>stored (21)</b> 30:10 30:20 32:25,25 37:14 39:9,15,17 40:6,24 41:9 45:6 45:7,14 52:5,12 52:14 53:25 54:3 54:6 80:21 <b>Stow (2)</b> 2:21 4:13 <b>straight (1)</b> 24:22 <b>straightening (1)</b> 19:17	<b>strategy (2)</b> 99:20 139:5 <b>stream (3)</b> 17:5 108:20 109:1 <b>streaming (2)</b> 17:4 17:6 <b>street (1)</b> 14:21 <b>strictly (2)</b> 15:14 25:25 <b>strike (12)</b> 27:22 28:5 32:13 44:1 56:11 64:11 80:16 85:23 94:4 129:21 142:24 144:15 <b>structure (8)</b> 45:16 49:19 93:21,25 94:10 99:22,24 110:3 <b>structured (1)</b> 44:7 <b>stuff (4)</b> 10:18 13:23 49:18 61:15 <b>subjects (1)</b> 145:11 <b>submitted (1)</b> 110:22 <b>subnet (1)</b> 109:14 <b>subordinates (1)</b> 37:10 <b>subpoena (15)</b> 3:8 7:14 29:13 40:5 42:11 45:24 46:2 46:3 89:6 102:9 103:2,9 104:9 134:7 138:1 <b>subpoenaed (2)</b> 37:7 97:6 <b>SUBSCRIBED (1)</b> 149:16 <b>subsequent (2)</b> 107:21,23 <b>subsequently (3)</b> 81:24 82:13 110:4 <b>subsystems (1)</b> 9:12 <b>suitable (1)</b> 19:13 <b>suite (8)</b> 1:15 2:4,9 2:18 4:17 14:18	15:10,22 <b>summary (1)</b> 108:19 <b>support (2)</b> 9:24 136:23 <b>supported (1)</b> 70:23 <b>supports (1)</b> 137:7 <b>supposed (2)</b> 113:4 143:7 <b>sure (23)</b> 7:10,11 7:19 15:10 21:23 22:24 28:2,23 29:12 34:22 48:15 58:20 59:5 64:17 72:24 88:6,14 93:1,24 94:10 121:3,8 142:14 <b>suspect (1)</b> 49:20 <b>swear (1)</b> 5:7 <b>sworn (3)</b> 5:11 149:16 150:10 <b>system (40)</b> 11:6 15:11,25 30:5,17 30:18 33:4 37:8 37:14,18,19 39:7 39:10,16 40:8 41:9,13 44:3,23 45:15,25 46:11 47:16 56:7,13 58:1 63:3,3 66:1 77:3,11 82:2 109:3,11 114:13 114:16,19 132:23 145:25 146:5 <b>systems (11)</b> 8:24 9:10,11,17,24 11:3 14:1,2 20:19 67:3 136:23 <b>S-a-u-v-e (1)</b> 91:20 <b>S5 (9)</b> 48:23,24 51:19,22,23 52:1 53:17,18,22 <b>S5HOOK (2)</b> 63:18 63:19	<b>T</b> <b>T (8)</b> 5:21 87:8 112:3 141:15,15 149:1 150:1,1 <b>table (3)</b> 112:3 125:13 136:19 <b>tag (2)</b> 82:9 110:4 <b>tagged (1)</b> 47:3 <b>take (14)</b> 8:15 36:6 41:18 62:7,13 75:14,20 83:21,25 106:15 110:23 142:12 146:18,23 <b>taken (5)</b> 1:15 86:12 149:5 150:7 150:12 <b>takes (3)</b> 57:23 112:18,20 <b>talk (2)</b> 25:7 141:17 <b>talked (1)</b> 24:7 <b>talking (13)</b> 6:21 22:5 55:4 103:1 110:25 120:16,18 121:3,4,13 135:13 141:6 145:5 <b>Talks (1)</b> 60:18 <b>tape (3)</b> 75:19 76:1 134:4 <b>target (43)</b> 81:1 83:8 84:5,9 105:11 106:3,13 108:4 110:7,17,19 110:24 112:16 113:3 115:1,5,9 117:22,25 118:9 118:17,20,24 119:1,4,15 123:2 123:10 124:17,20 124:24 126:2,4 131:2,6 132:4 135:3 141:8 145:13,18 146:1 146:13,15 <b>TCP (14)</b> 20:17,17 24:22 82:14 84:16
--	--	---	---	---

84:23 85:9 111:17 112:1 113:18 119:25 123:19 127:20,22 <b>TCP's (1)</b> 113:18 <b>TCP-originated (...)</b> 20:18 <b>TCP/IP (17)</b> 10:17 10:24 11:7 12:3 21:3 26:1 73:19 73:20 74:19 77:20 77:23 85:2,8 105:19 108:22 114:25 119:24 <b>team (3)</b> 14:7 47:9 47:15 <b>teams (1)</b> 18:25 <b>tech (1)</b> 14:11 <b>technical (18)</b> 24:1 29:13 30:12,22,23 31:1,5,6,10 35:4,5 35:10,10 36:15 38:2,6,13,16 <b>technically (2)</b> 106:5 108:24 <b>technologies (2)</b> 14:1,8 <b>technology (4)</b> 14:17,24 17:3 120:6 <b>tell (13)</b> 8:17 11:16 21:6 42:20,22 49:10,12,19 67:22 69:18,20 84:20 142:7 <b>tells (1)</b> 82:6 <b>tend (1)</b> 20:4 <b>term (3)</b> 20:6,16 29:13 <b>terminated (1)</b> 147:13 <b>terminology (1)</b> 62:3 <b>terminus (1)</b> 147:15 <b>terms (2)</b> 31:11	120:16 <b>tested (3)</b> 95:15,16 95:18 <b>testified (5)</b> 5:12 125:3 129:20 134:23 136:13 <b>testify (4)</b> 5:25 7:17 8:11 150:10 <b>testifying (2)</b> 141:20 145:11 <b>testimony (11)</b> 6:25 91:5 125:19 129:22 134:25 135:5,12 136:12 138:4 139:23 150:11 <b>testing (3)</b> 23:14 78:10 137:15 <b>Texas (2)</b> 1:2 4:10 <b>text (1)</b> 123:11 <b>Thank (16)</b> 42:10 48:17 96:14,22 101:19 110:20 121:10,18 124:21 126:23 127:13 134:12 147:3 148:11,12,13 <b>Thanks (3)</b> 42:2 90:16 121:11 <b>thing (4)</b> 6:19 70:4 77:10 82:18 <b>things (15)</b> 11:14 15:6 16:17 19:11 21:19 23:22 24:8 25:3,8 30:16,20 31:2,11 71:1 145:4 <b>think (31)</b> 7:10 9:19 15:4,17 20:5 20:15 22:1 28:2 30:5 31:9 34:6 36:6 58:20 59:4 59:25 60:25 61:3 63:14 88:5 100:18 103:14,15 120:4 126:7 129:13	130:16 142:9,11 146:22 147:23 148:10 <b>thinking (2)</b> 120:6 121:15 <b>third (4)</b> 135:22,24 135:25 136:19 <b>Thomas (2)</b> 2:12 4:20 <b>thomas.king@we...</b> 2:14 <b>thought (2)</b> 46:3 142:15 <b>thousand (2)</b> 90:5,6 <b>three (1)</b> 60:9 <b>till (1)</b> 26:19 <b>time (97)</b> 4:12 6:21 8:8 9:6,14,15,18 10:11,22 11:20 13:18 14:22 18:7 18:24 21:24 23:19 26:8 29:24 30:21 35:17 36:9,12 38:10,12,19,21 39:1 40:20 41:13 41:21 42:1 43:19 44:10,22 45:5,12 45:19,20 46:2 49:9 55:10 56:2 56:15 58:19,23 59:18,18 62:7,11 62:13 65:12,13,17 65:21 66:1,1,12 66:19 67:5,10 72:16 74:23 75:22 76:1,24 78:12 85:16 86:11 87:6 88:12,12 89:22 92:17,21 94:12,13 95:23,25 96:1,11 97:11,12 98:9 103:22 107:22 126:18 133:25 134:4,8 137:24 138:9,10 140:25 141:18 148:12,16	150:12 <b>times (3)</b> 21:6 66:12 127:9 <b>title (2)</b> 16:23 55:22 <b>titled (1)</b> 48:1 <b>today (8)</b> 4:13 5:5 6:1,8,25 8:12 30:6 140:10 <b>Today's (1)</b> 4:11 <b>tokens (1)</b> 70:24 <b>told (5)</b> 23:2 50:23 50:25 53:4 134:14 <b>Tom (6)</b> 72:10,21 103:1,2,15,15 <b>Tomlinson (7)</b> 1:13 5:10,17,23 148:15 148:18 149:12 <b>tool (2)</b> 43:2,3 <b>top (15)</b> 8:3 33:10 35:24 50:1 58:12 58:25 59:19 62:17 64:21 65:13 73:17 90:4 125:13 129:1 136:20 <b>topic (2)</b> 12:16,19 <b>topics (3)</b> 7:17 8:4 8:11 <b>top-level (2)</b> 46:19 46:24 <b>track (1)</b> 44:22 <b>tracking (1)</b> 45:5 <b>trade (1)</b> 23:5 <b>traffic (14)</b> 20:17 21:11 68:2 74:19 79:4,25 80:18 81:10 83:24 85:8 105:23 113:17 119:24 121:22 <b>transcribed (1)</b> 150:8 <b>transcript (2)</b> 150:10,11 <b>transferring (1)</b> 142:11 <b>transit (1)</b> 83:24 <b>translate (1)</b>	112:11 <b>translated (1)</b> 81:19 <b>translates (1)</b> 130:22 <b>translations (1)</b> 131:21 <b>transmit (1)</b> 147:6 <b>transmits (1)</b> 147:9 <b>transmitted (4)</b> 119:25 123:9,12 124:24 <b>transparent (2)</b> 85:10,11 <b>transparently (1)</b> 85:4 <b>treats (1)</b> 109:12 <b>tree (6)</b> 49:23,24 50:1 55:9 56:6 92:6 <b>trees (1)</b> 50:2 <b>tries (2)</b> 113:8 132:25 <b>true (6)</b> 117:12 120:1 144:22 146:17 149:6 150:10 <b>trunk (6)</b> 61:15,25 62:3,6,11,13 <b>truthful (1)</b> 6:25 <b>truthfully (1)</b> 150:10 <b>try (3)</b> 6:21 77:4 126:21 <b>trying (2)</b> 24:15 142:10 <b>tunnel (27)</b> 21:11 68:13 69:14,15 82:17 83:20,22,23 84:1,24 85:7 119:8,11,12,19 120:2,9,12,23,24 121:2 128:8,15,16 131:24 141:7,7 <b>tunneled (1)</b> 20:17 <b>tunneling (2)</b> 120:6
--	---	---	--	---

122:23 <b>turn (11)</b> 19:8 33:7 60:6 87:16 109:18 122:21 125:6 128:19 135:20 137:17 146:1 <b>turning (1)</b> 7:18 <b>turnkey (1)</b> 19:10 <b>two (17)</b> 8:19 9:24 16:2 20:4,10 29:22 56:23 57:4 79:17 95:19 98:18 124:5,5 139:6 144:6 146:1 147:14 <b>Tyler (2)</b> 1:3 4:10 <b>type (6)</b> 10:17,18 27:4 31:4 79:23 107:9 <b>typical (3)</b> 56:12 70:22 77:10 <b>typically (10)</b> 30:15 34:10 35:17 62:5 68:15 83:2,4,18 83:19 122:7	128:14 135:13 <b>understanding (6)</b> 36:1 75:3 104:11 119:10 127:19 128:1 <b>undertake (4)</b> 97:22 99:25 139:1 139:13 <b>unique (1)</b> 62:9 <b>Unisys (3)</b> 10:9 12:24 13:5 <b>United (2)</b> 1:1 4:9 <b>Univac (4)</b> 9:6,9,21 10:15 <b>Univac's (1)</b> 9:13 <b>University (2)</b> 8:22 11:10 <b>Unix (13)</b> 10:15,16 11:5,6,8 13:21,22 14:5,5 63:3,4,23 67:6 <b>unknown (1)</b> 107:21 <b>unsure (1)</b> 21:18 <b>unusual (1)</b> 67:14 <b>update (1)</b> 34:7 <b>URL (1)</b> 20:24 <b>URLs (1)</b> 20:23 <b>use (22)</b> 11:24 42:17,18 64:9 68:13,23 69:1,7 73:18 74:1,6 77:16,23 78:2 100:17 101:17,18 115:16 133:1,6 137:14 142:16 <b>user (26)</b> 34:25 35:11 40:10,16 41:2 68:16,17 70:1,21,24,25 71:3,4,12 78:8,9,9 82:23,23 83:2,5 85:12 99:21 115:17,21,22 <b>users (4)</b> 40:13,16 68:23 70:9	<b>user's (4)</b> 31:1 39:19 40:1 69:6 <b>uses (3)</b> 32:18 45:2 96:9 <b>usr/aventail/pro...</b> 62:18 <b>Utah (1)</b> 9:6 <b>utility (1)</b> 27:7 <b>utilize (1)</b> 40:14 <b>U.S (1)</b> 11:23	121:7,9,14,19,20 122:23 127:15 131:25 132:19 135:14,17,17,18 136:14,20 141:4 144:9 <b>versions (9)</b> 23:21 41:8 44:6 46:6,21 46:24 61:25 63:7 90:2 <b>vice-president (1)</b> 18:13 <b>video (3)</b> 4:12,13 4:16 <b>Videographer (14)</b> 2:21 4:5 5:5 36:8 36:11 41:20,25 75:21,25 86:10 87:5 133:24 134:3 148:14 <b>videotape (4)</b> 1:11 4:6 148:15,17 <b>view (2)</b> 31:10 84:14 <b>viewed (1)</b> 24:12 <b>VirnetX (9)</b> 1:5 4:7 4:23,25 6:13 102:4,7,11,15 <b>virtual (6)</b> 14:23 15:2,18 128:25 129:3,6 <b>voiceover (1)</b> 148:1 <b>Volume (1)</b> 4:5 <b>Von (1)</b> 2:9 <b>vouch (1)</b> 138:23 <b>vouched (1)</b> 54:21 <b>VP (1)</b> 146:4 <b>VPN (73)</b> 15:18 18:16 19:25 20:4 20:11,12,16 21:2 21:4 22:7 43:12 57:24 68:2,3,5,7 69:7,25 70:5,6,10 71:4 79:4,5,6,21 79:22 80:2,7,18 81:10,17,17 82:1	83:6,9 84:2,4 85:18 86:1 105:16 109:8,10 115:4,8 119:5 123:14 128:5,11,12 129:13,14,18,24 134:14,16 135:4,6 135:8,9,10 143:11 144:17 146:7,7,12 146:14 147:5,10 147:15,20,25 148:2 <b>vs (1)</b> 4:8 <b>V260 (2)</b> 48:1,3 <b>V3.1 (1)</b> 129:12 <b>v3.1/v2.6 (2)</b> 3:10 3:14 <b>v3.2 (1)</b> 3:12 <b>V310 (1)</b> 48:10 <b>V320 (1)</b> 48:12
<hr/> <b>U</b> <hr/> <b>U (1)</b> 141:15 <b>UDP (5)</b> 20:20 21:3 105:23 117:11 119:25 <b>ultimate (2)</b> 145:13 147:14 <b>ultimately (1)</b> 74:16 <b>un (1)</b> 21:18 <b>unclear (1)</b> 44:20 <b>underlying (2)</b> 11:3 25:22 <b>undersigned (1)</b> 150:6 <b>understand (14)</b> 5:25 6:14,18 34:22 83:3 87:12 105:13 121:13 126:20 128:4,7,10	<hr/> <b>V</b> <hr/> <b>v (5)</b> 1:7 50:8 59:13 135:8 149:1 <b>Valentine (3)</b> 55:16 55:17 56:2 <b>Valley (1)</b> 8:20 <b>variation (1)</b> 15:24 <b>variations (1)</b> 14:3 <b>variety (2)</b> 27:12 44:15 <b>various (2)</b> 15:17 60:18 <b>varying (1)</b> 22:25 <b>verified (1)</b> 92:9 <b>verify (2)</b> 89:8 97:22 <b>verifying (1)</b> 89:22 <b>version (81)</b> 21:15 21:22 25:17 41:7 43:11 44:6 47:24 48:5,6,11,13,16 48:18,25 49:6,11 50:8,9,10,16,19 50:20 51:4,11,14 51:16 52:2,6,12 52:19,21 53:11,16 54:12,14 55:1,3 59:16 62:2 63:8 63:11,14 67:16 88:8 90:19 91:13 95:4 96:3,6,9,16 96:20 98:15 100:8 100:14,17,22,25 101:4,9 104:25 105:3 120:20,21	<hr/> <b>W</b> <hr/> <b>Wade (3)</b> 55:16,17 56:2 <b>wait (2)</b> 22:1 127:1 <b>waiving (1)</b> 73:5 <b>walk (4)</b> 8:16,16 71:21 73:13 <b>want (10)</b> 6:5 11:24 16:10 36:14 69:3 71:20 72:22 73:7 121:2 141:17 <b>wanted (7)</b> 16:11 79:8,10,11 83:3 99:17 134:5 <b>wanting (1)</b> 27:2 <b>wants (2)</b> 77:9 82:13 <b>Washington (10)</b> 1:16 2:18 4:1,17 87:1 149:2,21 150:3,7,22 <b>wasn't (6)</b> 25:24,24 27:3 72:16 104:4 142:20 <b>way (14)</b> 6:7 8:21		

10:14 18:25 21:11 24:19 25:22 26:17 44:7 47:2 67:1 79:14 105:22 114:10 <b>ways (1)</b> 24:11 <b>Web (9)</b> 15:19 16:17 20:21,23,25 78:2 144:21,24 147:19 <b>Web-based (1)</b> 30:4 <b>Web-only (1)</b> 21:2 <b>week (1)</b> 134:7 <b>Weil (2)</b> 2:12 4:20 <b>went (14)</b> 8:18,19 8:19 9:22 10:8,15 13:9 15:24 16:21 29:14,17 37:6 51:21 140:13 <b>weren't (1)</b> 11:14 <b>we'll (3)</b> 16:18 38:20 58:11 <b>we're (12)</b> 55:4 63:7 66:6 113:4 120:18 121:1,3,4 121:8 126:16 148:9,10 <b>we've (11)</b> 22:5 36:5 42:3 50:20 55:4 57:3 111:4 112:13 119:16 121:13 135:12 <b>WHEREOF (1)</b> 150:16 <b>whichever (1)</b> 124:12 <b>white (1)</b> 31:10 <b>wide (1)</b> 27:12 <b>wide-area (3)</b> 11:20,21 12:2 <b>Win (5)</b> 63:18 73:12 74:13 137:9 144:17 <b>window (2)</b> 46:14 66:11	<b>Windows (4)</b> 3:11 3:15 63:3 73:18 <b>Windows-based ...</b> 68:21 <b>WINS (13)</b> 132:11 132:13,15,19,20 132:22,23,25 133:2,9,13,16 137:14 <b>WinSock (44)</b> 25:10,11,13,14,15 25:18,23 73:21,21 73:25,25 74:2,4,5 74:5,6,6,13,14,16 80:1 85:17 86:1 106:24,25 107:1,4 107:21,23 111:1 136:23 137:4,4,5 137:7,9 142:4 143:2,12,15,16,23 144:1,17 <b>witness (141)</b> 2:16 5:8,17 17:15,17 17:19 22:24 28:1 28:9,12 29:11 31:9,17 32:6,11 32:18,20 33:3,16 33:24 34:5,22 35:7,15 36:1 37:16 38:4,9,19 39:3,12 40:12,19 41:2,11,15 42:22 43:1,10,15,22 44:5,12,15 45:2 46:12 47:2 48:5 48:20 49:4,8 50:5 50:23 51:2,13 52:8,14,23 53:4 54:3,9,16,21 55:6 56:15,20 57:1,10 57:17 59:22 61:20 63:2 65:2,16 66:22 67:5,18,25 68:9,21 69:1,20 70:4,12,18 71:7 71:15 72:15 73:11	73:24 75:1,8 76:24 77:19 78:1 78:8 79:1,17 80:20 81:3,12 83:2,12,17 84:7 84:11,22 85:14 90:14,20 96:11 106:5,18,23 115:11,20 116:12 117:1 118:22 122:5 123:5 126:17 130:16 131:20 134:18 141:13 143:15 144:3,8,19 145:1 145:20,25 146:10 146:17 147:18 148:4,13 150:7,9 150:16 <b>WordPad (3)</b> 63:24 66:5,9 <b>words (4)</b> 24:23 25:24 26:22 111:8 <b>work (15)</b> 6:8 11:13 13:21 18:3 23:12,22 26:25 27:12,14 31:4 32:4 71:18 75:3 94:24 142:8 <b>worked (11)</b> 9:11 9:18 15:9 19:3 23:24 51:14 75:3 94:25 95:3 142:3 142:15 <b>working (11)</b> 9:4 12:18 19:1 23:1 23:19 25:4 27:8 38:21 137:12 142:21 145:1 <b>works (1)</b> 71:22 <b>world (2)</b> 26:20 147:4 <b>wouldn't (1)</b> 34:5 <b>wrap (1)</b> 85:15 <b>wrapper (1)</b> 122:8 <b>write (6)</b> 30:25	31:2 67:11 92:25 98:23 140:14 <b>writer (1)</b> 35:4 <b>writing (4)</b> 31:7 35:5,10 36:15 <b>written (3)</b> 31:19 38:1 140:18 <b>wrong (3)</b> 120:5 125:8 146:23 <b>wrote (2)</b> 37:23 61:11 <b>www.google.com...</b> 77:2 80:6 <b>www.myco.com (...)</b> 79:20,23 <hr/> <b>X</b> <hr/> <b>X (4)</b> 3:1 5:21 87:8 141:15 <b>X.25 (3)</b> 10:25 11:16,25 <hr/> <b>Y</b> <hr/> <b>yeah (34)</b> 8:13 10:2 10:2 12:20 31:10 34:1 63:12,20 64:3 66:14 67:5 69:20 71:23 72:20 73:15 76:10 77:13 78:13,13 79:1,13 79:17 81:12 91:7 95:16 102:18 103:16 106:18 108:18 111:17 118:10 127:7 129:10 136:2 <b>year (5)</b> 8:25 34:11 34:11 35:22 81:6 <b>years (7)</b> 9:7,24 13:11,16 23:17 29:15 40:19 <b>yup (1)</b> 63:21 <hr/> <b>0</b> <hr/> <b>00000015 (1)</b> 108:8 <b>00000120 (1)</b>	128:22 <b>00000143 (1)</b> 127:8 <b>0000052 (1)</b> 125:7 <b>00005120 (1)</b> 128:20 <b>00015 (1)</b> 72:12 <b>00016 (1)</b> 72:12 <b>015 (1)</b> 108:14 <b>04-6-10 (1)</b> 150:23 <hr/> <b>1</b> <hr/> <b>1 (8)</b> 3:8 4:6 7:5 75:11 76:3,11,22 108:16 <b>1.1 (8)</b> 73:21 74:4,5 136:23 137:4,4,7 137:10 <b>1.5 (2)</b> 59:13 60:21 <b>1:22 (1)</b> 59:7 <b>1:35 (2)</b> 87:2,6 <b>10 (5)</b> 13:11,15 72:4,5 135:20 <b>10:08 (2)</b> 4:2,12 <b>10:58 (1)</b> 36:9 <b>100 (1)</b> 2:4 <b>11 (11)</b> 71:16,21 75:9,10,15 76:3,9 76:10 108:7,9 136:17 <b>11:09 (1)</b> 36:12 <b>11:18 (1)</b> 41:21 <b>11:21 (1)</b> 42:1 <b>116 (3)</b> 129:14,24 147:2 <b>12 (5)</b> 71:21 84:13 84:17 109:18,19 <b>12:11 (1)</b> 75:22 <b>12:17 (1)</b> 76:1 <b>12:33 (2)</b> 86:11,13 <b>120 (1)</b> 128:22 <b>13 (4)</b> 71:21 75:10 75:15 84:18 <b>13th (1)</b> 150:16 <b>1322 (3)</b> 59:9,10 64:4 <b>141 (1)</b> 3:4
---	---	--	--	--

<b>15 (1)</b> 101:14	108:7 125:6,10	<b>25 (2)</b> 146:21,23	<b>39 (1)</b> 3:14	<b>7th (1)</b> 66:22
<b>15th (1)</b> 141:4	128:19 129:14,24	<b>27 (5)</b> 1:19 4:1,11	<hr/>	<hr/>
<b>18191 (1)</b> 2:9	130:5,8 135:14,20	87:1 149:6	<b>4</b>	<b>8</b>
<b>1822 (1)</b> 11:22	137:5 139:22,24	<b>275 (1)</b> 2:4	<b>4 (11)</b> 3:14 15:14	<b>8th (3)</b> 59:6 61:2
<b>19 (2)</b> 3:8 12:20	142:4 143:2,12,15	<b>28 (1)</b> 3:10	39:18,20 137:17	64:4
<b>1979 (1)</b> 9:2	143:16,23 144:1	<b>2900 (2)</b> 1:15 4:17	138:24 139:1,9,14	<b>80 (1)</b> 14:7
<b>1982 (1)</b> 10:14	144:17 146:18	<hr/>	139:18,23	<b>87 (1)</b> 3:3
<b>1985 (2)</b> 10:1,3	147:2	<b>3</b>	<b>4,000 (1)</b> 91:2	<hr/>
<b>1986 (1)</b> 13:2	<b>2nd (1)</b> 59:6	<b>3 (37)</b> 3:12 15:14	<b>4:13 (1)</b> 66:23	<b>9</b>
<b>1989 (4)</b> 10:8 13:1	<b>2.0 (1)</b> 137:10	36:19,22,24 37:2	<b>400 (1)</b> 2:18	<b>9 (3)</b> 72:5,8 73:8
13:4,7	<b>2.6 (20)</b> 3:16 42:8	37:23 38:1,7	<b>41 (1)</b> 3:16	<b>90 (1)</b> 16:8
<b>1995 (1)</b> 26:19	48:5,6 50:17	39:15 54:13,19	<b>48 (3)</b> 125:10,12,24	<b>925 (2)</b> 1:15 4:17
<b>1996 (5)</b> 12:20 23:1	51:16 52:2,4,6,12	55:4 75:11 96:24	<hr/>	<b>92612 (1)</b> 2:10
23:5 36:3 43:8	52:19,21 135:14	96:25 97:2,4,7,11	<b>5</b>	<b>94025-4004 (1)</b> 2:5
<b>1996-1999 (2)</b>	135:17 136:1,6,14	97:20,23 98:4,10	<b>5 (28)</b> 3:3,16 11:6	<b>94065 (1)</b> 2:13
33:10 35:24	136:22 137:2	99:6,9,13,17,18	41:23 42:4,5	<b>95 (3)</b> 14:22 73:12
<b>1997 (3)</b> 23:12,18	144:3	100:5 101:12	46:25 48:25 49:2	73:18
144:9	<b>2:41 (1)</b> 133:25	127:3,5 130:5,9	49:6 50:9,21	<b>97 (1)</b> 14:22
<b>1998 (4)</b> 23:13 28:2	<b>2:56 (1)</b> 134:4	134:4 148:15	51:11,17 53:12	<b>98104 (1)</b> 4:17
28:23 78:13	<b>2000 (14)</b> 13:16,16	<b>3,000 (2)</b> 98:17,20	54:13 55:2 57:5	<b>98121 (1)</b> 2:18
<b>1999 (11)</b> 13:12	16:20 28:7,18	<b>3.1 (47)</b> 3:16 41:7	63:6,11 64:5 66:4	
23:17 28:22 33:22	35:22,22 78:13	42:8 48:11,18	66:6 90:8,21	
34:3 36:3 61:2	95:12 96:16,20	50:8,9,10,16,19	92:25 93:5 139:20	
66:23 75:4 78:11	101:9,14 141:4	50:20 51:4,11,14	<b>500 (1)</b> 2:9	
144:16	<b>2001 (1)</b> 141:2	63:11 75:5 77:17	<b>5120 (1)</b> 128:21	
<b>1999/02/08 (1)</b>	<b>2002 (8)</b> 17:11,23	77:20 78:6 90:19	<b>56 (2)</b> 3:17,18	
60:22	18:8 21:19,25	91:13 96:3,6,9,16	<hr/>	
<hr/>	22:2 36:16 81:6	96:20 104:25	<b>6</b>	
<b>2</b>	<b>2003 (15)</b> 18:8,19	105:3 120:21	<b>6 (22)</b> 3:17 7:18,20	
<b>2 (84)</b> 3:10 25:10	19:2,18,20 20:1	121:9,14,20	56:24 57:3,7,8,18	
25:11,13,14,18	20:11 21:16 22:3	122:23 127:15	58:24 59:2 60:7	
28:25 30:7,10	38:12,21 39:6	129:15,18 131:25	61:18 62:16 64:16	
32:9 34:25 35:11	50:3 101:22,25	132:19 134:15	65:3,10,14 67:16	
36:13 43:11 50:12	<b>2004 (3)</b> 43:3,5	135:10,13,18	140:2,5,11,15	
50:16,19 52:21	101:25	136:7 137:2 141:4	<b>6:07CV80V(LE...</b>	
67:21 69:11 73:9	<b>2007 (9)</b> 3:9 89:4	144:4 145:12	1:7 4:10	
73:21,25,25 74:2	97:7 98:2 103:5	<b>3.2 (22)</b> 3:16 36:20	<b>650.802.3210 (1)</b>	
74:5,6,6,13,16	104:10,12 138:2,5	42:8 48:16 53:11	2:14	
75:6,11 76:1,2	<b>2008 (1)</b> 89:16	53:16,24 54:12,14	<b>650.815.7560 (1)</b>	
85:17 86:1 87:17	<b>2009 (7)</b> 1:19 4:1	55:1,3 63:14	2:5	
87:20,23 88:3,8	4:11 87:1 149:6	98:11,15 99:2	<hr/>	
88:12,25 89:9,18	149:17 150:16	100:8,14,17,22,25	<b>7</b>	
89:23 90:3 91:23	<b>201 (1)</b> 2:13	101:4,9	<b>7 (10)</b> 3:8,18 13:2	
92:3,8,11,14,21	<b>206.438.7367 (1)</b>	<b>3.6 (2)</b> 48:13,15	56:24 57:4 64:13	
93:9,14 94:1,7,11	2:19	<b>3:17 (2)</b> 148:16,19	64:15,25 69:10	
94:14,20 101:12	<b>2101 (1)</b> 2:17	<b>36 (1)</b> 3:12	140:5	

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<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>11/839,987</b>	Filing Date <b>08/16/2007</b>	<input type="checkbox"/> To be Mailed
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APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY			
	(Column 1)	(Column 2)	SMALL ENTITY <input type="checkbox"/>	OR		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A		N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A		N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A		N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =		X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =		X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).					
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>						
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL		TOTAL	


APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY			
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		
AMENDMENT	01/10/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 1	Minus ** 20	= 0	X \$ =		OR X \$52=	0
	Independent <small>(37 CFR 1.16(h))</small>	* 1	Minus *** 3	= 0	X \$ =		OR X \$220=	0
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<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>								
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APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY			
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
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					TOTAL ADD'L FEE		OR TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:  
 /PATRICIA F. LEWIS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**  
 If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

<b>Application Number</b> 	<b>Application/Control No.</b> 11/839,987	<b>Applicant(s)/Patent under Reexamination</b> LARSON ET AL.

<b>Document Code - DISQ</b>	<b>Internal Document – DO NOT MAIL</b>
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<b>TERMINAL DISCLAIMER</b>	<input checked="" type="checkbox"/> <b>APPROVED</b>	<input type="checkbox"/> <b>DISAPPROVED</b>
Date Filed : 01/10/11	<b>This patent is subject to a Terminal Disclaimer</b>	

<b>Approved/Disapproved by:</b>
Felicia D. Roberts 11/679,416

U.S. Patent and Trademark Office

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	11839987
<b>Filing Date:</b>	16-Aug-2007
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Filer:</b>	Toby H. Kusmer./Kerrie Jones
<b>Attorney Docket Number:</b>	77580-0066 (VRNK-1 CP2DVCN)

Filed as Large Entity

### Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
Submission- Information Disclosure Stmt	1806	1	180	180
<b>Total in USD (\$)</b>				<b>180</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	9446724
<b>Application Number:</b>	11839987
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	9470
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
<b>Filer:</b>	Toby H. Kusmer./Kerrie Jones
<b>Filer Authorized By:</b>	Toby H. Kusmer.
<b>Attorney Docket Number:</b>	77580-0066 (VRNK-1CP2DVCN)
<b>Receipt Date:</b>	15-FEB-2011
<b>Filing Date:</b>	16-AUG-2007
<b>Time Stamp:</b>	14:18:37
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$180
RAM confirmation Number	644
Deposit Account	501133
Authorized User	

### File Listing:

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60	NPL Documents	Glossary.pdf	492648	no	27
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61	Fee Worksheet (PTO-875)	fee-info.pdf	30626	no	2
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<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>	



**INFORMATION DISCLOSURE STATEMENT BY APPLICANT***(Use as many sheets as necessary)***Complete if Known**

Application Number	11/839,987
Filing Date	08-16-2007
First Named Inventor	Victor Larson
Art Unit	2453
Examiner Name	Lim, Krisna
Docket Number	077580-0066

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				Art Unit	2453
				Examiner Name	Lim, Krisna
				Docket Number	077580-0066

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				First Named Inventor	Victor Larson
				Art Unit	2453
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		Art Unit	<b>2453</b>
		Examiner Name	<b>Lim, Krisna</b>
		Docket Number	<b>077580-0066</b>

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				Examiner Name	<b>Lim, Krisna</b>
				Docket Number	<b>077580-0066</b>

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		Examiner Name	<b>Lim, Krisna</b>
		Docket Number	<b>077580-0066</b>

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		Docket Number	<b>077580-0066</b>

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	D1331	Search Report, IPER (dated Jan. 14, 2003), International Application No. PCT/US01/13260.	
	D1332	Search Report, IPER (dated Nov. 13, 2002), International Application No. PCT/US01/04340.	
	D1333	Shankar, A.U. "A verified sliding window protocol with variable flow control". Proceedings of ACM SIGCOMM conferece on Communications architectures & protocols. pp. 84-91, ACM Press, NY,NY 1986.	
	D1334	Shree Murthy et al., "Congestion-Oriented Shortest Multi-path Routing", Proceedings of IEEE INFOCOM, 1996, pp. 1028-1036.	
	D1335	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 10, 2010, 9:00 AM.	
	D1336	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 10, 2010, 1:00 PM.	
	D1337	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 11, 2010, 9:00 AM.	
	D1338	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 11, 2010, 1:30 PM.	
	D1339	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 12, 2010, 9:00 AM.	
	D1340	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 12, 2010, 1:15 PM.	



Subst. for form 1449/PTO		<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>		Application Number	<b>11/839,987</b>
		Filing Date	<b>08-16-2007</b>
		First Named Inventor	<b>Victor Larson</b>
		Art Unit	<b>2453</b>
		Examiner Name	<b>Lim, Krisna</b>
		Docket Number	<b>077580-0066</b>

	D1341	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 15, 2010, 9:00 AM.	
	D1342	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 15, 2010, 12:35 PM.	
	D1343	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 8, 2010, 8:45 AM.	
	D1344	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 8, 2010, 1:30 PM.	
	D1345	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 9, 2010, 9:00 AM.	
	D1346	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 9, 2010, 1:30 PM.	
	D1347	W. Stallings, "Cryptography And Network Security", 2nd, Edition, Chapter 13, IP Security, Jun. 8, 1998, pp. 399-440.	
EXAMINER		DATE CONSIDERED	

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO				<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>				Application Number	11/839,987
				Filing Date	08-16-2007
				First Named Inventor	Victor Larson
				Art Unit	2453
				Examiner Name	Lim, Krisna
				Docket Number	077580-0066


**CERTIFICATION STATEMENT**

Please See 37 CFR 1.97 and 1.98 to make the appropriate selection(s)

- Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
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 Toby H. Kusner, Reg. No.: 26,418  
 McDermott Will & Emery LLP  
 28 State Street  
 Boston, MA 02109  
 Tel. (617) 535-4000  
 Fax (617) 535-3800

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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Filed on	26 April 2000 (26.04.2000)
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US	60/137,704 (CON)
Filed on	7 June 1999 (07.06.1999)
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(71) Applicant (for all designated States except US): **SCIENCE APPLICATIONS INTERNATIONAL CORPORATION** [US/US]; 10260 Campus Point Drive, MS#F3, San Diego, CA 92121 (US).

(71) Applicants and

(72) Inventors: **LARSON, Victor** [US/US]; 12026 Lisa Marie Court, Fairfax, VA 22033 (US). **SHORT, Robert,**

**Durham, III** [US/US]; 38710 Goose Creek Lane, Leesburg, VA 20175 (US). **MUNGER, Edmund, Colby** [US/US]; 1101 Opaca Court, Crownsville, MD 21032 (US). **SCHMIDT, Douglas, Charles** [US/US]; 230 Oak Court, Severna Park, MD 21146 (US). **WILLIAMSON, Michael** [US/US]; 26203 Ocala Circle, South Riding, VA 20152 (US).

(74) Agents: **CURTIN, Joseph, P.** et al.; Banner & Witcoff, Ltd., 1001 G Street, N.W., Eleventh Floor, Washington, DC 20001-4597 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

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(88) Date of publication of the international search report:  
6 February 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **PROTOCOL FOR SECURE COMMUNICATIONS**

(57) Abstract: A technique is disclosed for establishing a secure communication link between a first computer and a second computer over a computer network. Initially, a secure communication mode of communication is enabled at a first computer without a user entering any cryptographic information for establishing the secure communication mode of communication. Then, a secure communication link is established between the first computer and a second computer over a computer network based on the enabled secure communication mode of communication. The secure communication link is a virtual private network communication link over the computer network in which one or more data values that vary according to a pseudo-random sequence are inserted into each data packet.



**WO 01/086911 A3**

INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/13261

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H04L29/06 H04L29/12

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
EPO-Internal, PAJ, WPI Data, IBM-TDB

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 838 930 A (DIGITAL EQUIPMENT CORP) 29 April 1998 (1998-04-29)	1,8,16, 23,53, 54, 56-58, 63-65, 67-69, 74-76, 78-80, 85-87, 89-91, 96-98, 100,101, 106-108, 110,111, 116
Y	abstract  -/--	2,4-7, 9-14,17, 18, 20-22,

Further documents are listed in the continuation of box C.  Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search  23 September 2002	Date of mailing of the international search report  07.10.2002
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Bertolissi, E
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## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/13261

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	<p>column 3, line 30 -column 4, line 14 column 16, line 12 -column 17, line 14 column 22, line 56 -column 23, line 20 figures 3,4,9,11-13,21,22</p>	<p>24-29, 55, 59-62, 66, 70-73, 77, 81-84, 88, 92-95, 99, 102-105, 109, 112-115</p>
X	<p>GB 2 317 792 A (SECURE COMPUTING CORP) 1 April 1998 (1998-04-01)</p>	<p>1,4,8, 14,16, 18,23, 29, 53-58, 63-69, 74-80, 85-91, 96-101, 106-111, 116</p>
Y	<p>abstract</p> <p>page 2, line 3 - line 25 page 3, line 1 - line 10 page 8, line 18 - line 24 page 10, line 20 -page 12, line 2 page 12, line 26 - line 31 page 13, line 16 - line 29 figures 1-4</p>	<p>15,30, 31,34, 36,41, 42,45, 47,52</p>
Y	<p>EP 0 814 589 A (AT &amp; T CORP) 29 December 1997 (1997-12-29) page 1, line 45 -page 2, line 2 page 5, line 8 - line 14</p>	<p>2,17</p>
X	<p>US 5 588 060 A (AZIZ ASHAR) 24 December 1996 (1996-12-24)</p>	<p>1,3,16, 19</p>
Y	<p>abstract</p> <p>column 4, line 38 - line 46 column 6, line 50 - line 67 figure 2</p>	<p>59,70, 81,92, 102,112</p>
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/13261

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>US 5 689 566 A (NGUYEN MINH TAM C) 18 November 1997 (1997-11-18)</p> <p>abstract column 9, line 10 -column 10, line 4</p>	<p>4, 9, 10, 14, 18, 24, 25, 29, 55, 66, 77, 88, 99, 109</p>
Y	<p>WO 98 27783 A (NORTHERN TELECOM LTD ;HOLMES KIM (US); HUI MARGARET (US); TELLO AN) 25 June 1998 (1998-06-25)</p> <p>abstract figure 3</p>	<p>11, 26</p>
Y	<p>LAURIE WELLS (LANCASTERB1B@EMAIL.MSN.COM): "Subject: Security Icon" USENET NEWSGROUP, 'Online! 19 October 1998 (1998-10-19), XP002200606 microsoft.public.inetexplorer.ie4.security Retrieved from the Internet: &lt;URL:http://groups.google.com/&gt; 'retrieved on 2002-05-30! the whole document</p>	<p>12, 13, 27, 28</p>
A	<p>STALLINGS W: "CRYPTOGRAPHY AND NETWORK SECURITY, PRINCIPLES AND PRACTICE, 2ND EDITION" CRYPTOGRAPHY AND NETWORK SECURITY, XX, XX, 8 June 1998 (1998-06-08), pages 399-440, XP002167283</p> <p>13.4 Encapsulating security payload 13.5 Combining security associations</p>	<p>53-59, 63-70, 74-81, 85-92, 96-102, 106-112, 116</p>
L	<p>WILLIAM STALLINGS (WS@SHORE.NET): "Subject: new cryptography and network security book" USENET NEWSGROUP, 'Online! 8 June 1998 (1998-06-08), XP002200607 comp.security.misc Retrieved from the Internet: &lt;URL:http://groups.google.com/&gt; 'retrieved on 2002-05-30! Proof of publication date of XP002167283</p>	

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INTERNATIONAL SEARCH REPORT

national Application No  
PCT/US 01/13261

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>WO 98 55930 A (KONINKL PHILIPS ELECTRONICS NV ;PHILIPS SVENSKA AB (SE)) 10 December 1998 (1998-12-10)</p> <p>abstract page 16, line 21 -page 18, line 20; figures 2,3</p> <p>---</p>	<p>5,7,20, 22,60, 62,71, 73,82, 84,93, 95,103, 105,113, 115</p>
Y	<p>HALSALL F.: " DATA COMMUNICATIONS, COMPUTER NETWORKS AND OPEN SYSTEMS" 1996 , ADDISON-WESLEY XP002214366</p> <p>---</p>	<p>6,21,61, 72,83, 94,104, 114</p>
A	<p>page 198 -page 203 Sliding window 4.3.4 Sequence numbers</p> <p>---</p>	<p>38,49</p>
Y	<p>EASTLAKE D E: "Domain Name System Security Extensions" INTERNET DRAFT, April 1998 (1998-04), XP002199931</p> <p>abstract 1. Overview of the Contents 2.3 Data origin authentication and integrity 2.4 DNS transaction and request authentication</p> <p>---</p>	<p>15,30, 31,34, 36,41, 42,45, 47,52</p>
A	<p>CHAPMAN D B ET AL: "Building Internet Firewalls" BUILDING INTERNET FIREWALLS, SEBASTOPOL, CA: O'REILLY, US, 1995, pages 278-296,351-375, XP002199932 ISBN: 1-56592-124-0 page 286 -page 296</p> <p>-----</p>	<p>31-52</p>

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US 01/13261

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.



FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4 8-14 16-19 23-29 53-59 63-70 74-81 85-92  
96-102 106-112 116

A method and computer readable medium for loading a secure communication software module

2. Claims: 5-7 (as dependent from 1) 20-22 (as dependent from 16) 60-62 (as dependent from 53) 71-73 (as dependent from 64) 82-84 (as dependent from 75) 93-95 (as dependent from 86) 103-105 (as dependent from 97) 113-115 (as dependent from 107)

A method and computer readable medium based on a computer address hopping regime

3. Claims: 15 (as dependent from 1),  
30 (as dependent from 16), 31-52

A method and computer readable medium for sending a query for a secure network address to a secure domain name server

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/US 01/13261

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0838930	A	29-04-1998	US 6101543 A EP 0838930 A2 JP 10178450 A	08-08-2000 29-04-1998 30-06-1998
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WO 9855930	A	10-12-1998	EP 0914635 A1 WO 9855930 A1 JP 2000516734 T US 6185682 B1	12-05-1999 10-12-1998 12-12-2000 06-02-2001



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> <b>H04L 29/06</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 00/27090</b>  <b>(43) International Publication Date:</b> 11 May 2000 (11.05.00)
<b>(21) International Application Number:</b> PCT/US99/25323 <b>(22) International Filing Date:</b> 29 October 1999 (29.10.99)  <b>(30) Priority Data:</b> 60/106,261                      30 October 1998 (30.10.98)      US 60/137,704                      7 June 1999 (07.06.99)              US  <b>(71) Applicant (for all designated States except US):</b> SCIENCE APPLICATIONS INTERNATIONAL CORPORATION [US/US]; 10260 Campus Point Drive, San Diego, CA 92121 (US).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> MUNGER, Edmund, C. [US/US]; 1101 Opaca Court, Crownsville, MD 21032 (US). SABIO, Vincent, J. [US/US]; 7489 Setting Sun Way, Columbia, MD 21046 (US). SHORT, Robert, Dunham, III [US/US]; 38710 Goose Creek Lane, Leesburg, VA 20175 (US). GLIGOR, Virgil, D. [US/US]; 6009 Brookside Drive, Chevy Chase, MD 20815 (US). SCHMIDT, Douglas, Charles [US/US]; 230 Oak Court, Severna Park, MD 21146 (US).	<b>(74) Agents:</b> WRIGHT, Bradley, C. et al.; Banner & Witcoff, Ltd., Eleventh floor, 1001 G Street, N.W., Washington, DC 20001-4597 (US).  <b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>  <b>(88) Date of publication of the international search report:</b> 12 October 2000 (12.10.00)	
<b>(54) Title:</b> NETWORK PROTOCOL FOR SECURE COMMUNICATIONS		
<b>(57) Abstract</b>  A plurality of computer nodes communicates using seemingly random IP source and destination addresses and (optionally) a seemingly random discriminator field. Data packets matching criteria defined by a moving window of valid addresses are accepted for further processing, while those that do not meet the criteria are rejected. In addition to "hopping" of IP addresses and discriminator fields, hardware addresses such as Media Access Control addresses can be hopped. The hopped addresses are generated by random number generators having non-repeating sequence lengths that are easily determined a-priori, which can quickly jump ahead in sequence by an arbitrary number of random steps and which have the property that future random numbers are difficult to guess without knowing the random number generator's parameters. Synchronisation techniques can be used to re-establish synchronization between sending and receiving nodes. These techniques include a self-synchronization technique in which a sync field is transmitted as part of each packet, and a "checkpoint" scheme by which transmitting and receiving nodes can advance to a known point in their hopping schemes. A fast-packet reject technique based on the use of presence vectors is also described.		

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INTERNATIONAL SEARCH REPORT

Int'l Patent Application No

PCT/US 99/25323

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 H04L29/06		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC 7 H04L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FASBENDER A ET AL: "VARIABLE AND SCALABLE SECURITY: PROTECTION OF LOCATION INFORMATION IN MOBILE IP" IEEE VEHICULAR TECHNOLOGY CONFERENCE, US, NEW YORK, IEEE, vol. CONF. 46, 1996, pages 963-967, XP000593113 ISBN: 0-7803-3158-3 the whole document -----	1-63
<input type="checkbox"/> Further documents are listed in the continuation of box C.		
<input type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search 20 July 2000		Date of mailing of the international search report 27/07/2000
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentiaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Canosa Aresté, C



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>7</sup> : <b>H04L 29/06</b></p>	<p><b>A3</b></p>	<p>(11) International Publication Number: <b>WO 00/27086</b> (43) International Publication Date: 11 May 2000 (11.05.00)</p>
<p>(21) International Application Number: PCT/US99/25325 (22) International Filing Date: 29 October 1999 (29.10.99) (30) Priority Data: 60/106,261 30 October 1998 (30.10.98) US 60/137,704 7 June 1999 (07.06.99) US (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Applications US 60/106,261 (CON) Filed on 30 October 1998 (30.10.98) US 60/137,704 (CON) Filed on 7 June 1999 (07.06.99) (71) Applicant (for all designated States except US): SCIENCE APPLICATIONS INTERNATIONAL CORPORATION [US/US]; 10260 Campus Point Drive, San Diego, CA 92121 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): MUNGER, Edmund, C. [US/US]; 1101 Opaca Court, Crownsville, MD 21032 (US). SABIO, Vincent, J. [US/US]; 7489 Setting Sun Way, Columbia, MD 21046 (US). SHORT, Robert, Dunham,</p>		<p>III [US/US]; 38710 Goose Creek Lane, Leesburg, VA 20175 (US). GLIGOR, Virgil, D. [US/US]; 6009 Brookside Drive, Chevy Chase, MD 20815 (US). SCHMIDT, Douglas, Charles [US/US]; 230 Oak Court, Severna Park, MD 21146 (US). (74) Agents: WRIGHT, Bradley, C. et al.; Banner &amp; Witcoff, Ltd., Eleventh floor, 1001 G Street, N.W., Washington, DC 20001-4597 (US). (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). <b>Published</b> <i>With international search report.</i> (88) Date of publication of the international search report: 5 October 2000 (05.10.00)</p>
<p>(54) Title: NETWORK PROTOCOL FOR SECURE COMMUNICATIONS</p>		
<p>(57) Abstract  A plurality of computer nodes communicates using seemingly random IP source and destination addresses and (optionally) a seemingly random discriminator field. Data packets matching criteria defined by a moving window of valid addresses are accepted for further processing, while those that do not meet the criteria are rejected. In addition to "hopping" of IP addresses and discriminator fields, hardware addresses such as Media Access Control addresses can be hopped. The hopped addresses are generated by random number generators having non-repeating sequence lengths that are easily determined a-priori, which can quickly jump ahead in sequence by an arbitrary number of random steps and which have the property that future random numbers are difficult to guess without knowing the random number generator's parameters. Synchronization techniques can be used to re-establish synchronization between sending and receiving nodes. These techniques include a self-synchronization technique in which a sync field is transmitted as part of each packet, and a "checkpoint" scheme by which transmitting and receiving nodes can advance to a known point in their hopping schemes. A fast-packet reject technique based on the use of presence vectors is also described. A distributed transmission path embodiment incorporates randomly selected physical transmission paths.</p>		

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# INTERNATIONAL SEARCH REPORT

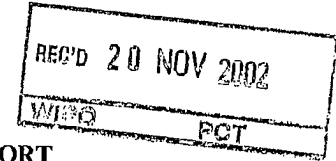
International Application No  
**PCT/US 99/25325**

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 H04L29/06				
According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>				
Minimum documentation searched (classification system followed by classification symbols) IPC 7 H04L				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
A	FASBENDER A ET AL: "VARIABLE AND SCALABLE SECURITY: PROTECTION OF LOCATION INFORMATION IN MOBILE IP" IEEE VEHICULAR TECHNOLOGY CONFERENCE, US, NEW YORK, IEEE, vol. CONF. 46, 1996, pages 963-967, XP000593113 ISBN: 0-7803-3158-3 the whole document	1-67		
<input type="checkbox"/> Further documents are listed in the continuation of box C.				
<input type="checkbox"/> Patent family members are listed in annex.				
* Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;">                     *A* document defining the general state of the art which is not considered to be of particular relevance                      *E* earlier document but published on or after the international filing date                      *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)                      *O* document referring to an oral disclosure, use, exhibition or other means                      *P* document published prior to the international filing date but later than the priority date claimed                 </td> <td style="width: 50%; border: none; vertical-align: top;">                     *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                      *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                      *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.                      *&amp;* document member of the same patent family                 </td> </tr> </table>			*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family
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Date of the actual completion of the international search  <p style="text-align: center; font-size: 1.2em;">20 July 2000</p>		Date of mailing of the international search report  <p style="text-align: center; font-size: 1.2em;">27/07/2000</p>		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer  <p style="text-align: center; font-size: 1.2em;">Canosa Aresté, C</p>		



PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

(Rationalised Report according to the Notice of the President of the EPO published in the OJ11/2001)

Applicant's or agent's file reference 00479.00029	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US 01/ 04340	International filing date (day/month/year) 12/02/2001	Priority date (day/month/year) 15/02/2000
International Patent Classification (IPC) or national classification and IPC H04L12/56		
Applicant SCIENCE APPLICATIONS INTERNATIONAL CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This **REPORT** consists of a total of 2 sheets, including this cover sheet.

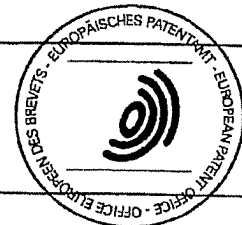
This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consists of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 20/08/2001	Date of completion of this report 13/11/2002
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer HEY S A Tel. (+49-89) 2399 2828



Form PCT/IPEA/409 (cover sheet) P20476 (October 2002)

**I. Basis of the report**

The basis of this international preliminary examination is the application as originally filed.

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

If all the additional search fees, which the applicant has been invited to pay, have not been paid, then all the inventions or groups of inventions corresponding to the unpaid fees will not have been searched. This means that the question of whether the claimed invention appears to be novel, to involve an inventive step, or to be industrially applicable has not been the subject of the international preliminary examination in respect of the claims corresponding to these inventions or groups of inventions (Article 17(3)(a) and Rule 66.1(e) PCT; see also international search report).

**IV. Lack of unity of invention**

The objection as to lack of unity raised in the international search report is maintained. The reasons for the objection are the same as those indicated in the international search report.

**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability**

To the extent that the international preliminary examination has been carried out (see item III above), the following is pointed out:

In light of the documents cited in the international search report, it is considered that the invention as defined in at least some of the claims, which have been the subject of an international search report, does not appear to meet the criteria mentioned in Article 33(1) PCT, i.e. does not appear to be novel and/or to involve an inventive step (see international search report, in particular the documents cited X and/or Y and corresponding claim references).

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
6 December 2001 (06.12.2001)

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(10) International Publication Number  
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(51) International Patent Classification<sup>7</sup>: H04L 29/12,  
29/06, G06F 17/60

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(30) Priority Data:  
09/558,210 26 April 2000 (26.04.2000) US

(71) Applicant (for all designated States except US): **SCI-  
ENCE APPLICATIONS INTERNATIONAL CORPO-  
RATION** [US/US]; 10260 Campus Point Drive, MS #F3,  
San Diego, CA 92121 (US).

(71) Applicants and

(72) Inventors: **LARSON, Victor** [US/US]; 12026 Lisa  
Marie Court, Fairfax, VA 22033 (US). **SHORT, Robert,**

**Durham, III** [US/US]; 38710 Goose Creek Lane, Lees-  
burg, VA 20175 (US). **MUNGER, Edmund, Colby**  
[US/US]; 1101 Opaca Court, Crownsville, MD 21032  
(US). **SCHMIDT, Douglas, Charles** [US/US]; 230 Oak  
Court, Severna Park, MD 21146 (US). **WILLIAMSON,  
Michael** [US/US]; 26203 Ocala Circle, South Riding, VA  
20152 (US).

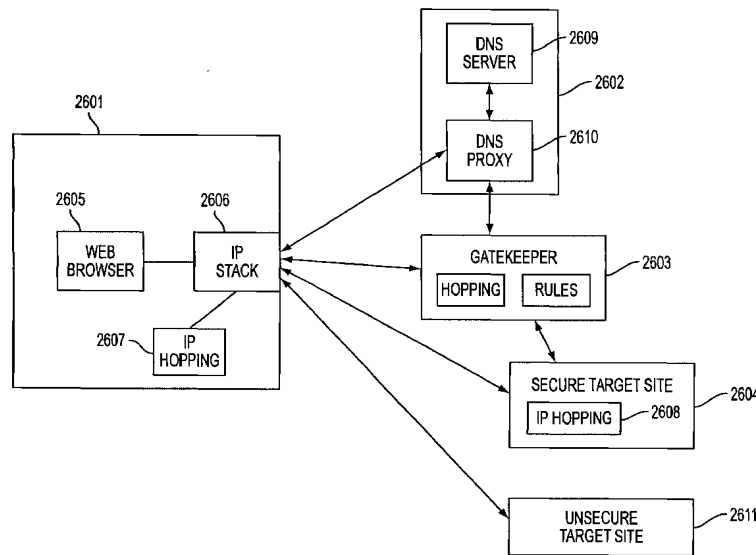
(74) Agents: **CURTIN, Joseph, P.** et al.; Banner & Witcoff,  
Ltd., 1001 G Street, N.W., Eleventh Floor, Washington, DC  
20001-4597 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM,  
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TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian  
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European  
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

[Continued on next page]

(54) Title: SECURE DOMAIN NAME SERVICE



(57) Abstract: A secure domain name service for a computer network is disclosed that includes a portal connected to a computer network, such as the Internet, and a domain name database connected to the computer network through the portal. The portal authenticates a query for a secure computer network address, and the domain name database stores secure computer network addresses for the computer network. Each secure computer network address is based on a non-standard top-level domain name, such as .scom, .sorg, .snet, .snet, .sedu, .smil and .sint.



WO 01/092997 A3



IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

**(88) Date of publication of the international search report:**  
17 October 2002

**Published:**

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/13260

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H04L29/12 H04L29/06 G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H04L G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>DONALD E. EASTLAKE 3RD:                      "&lt;draft-ietf-dnssec-secext2-05.txt&gt; Domain Name System Security Extensions"                      INTERNET DRAFT, 'Online!                      April 1998 (1998-04), XP002199931                      Retrieved from the Internet:                      &lt;URL:ftp://ftp.inet.no/pub/ietf/internet-drafts/draft-ietf-dnssec-secext2-05.txt&gt;                      'retrieved on 2002-05-23!                      1. Overview of the contents                      2.3 Data origin authentication and integrity                      2.4 DNS transaction and request authentication</p> <p style="text-align: center;">--- -/--</p>	1, 4-6

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Date of the actual completion of the international search

12 August 2002

Date of mailing of the international search report

23. 08. 2002

Name and mailing address of the ISA  
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 Fax: (+31-70) 340-3016

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Bertolissi, E

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/13260

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CHAPMAN D.B.; ZWICKY E.D.: " Building Internet Firewalls" O'REILLY, November 1995 (1995-11), XP002199932 pag 278-296 pag 351-375	1,4-6
P,X	DE 199 24 575 A (SUN MICROSYSTEMS INC) 2 December 1999 (1999-12-02) abstract column 2, line 48 -column 3, line 6	1,4,5,7
A	P. SRISURESH, G. TSIRTSIS, P. AKKIRAJU, A. HEFFERNAN: "<draft-ietf-nat-dns-alg-00.txt> DNS extensions to Network Address Translators (DNS_ALG)" INTERNET DRAFT, 'Online! July 1998 (1998-07), XP002199933 Retrieved from the Internet: <URL:ftp://ftp.inet.no/pub/ietf/internet-drafts/draft-ietf-nat-dns-alg-00.txt> 'retrieved on 2002-05-23! 1. Introduction 2. Requirement for DNS extensions fig 3 5.3 Incoming name lookup queries 8. Security considerations	1-12
A	EP 0 838 930 A (DIGITAL EQUIPMENT CORP) 29 April 1998 (1998-04-29) abstract column 9, line 11 -column 10, line 34	1-12
X	JAMES E. BELLAIRE: "Subject: New Statement of Rules - Naming Internet Domains " INTERNET NEWSGROUP, 'Online! 30 July 1995 (1995-07-30), XP002209580 comp.dcom.telecom Retrieved from the Internet: <URL:http://groups.google.com/> 'retrieved on 2002-08-12! page 1, paragraph 8 page 2, paragraph 4	13,15
A	CLARK D: "US CALLS FOR PRIVATE DOMAIN-NAME SYSTEM" COMPUTER, IEEE COMPUTER SOCIETY, LONG BEACH., CA, US, US, vol. 31, no. 8, 1 August 1998 (1998-08-01), pages 22-25, XP000780513 ISSN: 0018-9162 page 22	13-16

INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/13260

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>BEQUAI A: "Balancing Legal Concerns Over Crime and Security in Cyberspace" COMPUTERS &amp; SECURITY. INTERNATIONAL JOURNAL DEVOTED TO THE STUDY OF TECHNICAL AND FINANCIAL ASPECTS OF COMPUTER SECURITY, ELSEVIER SCIENCE PUBLISHERS. AMSTERDAM, NL, vol. 17, no. 4, 1998, pages 293-298, XP004129224 ISSN: 0167-4048 pag 296-297 Lanham Act</p>	13-16
A	<p>RICH WINKEL : "CAQ: NETWORKING WITH SPOOKS: THE NET &amp; THE CONTROL OF INFORMATION " INTERNET NEWSGROUP, 'Online! 21 June 1997 (1997-06-21), XP002209581 misc.activism.progressive Retrieved from the Internet: &lt;URL:http://groups.google.com/&gt; 'retrieved on 2002-08-12! the whole document</p>	13-16

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 01/13260

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
- 2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
- 3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

- 1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
- 2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
- 3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
- 4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.



**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-12

A portal for authenticating a query for a secure computer network address

2. Claims: 13-16

A method and a computer readable storage medium for registering a secure domain name

INTERNATIONAL SEARCH REPORT

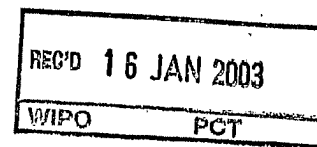
Information on patent family members

International Application No  
PCT/US 01/13260

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19924575	A	02-12-1999	DE 19924575 A1	02-12-1999
			FR 2782873 A1	03-03-2000
			GB 2340702 A ,B	23-02-2000
			JP 2000049867 A	18-02-2000
EP 0838930	A	29-04-1998	US 6101543 A	08-08-2000
			EP 0838930 A2	29-04-1998
			JP 10178450 A	30-06-1998


PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 00479.00028		<b>FOR FURTHER ACTION</b>	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US01/13260	International filing date (day/month/year) 25/04/2001	Priority date (day/month/year) 26/04/2000	
International Patent Classification (IPC) or national classification and IPC H04L29/12			
Applicant SCIENCE APPLICATIONS INTERNATIONAL CORP. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input checked="" type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input checked="" type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul>			
Date of submission of the demand 12/11/2001		Date of completion of this report 14.01.2003	
Name and mailing address of the International preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer  Pajatakis, E  Telephone No. +49 89 2399 8898	



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/US01/13260

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-92 as originally filed

**Claims, No.:**

1-15 as originally filed

**Drawings, sheets:**

1/40-40/40 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/US01/13260

- the drawings, sheets:
5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):  
*(Any replacement sheet containing such amendments must be referred to under Item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- the entire international application.
- claims Nos. 1-12.

because:

- the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1-12 are so unclear that no meaningful opinion could be formed (*specify*):  
**see separate sheet**
- the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- no international search report has been established for the said claims Nos.
2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:
- the written form has not been furnished or does not comply with the standard.
- the computer readable form has not been furnished or does not comply with the standard.

**IV. Lack of unity of invention**

1. In response to the invitation to restrict or pay additional fees the applicant has:
- restricted the claims.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/US01/13260

- paid additional fees.
- paid additional fees under protest.
- neither restricted nor paid additional fees.
- 2.  This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
- 3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1; 13.2 and 13.3 is
  - complied with.
  - not complied with for the following reasons:  
**see separate sheet**
- 4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:
  - all parts.
  - the parts relating to claims Nos. .

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims 13-15
	No: Claims
Inventive step (IS)	Yes: Claims 13-15
	No: Claims
Industrial applicability (IA)	Yes: Claims 13-15
	No: Claims

2. Citations and explanations  
**see separate sheet**

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. Claims 1-8 are seeking protection for a domain name service. A domain service is the result of executing a method or using an apparatus adapted to retrieve network addresses. Thus, it is not clear whether protection is sought for a method or an apparatus, see also Guidelines III-4.1.
  - 1.1 Claims 9-12 are seeking protection for a method according to Claim 7. However, Claim 7 does not relate to a method.
  - 1.2 The relative term "non-standard" in Claim 2 casts doubt on the scope of protection, see also Guidelines III-4.5.
  - 1.3 An antecedent definition is missing for "the secure communication link" in Claim 8.
  - 1.4 The wording of Claims 9-12 is a statement of the result to be achieved, see also Guidelines III-4.7.

**Re Item IV**

**Lack of unity of invention**

1. The application does not meet the requirement of unity, Rule 13.1.
  - 1.1 Independent Claim 1 is directed to resolving queries for a secure network address. This is done by a portal connected to the network, the portal authenticating a query for a secure network address, and by a domain name database connected to the network through the portal, the database storing secure network addresses.

On the other hand independent Claims 13 and 15 are directed to registering a secure domain name. This is done by verifying ownership information for an equivalent non-secure domain name corresponding to the secure domain name. The secure domain name is registered when the ownership information of the

non-secure domain name is consistent with the ownership information for the secure domain name.

- 1.2 Thus, the application comprises two groups of independent claims having different features and based on different concepts.

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**First Invention**

1. Despite the above-clarity objections it appears that the subject-matter of Claim 1, understood as an apparatus claim, is not new, Article 33(2).

**D1 = DE A 199 24 575** is published earlier than the amended priority date of the application (26.04.2000). **D1** discloses an apparatus for providing a secure domain name service for a computer network and comprising a portal (30) connected to a computer network (col. 7, lines 10-16, col. 11, lines 34-39; fig. 1), the portal authenticating a query for a secure network address, and a domain name database (32) connected to the computer network through the portal, the domain name database storing secure computer network addresses (col. 10, lines 23-33, col. 12, lines 51-64).

2. All features of Claim 1 appear also to be known from **D2 = DONALD E. EASTLAKE 3RD**: '<draft-ietf-dnssec-secext2-05.txt> Domain Name System Security Extensions' INTERNET DRAFT, [Online] April 1998 (1998-04), **XP002199931** Retrieved from the Internet: <URL:ftp://ftp.inet.no/pub/ietf/internet-drafts/draft-ietf-dnssec-secext2-05.txt> [retrieved on 2002-05-23], see paragraph 2.4.

**Second Invention**

1. The subject-matter of Claim 13 is new and involves an inventive step, Article 33(2)(3).



- 1.1 Claim 13 is directed to a method for registering a secure domain name. The method comprises the steps of receiving a request and verifying ownership information for an equivalent non-secure domain name corresponding to the requested secure domain name. The secure domain name is registered in a secure domain name service when the ownership-information for the non-secure domain name is consistent with ownership information for the secure domain service.

This way of registration has the technical result that a client application accessing a non-secure web site can easily switch to the secure web site of the same owner by merely changing the top-level domain name without needing to change the whole domain name.

- 1.2 The above registration method is not suggested in the prior art.

*JAMES E. BELLAIRE: 'Subject: New Statement of Rules - Naming Internet Domains ' INTERNET NEWSGROUP, [Online] 30 July 1995 (1995-07-30), XP002209580 comp.dcom.telecom Retrieved from the Internet: <URL:http://groups.google.com/> [retrieved on 2002-08-12]* does not relate to switching between a non-secure and a secure web site. The purpose of the document is to avoid potential trademark infringements. If the holder of a trademark provides evidence that an already assigned domain name is identical to that of the trademark, than the domain name will be put on hold until a court resolves the dispute. This also applies to the other documents cited in relation with the second invention.

2. The above finding also applies to Claim 15 which corresponds to Claim 13.
3. The dependent claims relate to specific embodiments of the above-mentioned independent claims and are therefore also new and inventive.

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
23 August 2001 (23.08.2001)

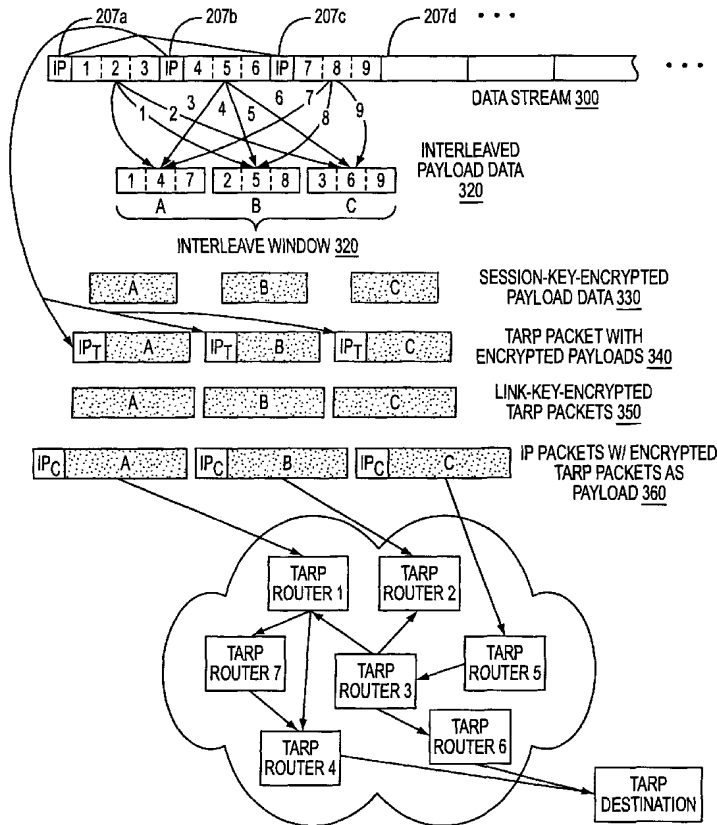
PCT

(10) International Publication Number  
WO 01/061922 A3

- (51) International Patent Classification<sup>7</sup>: H04L 12/56, 29/06, 12/46
- (71) Applicant (for all designated States except US): SCIENCE APPLICATIONS INTERNATIONAL CORPORATION [US/US]; 10260 Campus Point Drive, San Diego, CA 92121 (US).
- (21) International Application Number: PCT/US01/04340
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): MUNGER, Edmund, Colby [US/US]; 1101 Opaca Court, Crownsville, MD 21032 (US). SCHMIDT, Douglas, Charles [US/US]; 230 Oak Court, Severna Park, MD 21146 (US). SHORT, Robert, Dunham, III [US/US]; 38710 Goose Creek Lane, Leesburg, VA 20175 (US). LARSON, Victor [US/US]; 12026 Lisa Marie Court, Fairfax, VA 22033 (US). WILLIAMSON, Michael [US/US]; 26203 Ocala Circle, South Riding, VA 20152 (US).
- (22) International Filing Date: 12 February 2001 (12.02.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 09/504,783 15 February 2000 (15.02.2000) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application: US 09/504,783 (CON) Filed on 15 February 2000 (15.02.2000)
- (74) Agents: WRIGHT, Bradley, C. et al.; Banner & Witcoff, Ltd., 11th Floor, 1001 G Street, N.W., Washington, DC 20001-4597 (US).

[Continued on next page]

(54) Title: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS WITH ASSURED SYSTEM AVAILABILITY



(57) Abstract: A plurality of computer nodes communicate using seemingly random Internet Protocol source and destination addresses. Data packets matching criteria defined by a moving window of valid addresses are accepted for further processing, while those that do not meet the criteria are quickly rejected. Improvements to the basic design include (1) a load balancer that distributes packets across different transmission paths according to transmission path quality; (2) a DNS proxy server that transparently creates a virtual private network in response to a domain name inquiry; (3) a large-to-small link bandwidth management feature that prevents denial-of-service attacks at system chokepoints; (4) a traffic limiter that regulates incoming packets by limiting the rate at which a transmitter can be synchronized with a receiver; and (5) a signaling synchronizer that allows a large number of nodes to communicate with a central node by partitioning the communication function between two separate entities.



WO 01/061922 A3



**(81) Designated States (national):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— with international search report

**(88) Date of publication of the international search report:**  
6 March 2003

**(84) Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*



## INTERNATIONAL SEARCH REPORT

 International Application No  
 PCT/US 01/04340

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	MURTHY ET AL: "Congestion-oriented shortest multipath routing" PROCEEDINGS OF IEEE INFOCOM 1996. CONFERENCE ON COMPUTER COMMUNICATIONS. FIFTEENTH ANNUAL JOINT CONFERENCE OF THE IEEE COMPUTER AND COMMUNICATIONS SOCIETIES. NETWORKING THE NEXT GENERATION. SAN FRANCISCO, MAR. 24 - 28, 1996, PROCEEDINGS OF INFOCOM, L, vol. 2 CONF. 15, 24 March 1996 (1996-03-24), pages 1028-1036, XP010158171 ISBN: 0-8186-7293-5 abstract page 1028, left-hand column, line 38 -right-hand column, line 29 ---	1-27
E	WO 01 50688 A (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)) 12 July 2001 (2001-07-12) page 11, line 18 -page 13, line 21 ---	28,29,34
A	WO 98 59470 A (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)) 30 December 1998 (1998-12-30) page 4, line 5 -page 5, line 2 ---	28-39
X	WO 99 48303 A (CISCO TECHNOLOGY, INC.) 23 September 1999 (1999-09-23) page 1, line 8 -page 2, line 5 page 5, line 33 -page 6, line 15 page 7, line 21 - line 33 ---	40,50
A		41-49, 51-59
A	JONES JIM ET AL: "Distributed Denial of Service Attacks: Defenses" INTERNET ARTICLE, 'Online! 2000, XP002208785 Retrieved from the Internet: <URL:www.bai.org/pdf/DDOS-defense.pdf > 'retrieved on 2002-08-05! paragraph '0005! ---	60-66
X	WO 99 38081 A (ASCEND COMMUNICATIONS INC) 29 July 1999 (1999-07-29) page 9, line 13 -page 10, line 17 page 11, line 10 -page 12, line 2 ---	67
A		68-71

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 01/04340

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-27

A system and a method to balance the load between communication paths with varying transmission quality.

2. Claims: 28-39

A system and a method to prevent someone from learning requested IP addresses by intercepting DNS requests.

3. Claims: 40-59

A method to prevent a denial-of-service attack from an unauthenticated user flooding dummy data packets on to a low bandwidth link.

4. Claims: 60-66

A method to prevent an authenticated user residing within a secure system from flooding it with dummy data packets.

5. Claims: 67-71

A method to allocate memory in a central computer communicating with a potentially large number of client computers.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/US 01/04340





Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0858189	A	12-08-1998	JP 10224400 A	21-08-1998
			EP 0858189 A2	12-08-1998
			US 6112248 A	29-08-2000
WO 0150688	A	12-07-2001	SE 517217 C2	07-05-2002
			AU 2564501 A	16-07-2001
			WO 0150688 A1	12-07-2001
			SE 9904841 A	30-06-2001
			US 2001006523 A1	05-07-2001
WO 9859470	A	30-12-1998	AU 8052398 A	04-01-1999
			SE 9702385 A	24-12-1998
			WO 9859470 A2	30-12-1998
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			WO 9948303 A2	23-09-1999
WO 9938081	A	29-07-1999	US 6055575 A	25-04-2000
			AU 2562599 A	09-08-1999
			CA 2318267 A1	29-07-1999
			EP 1064602 A1	03-01-2001
			WO 9938081 A1	29-07-1999



**Communication system using the internet**

**Patent number:** DE19924575 (A1)  
**Publication date:** 1999-12-02  
**Inventor(s):** PROVINO JOSEPH E [US] +  
**Applicant(s):** SUN MICROSYSTEMS INC [US] +  
**Classification:**  
- international: **G06F13/00; H04L29/06; H04L29/12; G06F13/00; H04L29/06; H04L29/12;** (IPC1-7): G06F12/14; G06F13/00; H04L12/22; H04L29/06; H04L9/00  
- european: H04L29/06; H04L29/06S2C; H04L29/12A2A1; H04L29/12A4A1B; H04L29/12A4A8B; H04L29/12A4A8D  
**Application number:** DE19991024575 19990528  
**Priority number(s):** US19980087823 19980529

**Also published as:**

 US6557037 (B1)  
 JP2000049867 (A)  
 GB2340702 (A)  
 FR2782873 (A1)

**Abstract of DE 19924575 (A1)**

The system provides a connection between a virtual private network (15) and external units via the internet (14). The connection between the external units is made using a service provider (11). The virtual private network has a firewall (30) and internal servers (31) for secondary addresses and name addresses.

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19 BUNDESREPUBLIK  
DEUTSCHLAND



DEUTSCHES  
PATENT- UND  
MARKENAMT

# Offenlegungsschrift DE 199 24 575 A 1

51 Int. Cl.<sup>6</sup>:  
H 04 L 29/06  
H 04 L 12/22  
G 06 F 13/00  
G 06 F 12/14  
// H04L 9/00

21 Aktenzeichen: 199 24 575.4  
22 Anmeldetag: 28. 5. 99  
43 Offenlegungstag: 2. 12. 99

DE 199 24 575 A 1

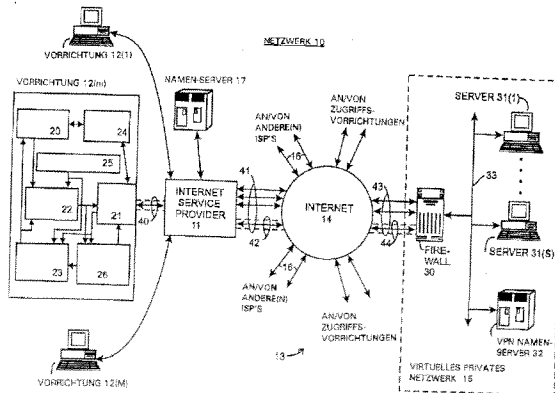
30 Unionspriorität:  
087823 29. 05. 98 US  
71 Anmelder:  
Sun Microsystems, Inc., Palo Alto, Calif., US  
74 Vertreter:  
Samson & Partner, Patentanwälte, 80538 München

72 Erfinder:  
Provino, Joseph E., Cambridge, Mass., US

### Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

54 Kommunikationssystem und -Verfahren

57 Das erfindungsgemäße System umfaßt ein virtuelles privates Netzwerk (15) und eine externe Vorrichtung (12(m)), welche durch ein digitales Netzwerk (14) miteinander verbunden sind. Das virtuelle private Netzwerk (15) weist eine Firewall (30), wenigstens eine interne Vorrichtung (31(s)) und einen Namen-Server (32) auf, welche jeweils eine Netzwerkadresse besitzen. Die interne Vorrichtung (31(s)) besitzt auch eine Sekundäradresse, und der Namen-Server (32) ist derart konfiguriert, daß er eine Zuordnung zwischen der Sekundäradresse und der Netzwerkadresse bereitstellt. In Reaktion auf eine Anfrage von der externen Vorrichtung (12(m)) zum Aufbau einer Verbindung zur Firewall (30) übermittle die Firewall (30) der externen Vorrichtung (12(m)) die Netzwerkadresse des Namen-Servers (32). In Reaktion auf eine Anfrage von einem Bediener oder ähnlichem, welche die Sekundäradresse der internen Vorrichtung (31(s)) enthält und einen Zugriff an die interne Vorrichtung (31(s)) anfordert, erzeugt die externe Vorrichtung (12(m)) eine Netzwerkadressen-Anfragennachricht zur Übertragung über die Verbindung an die Firewall (30), welche eine Auflösung der Netzwerkadresse, die der Sekundäradresse zugeordnet ist, anfordert. Die Firewall (30) übermittle die Adressenauflösungsanfrage an den Namen-Server (32), und der Namen-Server (32) übermittle die Netzwerkadresse, welche der Sekundäradresse zugeordnet ist, an die Firewall (30). Daraufhin stellt die Firewall (30) die Netzwerkadresse in einer ...



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## Beschreibung

Die Erfindung betrifft allgemein das Gebiet der digitalen Kommunikationssysteme und -verfahren, und insbesondere Systeme und Verfahren zum Vereinfachen der Kommunikation zwischen Vorrichtungen, welche mit öffentlichen Netzwerken verbunden sind, z. B. dem Internet, und Vorrichtungen, welche mit privaten Netzwerken verbunden sind.

Digitale Netzwerke wurden entwickelt, um die Übertragung von Information, welche auch Daten und Programme umfaßt, über digitale Computersysteme und andere Digitalvorrichtungen zu ermöglichen. Es wurde eine Vielzahl von Arten von Netzwerken entwickelt und realisiert, einschließlich sog. Fernverbindungsnetze (Wide-Area Networks, nachfolgend "WAN" genannt) und lokale Netzwerke (Local Area Networks, nachfolgend "LAN" genannt), welche eine Information unter Verwendung verschiedener Informationsübertragungsmethoden übermitteln. Im allgemeinen werden LANs innerhalb kleiner geographischer Bereiche realisiert, z. B. innerhalb eines einzelnen Bürogebäudes oder ähnlichem, zum Übertragen von Information innerhalb eines bestimmten Büros, einer Firma oder einer ähnlichen Art von Organisationseinheit. Andererseits werden WANs im allgemeinen auf relativ großen geographischen Bereichen realisiert und können verwendet werden, um Information sowohl zwischen LANs als auch zwischen Vorrichtungen, welche nicht mit LANs verbunden sind, zu übertragen. Derartige WANs umfassen auch öffentliche Netzwerke, z. B. das Internet, welche zur Informationsübertragung zwischen einer Anzahl von Unternehmen verwendet werden können.

Es sind mehrere Probleme im Zusammenhang der Kommunikation über ein Netzwerk aufgetreten, insbesondere in einem großen öffentlichen WAN, wie es z. B. das Internet ist. Im allgemeinen werden Informationen über ein Netzwerk in Nachrichtenpaketen übertragen, welche ausgehend von einer Vorrichtung, als Quelle bzw. Quellenvorrichtung, zu einer anderen Vorrichtung, als Ziel bzw. Zielvorrichtung, über einen oder mehrere Router oder allgemein Schaltungsknoten im Netzwerk übertragen werden. Jedes Nachrichtenpaket enthält eine Zieladresse, welche von den Schaltungsknoten verwendet wird, um das jeweilige Nachrichtenpaket an die geeignete Zielvorrichtung zu leiten. Z. B. im Internet haben solche Adressen die Form von "n"-Bit Zahlen (wobei "n" 32 oder 128 sein kann), wobei solche Zahlenkolonnen für einen Benutzer schwierig sind zu merken und einzugeben, wenn die oder der Benutzer die Übertragung eines Nachrichtenpakets veranlassen möchte. Um einen Benutzer von der Notwendigkeit zu befreien, sich solche spezifische Zahlen-Internetadressen zu merken und einzugeben, stellt das Internet einen zweiten Adressierungsmechanismus bereit, der durch Benutzer der jeweiligen Vorrichtungen einfacher handzuhaben ist. Bei diesem Adressierungsmechanismus werden Internet-Domains, wie etwa LANs, Internet-Service-Provider (nachfolgend "ISP" genannt) und ähnliche, welche im Internet verbunden sind, durch für einen Benutzer relativ einfach les- und merkbare Namen identifiziert, die nachfolgend als "Klartextnamen" bezeichnet werden. Um den Einsatz von solchen Klartextnamen umzusetzen, werden Namen-Server, auch als DNS-Server für "Domain Name Server" bezeichnet, bereitgestellt, um die Klartextnamen in die geeigneten Internetadressen umzuwandeln. Wenn ein Bediener einer Vorrichtung, der die Übertragung eines Nachrichtenpakets an eine andere Vorrichtung wünscht, den Klartextnamen der anderen Vorrichtung eingibt, nimmt die Vorrichtung zuerst Kontakt mit einem Namen-Server auf. Im allgemeinen kann der Namen-Server ein Teil des ISP selbst sein oder er kann eine spezielle Vorrichtung sein, welche durch den ISP über das Internet zugäng-

lich ist; in jedem Fall wird der ISP den Namen-Server identifizieren, welcher für die Vorrichtung zu verwenden ist, wenn sich die Vorrichtung beim ISP einloggt, d. h. anmeldet. Falls der Namen-Server, nachdem die Vorrichtung einen Kontakt hergestellt hat, eine Zahlen-Internetadresse für den Klartext-Domainnamen besitzt oder erhalten kann, übermittelt der Namen-Server die Zahlen-Internetadresse, welche dem Klartext-Domainnamen entspricht, zu der Vorrichtung des Bedieners. Die Vorrichtung kann sodann die Zahlen-Internetadresse, welche von dem Namen-Server zurückgesendet wurde, in das Nachrichtenpaket einfügen und das Nachrichtenpaket an den ISP für die Übertragung über das Internet auf konventioneller Weise liefern. Die Internet-Schaltungsknoten verwenden die Zahlen-Internetadresse, um das Nachrichtenpaket an die gewünschte Zielvorrichtung zu übermitteln.

Andere Probleme treten insbesondere in Verbindung mit der Übertragung von Information über ein öffentliches WAN, z. B. das Internet, auf. Ein Problem besteht darin, sicherzustellen, daß die über das WAN übertragene Information, welche die Quellenvorrichtung und die Zielvorrichtung vertraulich behalten möchten, auch tatsächlich vertraulich bleibt gegenüber möglichen Lauschern, welche die Information abfangen können. Um die Vertraulichkeit zu wahren, wurden verschiedene Formen von Verschlüsselung entwickelt und werden verwendet, um die Information vor der Übertragung durch die Quellenvorrichtung zu verschlüsseln und die Information nach deren Empfang durch die Zielvorrichtung zu entschlüsseln. Falls gewünscht wird, daß beispielsweise die gesamte Information, welche zwischen einer bestimmten Quellenvorrichtung und einer bestimmten Zielvorrichtung übertragen wird, vertraulich bleiben soll, können die Vorrichtungen einen sog. "Sicherheitstunnel" zwischen den Vorrichtungen einrichten, der im wesentlichen sicherstellt, daß die gesamte Information, welche von der Quellenvorrichtung an die Zielvorrichtung übertragen wird, vor der Übertragung verschlüsselt wird (mit Ausnahme von bestimmten Protokollinformationen, wie Adresseninformation, welche den Fluß von Netzpaketen über das Netzwerk zwischen der Quellen- und Zielvorrichtung steuert), und daß die verschlüsselte Information vor der Verwendung durch die Zielvorrichtung entschlüsselt wird. Die Quellen- und Zielvorrichtungen können jeweils für sich eine Verschlüsselung bzw. Entschlüsselung durchführen, oder die Verschlüsselung und Entschlüsselung kann durch andere Vorrichtungen durchgeführt werden, bevor die Nachrichtenpakete über das Internet übertragen werden.

Ein weiteres Problem, welches insbesondere im Zusammenhang mit Unternehmen, Regierungsämtern und privaten Organisationen auftritt, deren private Netzwerke, welche LANs, WANs oder etwaige Kombinationen derselben sein können, mit öffentlichen WANs, z. B. dem Internet, verbunden sind, besteht darin, sicherzustellen, daß deren private Netzwerke sicher sind gegenüber anderen Netzwerken, zu welchen z. B. die Unternehmen keinen Zugriff haben möchten, oder einen Zugriff durch andere zu regulieren und zu kontrollieren, zu welchen z. B. die jeweiligen Organisationen einen begrenzten Zugriff haben möchten. Um dies umzusetzen, verbinden die Organisationen in der Regel ihre privaten Netzwerke mit öffentlichen WANs über eine begrenzte Anzahl von Gateways, welche manchmal als "Firewalls" bezeichnet werden, durch welche der gesamte Netzwerkverkehr zwischen dem internen und dem öffentlichen Netzwerk läuft. In der Regel sind Netzwerkadressen von Domains und Vorrichtungen in dem privaten Netzwerk "hinter" der Firewall den Namen-Servern bekannt, welche in den privaten Netzwerken vorgesehen sind; sie sind aber nicht zugänglich für Namen-Server oder andere Vorrichtungen au-

berhalb der privaten Netzwerke, was die Kommunikation zwischen einer Vorrichtung außerhalb des privaten Netzwerkes und einer Vorrichtung innerhalb des privaten Netzwerkes schwierig macht.

Ein Ziel der vorliegenden Erfindung ist es, hier Abhilfe zu schaffen.

Dieses Ziel erreicht die Erfindung durch die Gegenstände der Ansprüche 1, 7 und 13. Bevorzugte Ausführungsbeispiele der Erfindung sind in den jeweils abhängigen Ansprüchen beschrieben.

Danach schafft die Erfindung ein neuartiges und verbessertes System und ein Verfahren zum Vereinfachen von Kommunikation zwischen Vorrichtungen, welche mit öffentlichen Netzwerken, z. B. dem Internet, verbunden sind, und Vorrichtungen, welche mit privaten Netzwerken verbunden sind, wobei die Auflösung von Sekundäradressen, wie etwa Text- bzw. Klartextnamen im Internet, in die zugehörigen Netzwerkadressen durch Namen-Server oder ähnliche Vorrichtungen, die mit den privaten Netzwerken verbunden sind, ermöglicht wird.

Hierfür stellt die Erfindung ein System zur Verfügung mit einem virtuellen Privaten Netzwerk und einer externen Vorrichtung, welche durch ein digitales Netzwerk miteinander verbunden sind, sowie ein Kommunikationsverfahren und ein Computerprogrammprodukt zum gemeinsamen Verwenden mit einem derartiges System. Das virtuelle private Netzwerk weist eine Firewall bzw. ein Firewall-System, wenigstens eine interne Vorrichtung und einen Namen-Server auf, welche jeweils eine Netzwerkadresse besitzen. Die interne Vorrichtung besitzt ferner eine Sekundäradresse, und der Namen-Server ist derart konfiguriert, daß er eine Zuordnung zwischen der Sekundäradresse und der Netzwerkadresse bereitstellt. In Reaktion auf eine Anfrage von der externen Vorrichtung zum Aufbau einer Verbindung zur Firewall übermittelt die Firewall der externen Vorrichtung die Netzwerkadresse des Namen-Servers. In Reaktion auf eine Anfrage von einem Bediener oder ähnlichem, welche die Sekundäradresse der internen Vorrichtung enthält und einen Zugriff an die interne Vorrichtung anfordert, erzeugt die externe Vorrichtung eine Netzwerkadressen-Anfragennachricht zur Übertragung über die Verbindung an die Firewall, welche eine Auflösung der Netzwerkadresse, die der Sekundäradresse zugeordnet ist, anfordert. Die Firewall übermittelt die Adressenauflösungsanfrage an den Namen-Server und der Namen-Server übermittelt die Netzwerkadresse, welche der Sekundäradresse zugeordnet ist, an die Firewall. Daraufhin stellt die Firewall die Netzwerkadresse in einer Netzwerkadressenantwortnachricht zur Übertragung über die Verbindung an die externe Vorrichtung bereit. Die externe Vorrichtung kann sodann die auf diese Weise bereitgestellte Netzwerkadresse in nachfolgenden an die interne Vorrichtung gerichtete Kommunikationen mit der Firewall verwenden.

Weitere Vorteile und Ausgestaltungen der Erfindung ergeben sich aus der nachfolgenden detaillierten Beschreibung eines bevorzugten Ausführungsbeispiels. In der Beschreibung wird auf die beigelegte schematische Zeichnung Bezug genommen. Darin zeigt:

**Fig. 1** ein funktionelles Blockdiagramm eines erfindungsgemäßen Netzwerkes.

**Fig. 1** zeigt ein funktionelles Blockdiagramm eines Netzwerkes **10**, welches gemäß der vorliegenden Erfindung aufgebaut ist. Das Netzwerk **10** gemäß **Fig. 1** umfaßt einen Internet-Service-Provider (nachfolgend "ISP") **11**, welcher die Übertragung von Nachrichtenpaketen zwischen einer oder mehreren Vorrichtungen **12(1)** bis **12(M)** (nachfolgend allgemein mit dem Bezugszeichen **12(m)** identifiziert), welche mit dem ISP **11** verbunden sind, und anderen Vorrich-

tungen, welche allgemein durch ein Bezugszeichen **13** gekennzeichnet sind, über das Internet **14** ermöglicht, wobei die Übertragung von Information in Nachrichtenpaketen zwischen den Vorrichtungen **12(m)** und **13** realisiert wird.

Der ISP **11** verbindet das Internet **14** über eine oder mehrere logische Verbindungen oder Gateways oder ähnlichem (im vorliegenden allgemein als "Verbindungen" bezeichnet), welche allgemein durch das Bezugszeichen **41** gekennzeichnet sind. Der ISP **11** kann ein öffentlicher ISP sein, welcher in diesem Falle die Verbindung mit Vorrichtungen **12(m)** herstellt, welche durch Bediener betrieben werden können, die der allgemeinen Öffentlichkeit angehören, so daß diese Bediener Zugang zu dem Internet erlangen. Alternativ dazu kann der ISP **11** ein privater ISP sein. In diesem Falle werden die damit verbundenen Vorrichtungen **12(m)** im allgemeinen beispielsweise durch Angestellte eines bestimmten Unternehmens oder einer Regierungseinrichtung, Mitgliedern von einer privaten Organisation oder ähnlichen betrieben, um diesen Angestellten oder Mitglieder einen Zugang in das Internet bereit zu stellen.

In an sich konventioneller Weise weist das Internet ein Netz von Schaltungsknoten auf (welche nicht separat dargestellt sind), welche die ISPs **11** und die Vorrichtungen **13** miteinander verbinden, um dazwischen die Übertragung von Nachrichtenpaketen zu ermöglichen. Die Nachrichtenpakete, welche über das Internet **14** übertragen werden, stimmen mit denjenigen überein, welche durch das sog. Internetprotokoll (IP) definiert werden, und umfassen einen Kopfabschnitt, einen Datenabschnitt und können einen Fehlererfassungs- und/oder Korrekturabschnitt aufweisen. Der Kopfabschnitt enthält Information, welche verwendet wird, um das Nachrichtenpaket über das Internet **14** zu übertragen, beispielsweise eine Zieladresse, welche die Vorrichtung identifiziert, welche das Nachrichtenpaket als Zielvorrichtung empfangen soll, und eine Quellenadresse, welche diejenige Vorrichtung identifiziert, welche das Nachrichtenpaket erzeugt hat. In jedem Nachrichtenpaket haben die Ziel- und Quellenadresse jeweils die Form einer Zahl, welche eindeutig die jeweilige Ziel- bzw. Quellenvorrichtung identifiziert. Die Schaltungsknoten im Internet **14** verwenden wenigstens die Zieladresse eines jeweiligen Nachrichtenpaketes, um das jeweilige Nachrichtenpaket an die Zielvorrichtung zu übermitteln, wenn die Zielvorrichtung an das Internet angeschlossen ist, oder an einen ISP **11** oder andere Vorrichtungen, welche an das Internet **14** angeschlossen sind, welche sodann das Nachrichtenpaket an das geeignete Ziel senden werden. Der Datenabschnitt eines jeden Nachrichtenpakets enthält die in dem Nachrichtenpaket übertragenen Daten; und der Fehlererfassungs- und/oder Korrekturabschnitt enthält Fehlererfassungs- und/oder Korrekturinformationen, welche verwendet werden können, um zu verifizieren, daß das Nachrichtenpaket in korrekter Weise von der Quelle zu der Zielvorrichtung übertragen wurde (im Fall der Fehlererfassungsinformation), und um ausgewählte Arten von Fehlern zu korrigieren, falls das Nachrichtenpaket nicht korrekt übertragen wurde (im Falle der Fehlerkorrekturinformation).

Die Vorrichtungen **12(m)**, welche mit dem ISP **11** verbunden sind, können jede beliebige Anzahl von Arten von Vorrichtungen umfassen, welche über das Internet **14** mit anderen Vorrichtungen **13** kommunizieren, umfassend z. B. Personalcomputer, Computer-Workstations und ähnliches. Jede Vorrichtung **12(m)** kommuniziert mit dem ISP **11**, um Nachrichtenpakete für die Übertragung über das Internet **14** an diesen zu übertragen, oder um Nachrichtenpakete, welche durch den ISP **11** über das Internet empfangen werden, von diesem zu empfangen. Dabei kann jedes geeignete Protokoll verwendet werden, z. B. das bekannte Point-to-Point Proto-

koll (allgemein mit "PPP" abgekürzt), falls die Vorrichtung **12(m)** über eine Point-to-Point Verbindung mit dem ISP **11** verbunden ist, oder irgendein konventionelles "Multi-Drop" Protokoll, falls die Vorrichtung **12(m)** mit dem ISP **11** über ein "Multi-Drop"-Netzwerk, z. B. das Ethernet, verbunden ist, oder ähnliches. Die Vorrichtungen **12(m)** sind im allgemeinen entsprechend der üblichen Computerarchitektur mit gespeicherten Programmen aufgebaut, welche z. B. eine Systemeinheit, eine Bildschirmanzeigeeinheit und Bedieneingabeeinrichtungen, wie etwa eine Tastatur oder eine Maus, umfaßt. Eine Systemeinheit weist im allgemeinen eine oder mehrere Prozessor-, Speicher-, Massenspeichereinrichtungen, z. B. Festplatten- und/oder Bandspeicherelemente, oder andere Elemente (nicht separat gezeigt) auf, wie etwa Netzwerk- und/oder Telefonschnittstelleneinrichtungen, um die jeweilige Vorrichtung an den ISP **11** anzukoppeln. Die Prozessor- bzw. Verarbeitungseinrichtungen verarbeiten Programme, einschließlich Anwendungsprogramme, unter der Steuerung eines Betriebssystems, um verarbeitete Daten zu erzeugen. Die Bildschirmeinheit ermöglicht es der Vorrichtung, die verarbeiteten Daten und einen Verarbeitungsstatus der Daten dem Benutzer anzuzeigen, und die Bedieneingabeeinrichtung ermöglicht es dem Bediener, Daten einzugeben und die Verarbeitung zu steuern.

Diese Elemente der Vorrichtung **12(m)** arbeiten in Verbindung mit einer geeigneten Programmierung so zusammen, um eine Vorrichtung **12(m)** mit einer Anzahl von funktionellen Elementen bereit zustellen, beispielsweise eine Bedienerschnittstelle **20**, eine Netzwerkschnittstelle **21**, einen Nachrichtenpaketgenerator **22**, einen Nachrichtenpaketempfänger und -prozessor **23**, eine ISP Einloggsteuerung bzw. Anmeldungssteuerung **24**, einen Internetparameterspeicher **25** und im Zusammenhang mit der vorliegenden Erfindung einen Sicherheits-Nachrichtenpaketprozessor **26**. Die Bedienerschnittstelle **20** ermöglicht, daß die Vorrichtung **12(m)** Eingabeinformationen von der/den Bedieneingabeeinrichtung(en) der Vorrichtung **12(m)** empfängt und die Ausgabeinformationen dem Bediener auf der/den Bildschirmeinrichtung(en) der Vorrichtung **12(m)** angezeigt werden. Die Netzwerkschnittstelle **21** ermöglicht eine Verbindung der Vorrichtung **12(m)** mit dem ISP **11** unter Verwendung des geeigneten PPP oder Netzwerkprotokolls, um Nachrichtenpakete an den ISP **11** zu übertragen und von diesem Nachrichtenpakete zu empfangen. Die Netzwerkschnittstelle **21** kann eine Verbindung mit dem ISP **11** über das öffentliche Telefonnetz vorsehen, um einen Wählverbindungsnetzwerkbetrieb (sog. Dial-Up Betrieb) der Vorrichtung **12(m)** über das öffentliche Telefonnetz zu ermöglichen. Alternativ oder zusätzlich dazu kann die Netzwerkschnittstelle **21** eine Verbindung durch den ISP **11** über beispielsweise ein konventionelles LAN ermöglichen, wie etwa das Ethernet. In Reaktion auf eine durch die Bedienerschnittstelle **20** gelieferte Eingabe und/oder in Reaktion auf Anfragen aus Programmen (nicht gezeigt), welche durch die Vorrichtung **12(m)** verarbeitet werden, kommuniziert die ISP Einloggsteuerung **24** über die Netzwerkschnittstelle **21**, um die Initialisierung (sog. "Log-On") einer Kommunikationssitzung zwischen der Vorrichtung **12(m)** und dem ISP **11** zu ermöglichen. Während dieser Kommunikationssitzung kann die Vorrichtung **12(m)** Information in der Form von Nachrichtenpaketen an andere Vorrichtungen über das Internet **14** sowie an andere Vorrichtungen **12(m')** (wobei  $m' \neq m$ ), welche mit der ISP **11** oder mit anderen ISPs verbunden sind, übertragen. Während eines Log-On-Betriebs empfängt die ISP Einloggsteuerung **24** die Internetprotokollparameter (IP-Parameter), welche im Zusammenhang mit einer Nachrichtenpaketerzeugung während der Kommunikationssitzung verwendet werden.

Während einer Kommunikationssitzung erzeugt der Nachrichtenpaketgenerator **22** Nachrichtenpakete zur Übertragung durch die Netzwerkschnittstelle **21** in Reaktion auf eine Eingabe, welche durch den Bediener über die Bedienerschnittstelle **20** geliefert wird und/oder in Reaktion auf Anfragen aus Programmen (nicht separat gezeigt), welche durch die Vorrichtung **12(m)** verarbeitet werden. Die Netzwerkschnittstelle **21** empfängt auch Nachrichtenpakete aus dem ISP **11** und liefert diese an den Nachrichtenpaketempfänger und -prozessor **23** zur Verarbeitung und Bereitstellung an die Bedienerschnittstelle **20** und/oder anderen Programmen (nicht gezeigt), welche durch die Vorrichtung **12(m)** verarbeitet werden. Falls die empfangenen Nachrichtenpakete eine Information enthalten, z. B. Web-Seiten oder ähnliches, welche dem Bediener angezeigt werden soll, kann die Information der Bedienerschnittstelle **20** geliefert werden, damit die Information auf der Bildschirmeinheit der Vorrichtung angezeigt wird. Zusätzlich oder alternativ dazu kann die Information an andere Programme (nicht gezeigt) zur Verarbeitung geliefert werden, welche durch die Vorrichtung **12(m)** verarbeitet werden.

Im allgemeinen können die Elemente, wie die Bedienerschnittstelle **20**, der Nachrichtenpaketgenerator **22**, der Nachrichtenpaketempfänger und -prozessor **23**, die ISP Einloggsteuerung **24** und der Internetparameterspeicher **25** Elemente eines konventionellen Internet-Browsers enthalten, wie die von Mosaic, Netscape Navigator und Microsoft Internet Explorer.

Wie es oben erwähnt wurde, weist die Vorrichtung **12(m)** im Zusammenhang mit der vorliegenden Erfindung einen Sicherheits-Nachrichtenpaketprozessor **26** auf. Der Sicherheits-Nachrichtenpaketprozessor **26** ermöglicht den Aufbau und Verwendung eines "Sicherheitstunnels" zwischen der Vorrichtung **12(m)** und anderen Vorrichtungen **12(m')** (wobei  $m' \neq m$ ) oder **13**, wie es welches weiter unten beschrieben wird. Im allgemeinen wird in einem solchen Sicherheitstunnel Information in wenigstens dem Datenabschnitt der zwischen der Vorrichtung **12(m)** und einer spezifischen anderen Vorrichtung **12(m')** (wobei  $m' \neq m$ ) oder **13** übertragenen Nachrichtenpakete geheimgehalten, beispielsweise durch Verschlüsselung des Datenabschnittes vor der Übertragung durch die Quellenvorrichtung. Die Information in anderen Abschnitten eines derartigen Nachrichtenpakets kann ebenfalls geheimgehalten werden, mit Ausnahme der Information, welche benötigt wird, um die Übertragung des jeweiligen Nachrichtenpakets zwischen den Vorrichtungen zu ermöglichen, also z. B. wenigstens die Zielinformation, damit die Schaltungsknoten des Internets und die ISPs die Vorrichtung identifizieren können, welche das Nachrichtenpaket empfangen soll.

Zusätzlich zu dem ISP **11** kann eine Vielzahl von anderen ISPs die Verbindung zum Internet herstellen, wie es durch die Pfeile **16** angedeutet ist, um eine Kommunikation zwischen Vorrichtungen, welche an diesen anderen ISPs angeschlossen sind, mit anderen Vorrichtungen über das Internet zu ermöglichen, welche die Vorrichtungen **12(n)**, welche an dem ISP **11** angeschlossen sind, umfassen können.

Die Vorrichtungen **13**, auf welche die Vorrichtungen **12(m)** zugreifen und mit welchen diese kommunizieren, können auch von jeder beliebigen Anzahl von Arten von Vorrichtungen sein, einschließlich Personalcomputer, Computer-Workstations und ähnliches, oder auch Minicomputer und Großrechner, Großspeichersysteme, Rechenserver, lokale Netzwerke (LANs) und Fernverbindungsnetzwerke (WANs), welche derartige Vorrichtungen und zahlreiche andere Arten von Vorrichtungen enthalten, die direkt oder indirekt mit den Netzwerken verbunden werden können. Nach der vorliegenden Erfindung umfaßt wenigstens eine der Vor-

richtungen wenigstens ein privates Netzwerk, welches als virtuelles privates Netzwerk **15** gekennzeichnet ist und z. B. die Form eines LAN oder eines WAN haben kann. Das virtuelle private Netzwerk **15** kann jede der Vorrichtungen **12(m')** (wobei  $m' \neq m$ ) aufweisen (wobei die Verbindung zu dem Internet **14** über einen ISP erfolgt) oder der Vorrichtungen **13** (wobei die Verbindung zu dem Internet **14** unmittelbar erfolgt). Bei dem vorliegend beschriebenen Ausführungsbeispiel wird angenommen, daß das virtuelle Netzwerk **15** eine Vorrichtung **13** aufweist. Das virtuelle private Netzwerk **15** umfaßt selbst mehrere Vorrichtungen, welche hier als eine Firewall bzw. ein Firewall-System **30**, mehrere Server **31(1)** bis **31(S)** (im nachfolgenden allgemein mit dem Bezugszeichen **31(s)** angegeben) und ein Namen-Server **32** gekennzeichnet sind, wobei allesamt durch eine Übertragungsverbindung **33** miteinander verbunden sind. Die Firewall **30** und die Server **31(s)** können ähnlich sein wie jede der verschiedenen Arten von Vorrichtungen **12(m)** und **13**, die hier beschrieben sind, und können daher beispielsweise umfassen Personalcomputer, Computer-Workstations und ähnliches, aber auch Minicomputer und Großrechner, Großspeichersysteme, Rechnerserver, lokale Netzwerke (LANs) und Fernverbindungsnetzwerke (WANs), welche derartige Vorrichtungen und zahlreiche andere Arten von Vorrichtungen umfassen, welche direkt oder indirekt mit den Netzwerken verbunden werden können.

Wie oben ausgeführt wurde, kommunizieren diese Vorrichtungen einschließlich der Vorrichtungen **12(m)** und der Vorrichtungen **13** durch Übertragung von Nachrichtenpaketen über das Internet. Die Vorrichtungen **12(m)** und **13** können Information in einem Peer-to-Peer bzw. gleichrangigem Modus, in einem Client-Server Modus oder nach beiden dieser Modi übertragen. Im allgemeinen überträgt eine Vorrichtung in einer Peer-to-Peer Nachrichtenpaketübertragung Information in einem oder mehreren Nachrichtenpaketen an die andere Vorrichtung. Andererseits kann eine Vorrichtung, welche in einem Client-Server Modus als Client fungiert, ein Nachrichtenpaket an eine andere Vorrichtung übertragen, welche als Server fungiert, um beispielsweise einen Dienst durch die andere Vorrichtung auszulösen. Mehrere Arten derartiger Dienste sind dem Fachmann bekannt, beispielsweise das Wiedergewinnen bzw. Auslesen von Information aus der anderen Vorrichtung, damit diese aktiviert wird, um Verarbeitungsoperationen und dergleichen durchzuführen. Falls der Server dazu dient, dem Client vor allem Informationen zu liefern, kann dieser allgemein als ein Speicherserver bezeichnet werden. Falls der Server andererseits Verarbeitungsoperationen auf Anfrage des Client ausführen soll, kann dieser allgemein als ein Rechnerserver bezeichnet werden. Andere Arten von Servern zum Ausführen von anderen Arten von Diensten und Operationen auf Anfrage von Clients sind dem Fachmann ebenfalls bekannt.

Wenn in einer Client-Server Anordnung eine Vorrichtung **12(m)** einen Dienst durch beispielsweise eine Vorrichtung **13** ausgeführt haben möchte, erzeugt die Vorrichtung **12(m)** eines oder mehrere Anfragenachrichtenpakete zur Übertragung an die Vorrichtung **13**, welche den benötigten Dienst anfordern. Das Anfragenachrichtenpaket enthält die Internetadresse der Vorrichtung **13**, welche als die Zielvorrichtung das Nachrichtenpaket empfängt und den Dienst ausführt. Die Vorrichtung **12(m)** überträgt das/die Anfragenachrichtenpaket(e) an den ISP **11**. Der ISP **11** überträgt daraufhin das Nachrichtenpaket über das Internet an die Vorrichtung **13**.

Falls die Vorrichtung **13** die Form eines WAN oder LAN hat, empfängt das WAN oder LAN das/die Nachrichtenpaket(e) und leitet dieses/diese zu einer dort angeschlossenen Vorrichtung weiter, welche den angeforderten Dienst aus-

führen soll.

In jedem Fall wird die Vorrichtung **13**, welche den angeforderten Dienst ausführen soll, nach Empfang des/der Anfragenachrichtenpaket(e) die Anfrage bearbeiten. Falls die Vorrichtung **12(m)**, welche das/die Anfragenachrichtenpaket(e) erzeugt hat, oder deren Bediener die notwendigen Befugnisse hat, um den Dienst von der Vorrichtung **13** anzufordern, und falls der angeforderte Dienst die Einleitung einer Informationsübertragung aus der Vorrichtung **13** als ein Speicherserver an die Vorrichtung **12(m)** als ein Client umfaßt, erzeugt die Vorrichtung **13** eines oder mehrere Antwortnachrichtenpakete, welche die angeforderten Information enthalten, und überträgt das/die Paket(e) über das Internet **14** an den ISP **11**. Daraufhin überträgt der ISP **11** das/die Nachrichtenpaket(e) an die Vorrichtung **12(m)**. Falls andererseits der angeforderte Dienst die Einleitung eines Verarbeitungsvorganges durch die Vorrichtung **13** als ein Rechnerserver beinhaltet, wird die Vorrichtung **13** den/die angeforderten Rechendienst(e) ausführen. Falls die Vorrichtung **13** verarbeitete Daten, welche während den Rechenvorgängen erzeugt wurden, an die Vorrichtung **12(m)** als Client zurücksenden soll, erzeugt die Vorrichtung **13** zusätzlich eines oder mehrere Antwortnachrichtenpakete, welche die verarbeiteten Daten enthalten und überträgt das/die Paket(e) über das Internet **14** an den ISP **11**. Der ISP **11** überträgt daraufhin das/die Nachrichtenpaket(e) an die Vorrichtung **12(m)**. Entsprechende Operationen können durch die Vorrichtungen **12(m)** und **13**, dem ISP **11** und dem Internet **14** in Verbindung mit anderen Arten von Diensten ausgeführt werden, welche durch die Server-Vorrichtungen **13** bereitgestellt werden können.

Wie oben angemerkt wurde, enthält jedes Nachrichtenpaket, welches durch die Vorrichtungen **12(m)** und **13** zur Übertragung über das Internet **14** erzeugt wird, eine Zieladresse, welche von den Schaltungsknoten verwendet wird, um das jeweilige Nachrichtenpaket an die geeignete Zielvorrichtung zu leiten. Adressen im Internet haben die Form von "n"-Bit Zahlen (wobei "n" beim gegenwärtigen Standard **32** oder **128** sein kann). Um insbesondere einen Bediener einer Vorrichtung **12(m)** von der Notwendigkeit zu befreien, sich spezifische Zahlenkolonnen bzw. Zahlen-Internetadressen zu merken und diese der Vorrichtung **12(m)** einzugeben, um die Erzeugung eines Nachrichtenpakets zur Übertragung über das Internet einzuleiten, stellt das Internet einen zweiten Adressierungsmechanismus zur Verfügung, welcher einfacher durch menschliche Bediener der jeweiligen Vorrichtungen handhabbar ist. Bei diesem Adressierungsmechanismus werden Internet-Domains, wie etwa LANs, Internet-Service-Provider (ISPs) und ähnliche, welche in bzw. mit dem Internet verbunden sind, durch relativ einfach les- und merkbare Namen, sog. Klartextnamen, identifiziert. Dabei soll sich hier die Bezeichnung "Klartextname" auf jede Art von Namenstext beziehen, z. B. auch auf Abkürzungen, generische Bezeichnungen, Phantasiebe-griffe, etc. Um das System der Klartext-Domainnamen umzusetzen, ist der ISP **11** mit einem Namen-Server **17** (der auch als ein DNS Server (Domain Name Server) bezeichnet werden kann) verbunden, welcher die Klartext-Domainnamen auflösen bzw. in eine gültige Internetadresse umwandeln kann, um die geeignete Internetadresse für das in dem jeweiligen Klartextnamen angegebene Ziel bereitzustellen. Im allgemeinen kann der Namen-Server ein Teil des ISP **11** oder damit direkt verbunden sein, wie es in Fig. 1 gezeigt ist, oder er kann eine bestimmte Vorrichtung sein, welche durch den ISP über das Internet zugänglich ist. Jedenfalls wenn sich die Vorrichtung **12(m)** bei dem ISP **11** während einer Kommunikationssitzung einloggt, wird der ISP **11**, wie oben hingewiesen wurde, verschiedene Internet-Proto-

kollparameter (IP-Parameter) zuordnen, welche die Vorrichtung 12(m) während der Kommunikationssitzung verwendet, und welche in dem Internetparameterspeicher 25 gespeichert sind. Diese IP-Parameter enthalten Informationen, wie

- (a) eine Internetadresse für die Vorrichtung 12(m), welche die Vorrichtung 12(m) während der Kommunikationssitzung identifiziert; und
- (b) die Identifizierung eines Namen-Servers 17, welchen die Vorrichtung 12(m) während der Kommunikationssitzung verwendet.

Wenn die Vorrichtung 12(m) Nachrichtenpakete zur Übertragung erzeugt, fügt sie ihre Internetadresse (oberer Punkt (a)) als die Quellenadresse ein. Die Vorrichtung(en) 13, welche die jeweiligen Nachrichtenpakete empfängt/empfangen, kann/können die Quellenadresse aus den Nachrichtenpaketen, welche von der Vorrichtung 12(m) empfangen werden, in Nachrichtenpaketen verwenden, welche die Vorrichtung(en) 13 zur Übertragung an die Vorrichtung 12(m) erzeugt/erzeugen, so daß das Internet in der Lage ist, die durch die jeweilige Vorrichtung 13 erzeugten Nachrichtenpakete an die Vorrichtung 12(m) zu leiten. Falls die Vorrichtung 12(m) auf den Namen-Server 17 über das Internet 14 zugreift, hat die durch den ISP 11 bereitgestellte Identifizierung des Namen-Servers 17 (siehe oben unter (b)) die Form einer Zahlen-Internetadresse, welche es der Vorrichtung 12(m) ermöglicht, für den Namen-Server 17 Nachrichten zu erzeugen, welche eine Auflösung der Klartext-Internetadressen in Zahlen-Internetadressen anfordern. Der ISP 11 kann der Vorrichtung 12(m) auch andere IP-Parameter zuordnen, wenn diese sich beim ISP 11 einloggt, beispielsweise die Identifizierung einer Verbindung zu dem Internet 14, welche für Nachrichten zu verwenden ist, die durch die Vorrichtung 12(m) übersandt werden, insbesondere falls der ISP 11 Mehrfach-Gateways aufweist. In der Regel speichert die Vorrichtung 12(m) die Internetparameter im Internetparameterspeicher 25 für die Verwendung während der Kommunikationssitzung.

Wenn ein Bediener die Vorrichtung 12(m) veranlassen möchte, daß sie ein Nachrichtenpaket an eine Vorrichtung 13 überträgt gibt der oder die Bediener(in) die Internetadresse der Vorrichtung 13 an die Vorrichtung 12(m) über die Bedienerchnittstelle 20 ein, sowie eine Information oder die Identifizierung der in der Vorrichtung 12(m) aufbewahrten Information, welche in der Nachricht übertragen werden sollen. Die Bedienerchnittstelle 20 aktiviert daraufhin den Paketgenerator 22 zur Freigabe der benötigten Pakete zur Übertragung durch den ISP 11 über das Internet 14. Falls

- (i) der Bediener die Zahlen-Internetadresse bereitgestellt hat, oder
- (ii) der Bediener die Klartext-Internetadresse bereitgestellt hat, aber der Paketgenerator 22 bereits die Zahlen-Internetadresse besitzt, welche der durch den Bediener eingegebenen Klartext-Internetadresse entspricht,

kann der Paketgenerator 22 unmittelbar nach Aktivierung durch die Bedienerchnittstelle 20 die Pakete erzeugen und diese an die Netzwerkschnittstelle 21 zur Übertragung an den ISP 11 liefern.

Falls aber der Bediener die Klartext-Internetadresse der Vorrichtung 13, an welche die Pakete zu übertragen sind, eingegeben hat, und falls der Paketgenerator 22 die entsprechende Zahlen-Internetadresse davon nicht bereits besitzt,

ermöglicht es der Paketgenerator 22, daß die Netzwerkadresse von dem Namen-Server 17, der in dem IP-Parameterspeicher 25 identifiziert ist, erhalten wird.

Bei diesem Vorgang wird der Paketgenerator 22 anfänglich den Namen-Server 17 kontaktieren, um zu versuchen, die geeignete Zahlen-Internetadresse von dem Namen-Server 17 zu erhalten. Bei diesem Vorgang wird die Vorrichtung 12(m) geeignete Nachrichtenpakete zur Übertragung an den Namen-Server 17 unter Verwendung der Zahlen-Internetadresse des Namen-Servers 17 erzeugen, welche durch den ISP 11 bereitgestellt wird, wenn sich die Vorrichtung 12(m) zu Beginn der Kommunikationssitzung einloggt. Jedenfalls wenn der Namen-Server 17 die Zahlen-Internetadresse für den Klartextnamen besitzt oder erhalten kann, wird der Namen-Server 17 die Zahlen-Internetadresse an die Vorrichtung 12(m) übermitteln. Die Zahlen-Internetadresse wird durch den Paketgenerator 22 über die Netzwerkschnittstelle 21 und den Paketempfänger und -prozessor 23 empfangen. Nachdem der Paketgenerator 22 die Zahlen-Internetadresse empfangen hat, kann er die notwendigen Nachrichtenpakete zur Übertragung an die Vorrichtung 13 durch die Netzwerkschnittstelle 21 und den ISP 11 erzeugen.

Wie oben ausgeführt wurde, ist in Fig. 1 eine der Vorrichtungen 13, welche an das Internet 14 angeschlossen sind, ein virtuelles privates Netzwerk 15, wobei das virtuelle private Netzwerk 15 eine Firewall bzw. ein Firewall-System 30, mehrere als Server 31(s) gekennzeichnete Vorrichtungen und einen Namen-Server 32 aufweist, die durch eine Übertragungsverbindung 33 miteinander verbunden sind. Die Server 31(s), die Firewall 30 und der Namen-Server 32 können als z. B. in einem LAN oder WAN verbundene Vorrichtungen untereinander Information in Form von Nachrichtenpaketen austauschen. Da die Firewall 30 mit dem Internet 14 verbunden ist und darüber Nachrichtenpakete empfangen kann, hat sie auch eine Internetadresse. Zusätzlich haben wenigstens die Server 31(s), welche über das Internet zugänglich sind, auch jeweilige Internetadressen. Dabei dient der Namen-Server 32 der Umwandlung von Klartext-Internetadressen für die Server 31(s) innerhalb des virtuellen privaten Netzwerkes 15 in die jeweiligen Zahlen-Internetadressen.

Im allgemeinen wird das virtuelle private Netzwerke 15 von einem Unternehmen, einem Regierungsamt, einer Organisation oder ähnlichem gehalten, welche möchten, daß die Server 31(s) Zugriff auf andere Vorrichtungen außerhalb des virtuellen privaten Netzwerkes 15 haben und an diese Information über das Internet 14 übertragen können, aber welche ebenfalls möchten, daß der Zugriff an die Server 31(s) durch Vorrichtungen 12(m) und andere externe Vorrichtungen über das Internet 14 in einer kontrollierten Weise begrenzt ist. Die Firewall 30 dient dazu, den Zugriff durch Vorrichtungen außerhalb des virtuellen privaten Netzwerkes 15 auf Server 31(s) innerhalb des virtuellen privaten Netzwerkes 15 zu kontrollieren. Bei diesem Vorgang stellt die Firewall 30 auch die Verbindung zum Internet 14 her und empfängt Nachrichtenpakete darüber zur Übertragung an einen Server 31(s). Falls das Nachrichtenpaket angibt, daß die Quelle des Nachrichtenpaketes einen Zugriff auf einen bestimmten Server 31(s) anfordert, und falls die Quelle für den Zugriff an den Server 31(s) autorisiert ist, sendet die Firewall 30 das Nachrichtenpaket über die Übertragungsverbindung 33 an den Server 31(s). Falls andererseits die Quelle nicht autorisiert ist, auf den Server 31(s) zuzugreifen, wird die Firewall 30 das Nachrichtenpaket nicht an den Server 31(s) übersenden, und kann anstelle ein Antwortnachrichtenpaket an die Quellenvorrichtung übermitteln, welches angibt, daß die Quelle nicht für den Zugriff an den Server 31(s) autorisiert ist. Die Firewall kann ähnlich aufgebaut sein wie die ande-

ren Vorrichtungen 31(s) in dem virtuellen privaten Netzwerk 15, wobei zusätzlich eine oder mehrere Verbindungen mit dem Internet vorhanden sind, welche allgemein durch das Bezugszeichen 43 gekennzeichnet sind.

Kommunikationen zwischen Vorrichtungen außerhalb des virtuellen privaten Netzwerkes 15, z. B. der Vorrichtung 12(m), und einer Vorrichtung, z. B. einem Server 31(s), innerhalb des virtuellen privaten Netzwerkes 15 kann über einen Sicherheitstunnel zwischen der Firewall 30 und der externen Vorrichtung, wie es oben beschrieben ist, erreicht werden, damit die ausgetauschten Information geheim bleiben, während diese über das Internet 14 und durch den ISP 11 übertragen werden. Ein Sicherheitstunnel zwischen der Vorrichtung 12(m) und dem virtuellen privaten Netzwerk 15 ist in Fig. 1 durch logische Verbindungen dargestellt, welche durch die Bezugszeichen 40, 42 und 44 gekennzeichnet sind; es versteht sich, daß die logische Verbindung 42 eine der logischen Verbindungen 41 zwischen dem ISP 11 und dem Internet 14 und die logische Verbindung 44 eine der logischen Verbindungen 43 zwischen dem Internet 14 und der Firewall 30 umfaßt.

Der Aufbau eines Sicherheitstunnels kann durch eine Vorrichtung 12(m), die extern zu dem virtuellen privaten Netzwerk 15 ist, ausgelöst werden. Bei diesem Vorgang erzeugt die Vorrichtung 12(m) in Reaktion auf eine Aufforderung durch deren Bediener ein Nachrichtenpaket zur Übertragung durch den ISP 11 und das Internet 14 an die Firewall 30, welches den Aufbau eines Sicherheitstunnels zwischen der Vorrichtung 12(m) und der Firewall 30 anfordert. Das Nachrichtenpaket kann an eine bestimmte Zahlen-Internetadresse gerichtet sein, welche der Firewall 30 zugeordnet ist und welche für Sicherheitstunnelaufbauanfragen reserviert ist, und welche ferner der Vorrichtung 12(m) bekannt ist und durch den Namen-Server 17 bereitgestellt wird. Falls die Vorrichtung 12(m) autorisiert ist, auf einen Server 31(s) in dem virtuellen privaten Netzwerk 15 zuzugreifen, nehmen die Vorrichtung 12(m) als Client und die Firewall 30 einen Dialog auf, welcher den Austausch von einem oder mehreren Nachrichtenpaketen über das Internet 14 umfaßt. Während des Dialogs kann die Firewall 30 der Vorrichtung 12(m) die Identifizierung eines Entschlüsselungsalgorithmus und einen zugehörigen Entschlüsselungsschlüssel bereitstellen, welche die Vorrichtung 12(m) beim Entschlüsseln der verschlüsselten Abschnitte der Nachrichtenpakete zu verwenden hat, welche das virtuelle private Netzwerk an die Vorrichtung 12(m) überträgt. Zusätzlich dazu kann die Firewall 30 der Vorrichtung 12(m) auch die Identifizierung eines Verschlüsselungsalgorithmus und einen zugehörigen Verschlüsselungsschlüssel bereitstellen, welche die Vorrichtung 12(m) beim Verschlüsseln der Abschnitte der Nachrichtenpakete zu verwenden hat, welche die Vorrichtung 12(m) an das virtuelle private Netzwerk 15 überträgt und welche verschlüsselt werden sollen. Alternativ dazu kann die Vorrichtung 12(m) die Identifizierung des Verschlüsselungsalgorithmus und des Verschlüsselungsschlüssels, welche die Vorrichtung 12(m) verwenden wird, an die Firewall 30 während des Dialogs liefern. Die Vorrichtung 12(m) kann in ihrem IP-Parameterspeicher 25 Informationen betreffend den Sicherheitstunnel speichern, einschließlich der Information in Verbindung mit der Identifizierung der Firewall 30 und der Identifizierungen der Verschlüsselungs- und Entschlüsselungsalgorithmen und dazugehöriger Schlüssel für Nachrichtenpakete, welche durch den Sicherheitstunnel übertragen werden.

Sodann können die Vorrichtung 12(m) und die Firewall 30 Nachrichtenpakete über den Sicherheitstunnel übertragen. Beim Erzeugen von Nachrichtenpaketen zur Übertragung über den Sicherheitstunnel verwendet die Vorrichtung

12(m) den Sicherheits-Paketprozessor 26, um die Abschnitte der Nachrichtenpakete zu verschlüsseln, welche vor der Übertragung durch die Netzwerkschnittstelle 21 an den ISP 11 zur Übertragung über das Internet 14 an die Firewall 30 verschlüsselt werden sollen, und um die verschlüsselten Abschnitte der Nachrichtenpakete zu entschlüsseln, welche durch die Vorrichtung 12(m) empfangen werden und welche verschlüsselt sind. Insbesondere nachdem der Paketgenerator 22 ein Nachrichtenpaket zur Übertragung an die Firewall 30 über den Sicherheitstunnel erzeugt hat, liefert er das Nachrichtenpaket an den Sicherheits-Paketprozessor 26. Der Sicherheits-Paketprozessor 26 verschlüsselt daraufhin die Abschnitte des Nachrichtenpakets, welche verschlüsselt werden sollen, unter Verwendung des Verschlüsselungsalgorithmus und des Verschlüsselungsschlüssels. Nachdem die Firewall 30 ein Nachrichtenpaket von der Vorrichtung 12(m) über den Sicherheitstunnel empfangen hat, wird sie dieses entschlüsseln und, falls der beabsichtigte Empfänger des Nachrichtenpakets eine andere Vorrichtung, z. B. ein Server 31(s), in dem virtuellen privaten Netzwerk 15 ist, wird die Firewall 30 das Nachrichtenpaket an diese andere Vorrichtung über die Übertragungsverbindung 33 übertragen.

Wenn ein Nachrichtenpaket von einer Vorrichtung, z. B. einem Server 31(s), in dem virtuellen privaten Netzwerk 15 an die Vorrichtung 12(m) über den Sicherheitstunnel übertragen werden soll, empfängt die Firewall 30 ein solches Nachrichtenpaket über die Übertragungsverbindung 33 und verschlüsselt das Nachrichtenpaket zur Übertragung über das Internet 14 an den ISP 11. Der ISP 11 sendet daraufhin das Nachrichtenpaket an die Vorrichtung 12(m), insbesondere an deren Netzwerkschnittstelle 21. Die Netzwerkschnittstelle 21 liefert das Nachrichtenpaket an den Sicherheits-Paketprozessor 26, welcher die verschlüsselten Abschnitte des Nachrichtenpakets unter Verwendung des Entschlüsselungsalgorithmus und -schlüssels entschlüsselt.

Ein Problem tritt auf im Zusammenhang mit Zugriffen durch eine Vorrichtung, z. B. einer Vorrichtung 12(m), welche extern zum virtuellen privaten Netzwerk 15 ist, und einer Vorrichtung, z. B. einem Server 31(s), welche extern zu der Firewall ist, nämlich dann, wenn dem Namen-Server 17 keine Zahlen-Internetadressen für die Server 31(s) und andere Vorrichtungen bereitgestellt sind, die sich innerhalb des virtuellen privaten Netzwerkes 15 befinden – mit Ausnahme der Zahlen-Internetadressen, welche der Firewall 30 zugeordnet sind. Folglich wird die Vorrichtung 12(m) nach Eingabe der Klartext-Internetadresse durch den Bediener nicht in der Lage sein, die Zahlen-Internetadresse des Servers 31(s) zu erhalten, wenn er auf den Namen-Server 17 zugreift.

Wenn die Vorrichtung 12(m) und die Firewall 30 zusammenarbeiten, um einen dazwischenliegenden Sicherheitstunnel aufzubauen, liefert die Firewall 30 zur Behebung des obigen Problems an die Vorrichtung 12(m) zusätzlich zu möglichen Identifikationen der Verschlüsselungs- und Entschlüsselungsalgorithmen und -schlüsseln, welche im Zusammenhang mit der Übertragung der Nachrichtenpakete über den Sicherheitstunnel zu verwenden sind, an die Vorrichtung 12(m) auch die Identifizierung eines Namen-Servers, z. B. eines Namen-Servers 32, innerhalb des virtuellen privaten Netzwerkes 15, auf welchen die Vorrichtung 12(m) zugreifen kann, um die geeigneten Zahlen-Internetadressen für die Klartext-Internetadressen zu erhalten, welche durch den Bediener einer Vorrichtung 12(m) eingegeben werden. Die Identifizierung des Namen-Servers 32 wird ebenfalls in dem IP-Parameterspeicher 25 gespeichert, zusammen mit der Identifizierung des Namen-Servers 17, welche durch den ISP 11 bereitgestellt wurde, sobald die Vorrichtung 12(m)



beim ISP 11 zu Beginn einer Kommunikationssitzung eingeloggt wurde. Wenn daher die Vorrichtung 12(m) ein Nachrichtenpaket an eine Vorrichtung, z. B. einen Server 31(s), in dem virtuellen privaten Netzwerk 15 unter Verwendung einer Klartext-Internetadresse übertragen möchte, welche z. B. durch einen Bediener bereitgestellt bzw. eingegeben wurde, greift die Vorrichtung 12(m) zu Beginn auf den Namen-Server 17 zu, wie es oben beschrieben wurde, um zu versuchen, die zu der Klartext-Internetadresse zugehörige Zahlen-Internetadresse zu erhalten. Da der Namen-Server 17 außerhalb des virtuellen privaten Netzwerkes 15 ist und die durch die Vorrichtung 12(m) angeforderten Information nicht besitzt, sendet er ein entsprechend lautendes Antwortnachrichtenpaket. Die Vorrichtung 12(m) wird sodann ein Anfragenachrichtenpaket zur Übertragung an den Namen-Server 32 durch die Firewall 30 und über den Sicherheitstunnel erzeugen. Falls der Namen-Server 32 eine Zahlen-Internetadresse besitzt, welche zu der Klartext-Internetadresse in dem Anfragenachrichtenpaket gehört, welches durch die Vorrichtung 12(m) geliefert wird, stellt er die Zahlen-Internetadresse in einer Weise bereit, welche im allgemeinen derjenigen ähnlich ist, welche oben im Zusammenhang mit dem Namen-Server 17 beschrieben wurde mit der Ausnahme, daß die Zahlen-Internetadresse durch den Namen-Server 32 in einem an die Firewall 30 gerichteten Nachrichtenpaket geliefert wird, und die Firewall 30 sodann das Nachrichtenpaket über den Sicherheitstunnel an die Vorrichtung 12(m) übermittelt. Es versteht sich, daß sich in dem Nachrichtenpaket, welches durch die Firewall 30 übertragen wird, die Zahlen-Internetadresse in dem Nachrichtenpaket im Datenabschnitt des Nachrichtenpakets befindet, welches über den Sicherheitstunnel übertragen wird und entsprechend verschlüsselt sein wird. Das Nachrichtenpaket wird durch die Vorrichtung 12(m) in einer ähnlichen Weise verarbeitet, wie sie oben im Zusammenhang mit anderen Nachrichtenpaketen beschrieben wurde, welche durch die Vorrichtung 12(m) über den Sicherheitstunnel empfangen werden. Das heißt, daß das Nachrichtenpaket durch den Sicherheits-Paketprozessor 26 vor dem Übermitteln an den Paketempfänger und -prozessor 23 zur Verarbeitung entschlüsselt wird. Die Zahlen-Internetadresse für den Server 31(s) kann in einem Cache in einer Zugriffskontrollliste (ACL) in dem IP-Parameterspeicher 25 gespeichert werden, zusammen mit der Zuordnungsinformation bezüglich der zugehörigen Klartext-Internetadresse, einer Angabe, daß der Server 31(s), der dieser Klartext-Internetadresse zugeordnet ist, über die Firewall 30 des virtuellen privaten Netzwerkes 15 zugänglich ist, und die Identifizierungen der Verschlüsselungs- und Entschlüsselungsalgorithmen und -schlüssel, welche für eine Verschlüsselung und Entschlüsselung der geeigneten Abschnitte der Nachrichtenpakete zu verwenden sind, welche an den Server 31(s) übertragen und von diesem erhalten werden.

Es versteht sich, daß in Reaktion auf ein Nachrichtenpaket von der Vorrichtung 12(m), welches beim Namen-Server 32 die Bereitstellung einer Zahlen-Internetadresse für eine durch die Vorrichtung 12(m) angegebene Klartext-Internetadresse anfordert, falls der Namen-Server 32 keine Zuordnungsinformation zwischen der Klartext-Internetadresse und einer Zahlen-Internetadresse besitzt, der Namen-Server 32 ein Antwortnachrichtenpaket, das entsprechend lautet, übertragen kann. Falls die Vorrichtung 12(m) eine Identifizierung von anderen Namen-Servern besitzt, welche z. B. mit anderen virtuellen privaten Netzwerken (nicht gezeigt) verbunden sein können und zu welchen die Vorrichtung 12(m) Zugriff hat, dann kann die Vorrichtung 12(m) versuchen, auf die anderen Namen-Server in einer ähnlichen Weise, wie es oben beschrieben ist, zuzugreifen. Falls die

Vorrichtung 12(m) nicht in der Lage ist, eine Zahlen-Internetadresse, welche der Klartext-Internetadresse zugeordnet ist, von irgendeinem der Namen-Server zu erhalten, zu welchem sie Zugriff hat und welche im allgemeinen im IP-Parameterspeicher 25 der Vorrichtung 12(m) identifiziert sind, wird sie allgemein nicht in der Lage sein, auf eine Vorrichtung mit der vorgegebenen Klartext-Internetadresse zuzugreifen und wird den Bediener oder ein Programm, welche den Zugriff angefordert haben, dementsprechend unterrichten.

Mit diesem Hintergrund werden nun Operationen, welche durch die Vorrichtung 12(m) und das virtuelle private Netzwerk 15 in Verbindung mit der vorliegenden Erfindung durchgeführt werden, im Detail beschrieben. Im allgemeinen laufen die Operationen in zwei Phasen ab. In einer ersten Phase arbeiten die Vorrichtung 12(m) und das virtuelle private Netzwerk 15 zusammen, um einen Sicherheitstunnel durch das Internet 14 aufzubauen. In dieser ersten Phase liefert das virtuelle private Netzwerk 15, insbesondere die Firewall 30, die Identifizierung eines Namen-Servers 32, und es kann auch die den Verschlüsselungs- und Entschlüsselungsalgorithmus und -schlüssel betreffende Information bereitstellen, wie es oben beschrieben wurde. In der zweiten Phase, nachdem der Sicherheitstunnel eingerichtet wurde, kann die Vorrichtung 12(m) die während der ersten Phase gelieferten Information im Zusammenhang mit der Erzeugung und Übertragung von Nachrichtenpaketen an einen oder mehrere Server 31(s) in dem virtuellen privaten Netzwerk 15 und bei dem notwendigen Umwandlungsvorgang der Klartext-Internetadressen zu Zahlen-Internetadressen aus dem Namen-Server 32, welcher durch die Firewall 30 während der ersten Phase identifiziert wurde, verwenden.

Folglich erzeugt die Vorrichtung 12(m) in der ersten (Sicherheitstunnelaufbau)phase zu Beginn ein Nachrichtenpaket zur Übertragung an die Firewall 30, welches einen Aufbau eines Sicherheitstunnels anfordert. Das Nachrichtenpaket enthält eine Zahlen-Internetadresse für die Firewall, (welche durch den Bediener der Vorrichtung oder ein Programm bereitgestellt werden kann, welches durch die Vorrichtung 12(m) verarbeitet wird, oder durch den Namen-Server 17 bereitgestellt werden kann, nachdem eine Klartext-Internetadresse durch den Bediener oder ein Programm bereitgestellt wurde), und welche insbesondere dazu dient, die Firewall 30 zu veranlassen, mit der Vorrichtung 12(m) einen Sicherheitstunnel aufzubauen. Falls die Firewall 30 die Anfrage bezüglich des Sicherheitstunnelaufbaus akzeptiert und falls die Firewall 30 die Verschlüsselungs- und Entschlüsselungsalgorithmen und -schlüssel bereitstellt, so wie es oben angegeben wurde, erzeugt die Firewall 30 ein Antwortnachrichtenpaket zur Übertragung an die Vorrichtung 12(m), welches die Verschlüsselungs- und Entschlüsselungsalgorithmen und -schlüssel identifiziert. Wie oben beschrieben, wird dieses Antwortnachrichtenpaket nicht verschlüsselt. Wenn die Vorrichtung 12(m) die Antwort empfängt, werden die Identifizierungen der Verschlüsselungs- und Entschlüsselungsalgorithmen und -schlüssel in dem IP-Parameterspeicher 25 gespeichert.

Zu einem späteren Zeitpunkt in der ersten Phase erzeugt die Firewall 30 auch ein Nachrichtenpaket zur Übertragung an die Vorrichtung 12(m), welches die Zahlen-Internetadresse des Namen-Servers 32 enthält. Bei diesem Nachrichtenpaket wird der Abschnitt des Nachrichtenpakets, welcher die Zahlen-Internetadresse des Namen-Servers 32 enthält, unter Verwendung eines Verschlüsselungsalgorithmus und Verschlüsselungsschlüssels verschlüsselt, und dies kann unter Verwendung des Entschlüsselungsalgorithmus und -schlüssels, die durch das zuvor beschriebene Antwortnachrichtenpaket geliefert wurden, wieder entschlüsselt

werden. Diese Nachricht hat im allgemeinen die folgende Struktur:

```
"<IIA(FW),IIA(DEV_12(m))><SEC_TUN>
<ENCR<<IIA(FW),IIA(DEV_12(m))><(DNS_ADRS:IIA(NS_2)>>>"
```

wobei

- (i) "IIA(FW)" die Quellenadresse darstellt, d. h. eine Zahlen-Internetadresse der Firewall **30**,
- (ii) "IIA(DEV\_12(m))" die Zieladresse darstellt, d. h. die Zahlen-Internetadresse der Vorrichtung **12** (m),
- (iii) "DNS\_ADRS:IIA(NS)" angibt, daß "IIA(NS\_32)" die Zahlen-Internetadresse des Namen-Servers **32** darstellt, für dessen Benutzung die Vorrichtung **12**(m) autorisiert ist, und
- (iv) "ENCR<...>" bedeutet, daß die Information, zwischen den Klammern "<" und ">" verschlüsselt ist.

Der Anfangsabschnitt der Nachricht "IIA(FW),IIA(DEV\_12(m))>" bildet wenigstens einen Teil des Kopfabschnitts der Nachricht, und "<ENCR<<IIA(FW),IIA(DEV\_12(m))><IIA(NS)>>>" stellt wenigstens einen Teil des Datenabschnitts der Nachricht dar. "<SEC\_TUN>" stellt einen Hinweis in dem Kopfabschnitt dar, welcher angibt, daß die Nachricht über den Sicherheitstunnel übertragen wird, wodurch auch angezeigt wird, daß der Datenabschnitt der Nachricht verschlüsselte Information enthält.

Nachdem die Vorrichtung **12**(m) die Nachricht von der Firewall **30** empfängt, wie es oben beschrieben wurde, und weil das Nachrichtenpaket den <SEC\_TUN> Hinweis enthält, überträgt deren Netzwerkschnittstelle **21** den verschlüsselten Abschnitt "<ENCR<<IIA(FW),IIA(DEV\_12(m))><DNS\_ADRS:IIA(NS\_32)>>>" an den Sicherheits-Paketprozessor **26** zur Verarbeitung. Der Sicherheits-Paketprozessor **26** entschlüsselt den verschlüsselten Abschnitt, bestimmt weiter, daß der Abschnitt "IIA(NS\_32)" die Zahlen-Internetadresse des Namen-Servers darstellt, insbesondere des Namen-Servers **32**, für dessen Benutzung die Vorrichtung **12**(m) autorisiert ist, und speichert diese Adresse in dem IP-Parameterspeicher **25** zusammen mit einer Angabe, daß die dorthin gerichteten Nachrichtenpakete zu der Firewall **30** zu übertragen sind, und daß die Daten in den Nachrichtenpaketen unter Verwendung des Verschlüsselungsalgorithmus und -schlüssels, die davor durch die Firewall **30** übermitteln wurden, zu verschlüsseln sind. Es versteht sich, daß aufgrund der Tatsache, daß die Zahlen-Internetadresse des Namen-Servers **32** von der Firewall an die Vorrichtung **12**(m) in verschlüsselter Form übertragen wird, diese vertraulich bleibt, selbst wenn das Paket durch einen Dritten abgefangen wird.

In Abhängigkeit des speziellen Protokolls, welches für den Aufbau des Sicherheitstunnels verwendet wird, können die Firewall **30** und die Vorrichtung **12**(m) auch Nachrichtenpakete austauschen, welche andere Information enthalten als die oben beschriebenen.

Wie oben erwähnt wurde, kann die Vorrichtung **12**(m) in der zweiten Phase nach der Einrichtung des Sicherheitstunnels die Information, welche während der ersten Phase bereitgestellt wurde, im Zusammenhang mit dem Erzeugen und Übertragen von Nachrichtenpaketen zu einem oder mehreren der Server **31**(s) in dem virtuellen privaten Netzwerk **15** nutzen. Falls bei diesen Operationen der Bediener einer Vorrichtung **12**(m) oder ein Programm, welches durch eine Vorrichtung **12**(m) verarbeitet wird, möchte, daß die Vorrichtung **12**(m) ein Nachrichtenpaket an einen Server

**31**(s) in dem virtuellen privaten Netzwerk **15** überträgt, und falls der Bediener durch die Bedienerchnittstelle **20** oder das Programm eine Klartext-Internetadresse bereitstellt, wird zunächst die Vorrichtung **12**(m), insbesondere der Paketgenerator **22**, bestimmen, ob der IP-Parameterspeicher **25** dort in einem Cache eine Zahlen-Internetadresse gespeichert hat, welche zu der Klartext-Internetadresse gehört. Falls dies nicht der Fall ist, erzeugt der Paketgenerator **22** ein Anfragennachrichtenpaket zur Übertragung an den Namen-Server **17**, um von diesem die zu der Klartext-Internetadresse gehörige Zahlen-Internetadresse anzufordern. Falls der Namen-Server **17** eine zu der Klartext-Internetadresse gehörige Zahlen-Internetadresse besitzt, wird dieser die Zahlen-Internetadresse an die Vorrichtung **12**(m) liefern. Es versteht sich, daß dies nur erfolgen kann, wenn die Klartext-Internetadresse im Anfragennachrichtenpaket sowohl einer Vorrichtung **13** außerhalb des virtuellen privaten Netzwerkes **15** als auch einem Server **32**(s) in dem virtuellen privaten Netzwerk **15** zugeordnet wurde. Danach kann die Vorrichtung **12**(m) die Zahlen-Internetadresse verwenden, um Nachrichtenpakete zur Übertragung über das Internet zu erzeugen, wie es oben beschrieben wurde.

Falls andererseits angenommen wird, daß der Namen-Server **17** keine der Klartext-Internetadresse zugeordnete Zahlen-Internetadresse besitzt, wird der Namen-Server **17** ein entsprechend lautendes Antwortnachrichtenpaket an die Vorrichtung **12**(m) übermitteln. Sodann erzeugt der Paketgenerator **22** der Vorrichtung **12**(m) ein Anfragennachrichtenpaket zur Übertragung an den nächsten Namen-Server, der in ihrem IP-Parameterspeicher **25** identifiziert ist, um von diesem Namen-Server die der Klartext-Internetadresse zugeordnete Zahlen-Internetadresse anzufordern. Falls dieser nächste Namen-Server der Namen-Server **32** ist, liefert der Paketgenerator **22** das Nachrichtenpaket an den Sicherheits-Paketprozessor **26** zur weiteren Verarbeitung. Der Sicherheits-Paketprozessor **26** erzeugt daraufhin ein Anfragennachrichtenpaket zur Übertragung über den Sicherheitstunnel an die Firewall **30**. Diese Nachricht hat im allgemeinen folgende Struktur:

```
"<IIA(DEV_12(m)),IIA(FW)><SEC_TUN>
<ENCR<<IIA(DEV_12(m)),IIA(NS_32)>><IIA_REQ>>>"
```

wobei

- (i) "IIA(DEV\_12(m))" die Quellenadresse darstellt, d. h. die Zahlen-Internetadresse der Vorrichtung **12**(m),
- (ii) "IIA(FW)" die Zieladresse darstellt, d. h. die Zahlen-Internetadresse der Firewall **30**,
- (iii) "IIA(NS\_32)" die Adresse des Namen-Servers **32** darstellt,
- (iv) "<<IIA(DEV\_12(m)),IIA(NS\_32)>><IIA\_REQ>>" das Anfragennachrichtenpaket darstellt, welches durch den Paketgenerator **22** erzeugt wird, wobei "<IIA(DEV\_12(m)),IIA(NS\_32)>" den Kopfabschnitt des Anfragennachrichtenpakets und "<IIA\_REQ>" den Datenabschnitt des Anfragennachrichtenpakets darstellt,
- (v) "ENCR<...>" angibt, daß die Information zwischen den Klammern "<" und ">" verschlüsselt ist, und
- (vi) "<SEC\_TUN>" einen Hinweis in dem Kopfabschnitt des Nachrichtenpakets darstellt, welches durch den Sicherheitspaketgenerator **26** erzeugt wird und angibt, daß die Nachricht über den Sicherheitstunnel übertragen wird, wobei hierdurch angegeben wird, daß der Datenabschnitt der Nachricht verschlüsselte Information enthält.

Wenn die Firewall 30 das durch den Sicherheitspaketgenerator 26 erzeugte Anfragennachrichtenpaket empfängt, wird diese den verschlüsselten Abschnitt des Nachrichtenpakets entschlüsseln, um "`<<IIA(DEV_12(m)),IIA(NS_32)>><IIA_REQ>>`" zu erhalten. Dies stellt das Anfragennachrichtenpaket dar, welches durch den Paketgenerator 22 erzeugt wird. Nachdem das Anfragennachrichtenpaket erhalten wurde, überträgt die Firewall 30 dieses über die Übertragungsverbindung 33 an den Namen-Server 32. In Abhängigkeit von dem Protokoll zur Übertragung von Nachrichtenpaketen über die Übertragungsverbindung 33 kann es bei diesem Prozeß für die Firewall 30 notwendig sein, das Anfragennachrichtenpaket zu modifizieren, damit es dem Protokoll der Übertragungsverbindung 33 entspricht.

Nachdem der Namen-Server 32 das Anfragennachrichtenpaket erhalten hat, wird dieser das Anfragennachrichtenpaket verarbeiten, um zu bestimmen, ob er eine der Klartext-Internetadresse, welche in dem Anfragennachrichtenpaket gesendet wird, zugeordnete Zahlen-Internetadresse besitzt. Falls der Namen-Server feststellt, daß er eine solche Zahlen-Internetadresse aufweist, wird dieser ein Antwortnachrichtenpaket zur Übertragung an die Firewall erzeugen, welches die Zahlen-Internetadresse enthält. Im allgemeinen hat das Antwortnachrichtenpaket die folgende Struktur:

```
"<<IIA(NS_32),IIA(DEV_12(m))>><IIA_RESP>>"
```

wobei

- (i) "IIA(NS\_32)" die Quellenadresse darstellt, d. h. die Zahlen-Internetadresse des Namen-Servers 32,
- (ii) "IIA(DEV\_12(m))" die Zieladresse darstellt, d. h. die Zahlen-Internetadresse der Vorrichtung 12(m), und
- (iii) "IIA\_RESP" die Zahlen-Internetadresse darstellt, welche der Klartext-Internetadresse zugeordnet ist.

Nachdem die Firewall 30 das Antwortnachrichtenpaket empfangen hat, und weil die Kommunikation mit der Vorrichtung 12(m) über den dazwischenliegenden Sicherheitstunnel stattfindet, verschlüsselt die Firewall 30 das von dem Namen-Server 32 empfangene Antwortnachrichtenpaket und erzeugt ein Nachrichtenpaket zur Übertragung an die Vorrichtung 12(m), welches das verschlüsselte Antwortnachrichtenpaket enthält. Im allgemeinen hat das durch die Firewall 30 erzeugte Nachrichtenpaket die folgende Struktur:

```
"<IIA(FW),IIA(DEV12(m))><SEC_TUN>  
<ENCR<<IIA(NS_32),IIA(DEV_12(m))>><IIA_RESP>>>"
```

wobei

- (i) "IIA(FW)" die Quellenadresse darstellt, d. h. die Zahlen-Internetadresse der Firewall 30,
- (ii) "IIA(DEV\_12(m))" die Zieladresse darstellt, d. h. die Zahlen-Internetadresse der Vorrichtung 12(m),
- (iii) "SEC\_TUN" einen Hinweis in dem Kopfabschnitt des Nachrichtenpakets darstellt, welches durch den Sicherheitspaketgenerator 26 erzeugt wird, und angibt, daß die Nachricht über den Sicherheitstunnel übertragen wird, und wobei auch angegeben wird, daß der Datenabschnitt der Nachricht verschlüsselte Information enthält,
- (iv) "ENCR<...>" angibt, daß die Information zwischen den Klammern "<" und ">" (was dem von dem Namen-Server 32 empfangenen Antwortnachrichten-

paket entspricht) verschlüsselt ist.

Zusätzlich kann es je nach dem Protokoll zur Übertragung von Nachrichtenpaketen über die Übertragungsverbindung 33 für die Firewall 30 notwendig sein, das Nachrichtenpaket zu bearbeiten und/oder zu modifizieren, damit dieses dem Protokoll des Internets 14 entspricht.

Wenn die Vorrichtung 12(m) das Nachrichtenpaket von der Firewall 30 empfängt, wird das Nachrichtenpaket an den Sicherheits-Paketprozessor 26 geliefert. Der Sicherheitspaketprozessor 26 entschlüsselt daraufhin den verschlüsselten Abschnitt des Nachrichtenpakets, um die der Klartext-Internetadresse zugeordnete Zahlen-Internetadresse zu erhalten und lädt diese Information in den IP-Parameterspeicher 25. Danach kann die Vorrichtung diese Zahlen-Internetadresse beim Erzeugen von Nachrichtenpaketen zur Übertragung an den Server 31(s) verwenden, welcher zu der Klartext-Internetadresse gehört.

Es versteht sich, daß, falls der Namen-Server 32 keine Zahlen-Internetadresse besitzt, welche der durch die Vorrichtung 12(m) in dem Anfragennachrichtenpaket gelieferte Klartext-Internetadresse zugeordnet ist, dies der Namen-Server 32 in dem durch ihn erzeugten Antwortnachrichtenpaket entsprechend anzeigen. Die Firewall 30 erzeugt dann in Reaktion auf das durch den Namen-Server 32 gelieferte Antwortnachrichtenpaket auch ein Nachrichtenpaket zur Übertragung an die Vorrichtung 12(m), welches einen verschlüsselten Abschnitt enthält, der das Antwortnachrichtenpaket umfaßt, das durch den Namen-Server 32 erzeugt wurde. Nachdem die Vorrichtung 12(m) das Nachrichtenpaket empfangen hat, wird der verschlüsselte Abschnitt durch den Sicherheitspaketprozessor 26 entschlüsselt, welcher daraufhin den Paketgenerator 22 darüber informiert, daß der Namen-Server 32 keine der Klartext-Internetadresse zugeordnete Zahlen-Internetadresse besitzt. Falls der IP-Parameterspeicher 25 die Identifizierung eines anderen Namen-Servers enthält, erzeugt sodann der Paketgenerator 22 der Vorrichtung 12(m) ein Anfragennachrichtenpaket zur Übertragung an den nächsten Namen-Server, der in deren IP-Parameterspeicher 25 identifiziert ist, um von diesem Namen-Server die Zahlen-Internetadresse anzufordern, welche der Klartext-Internetadresse zugeordnet ist. Falls andererseits der IP-Parameterspeicher 25 keine Identifizierung eines anderen Namen-Servers enthält, kann der Paketgenerator 22 die Bedienschnittstelle 20 oder ein Programm darüber informieren, daß er nicht in der Lage ist, ein Nachrichtenpaket zur Übertragung an eine Vorrichtung zu erzeugen, welche der Klartext-Internetadresse zugeordnet ist, welche durch die Bedienschnittstelle 20 oder ein Programm eingegeben bzw. bereitgestellt wurde.

Die Erfindung liefert eine Anzahl von Vorteilen. Insbesondere schafft die Erfindung ein System zum Vereinfachen der Kommunikation zwischen Vorrichtungen, welche mit einem öffentlichen Netzwerk verbunden sind, z. B. mit dem Internet 14, und Vorrichtungen, welche mit privaten Netzwerken verbunden sind, z. B. mit dem virtuellen privaten Netzwerk 15, indem die Umwandlung von Klartextadressen in Netzwerkadressen durch einen Namen-Server, der bevorzugt über einen Sicherheitstunnel mit den privaten Netzwerken verbunden ist, ermöglicht wird.

Es versteht sich, daß eine Vielzahl von Modifikationen an der im Zusammenhang mit Fig. 1 beschriebenen Anordnung durchgeführt werden können. Obwohl das Netzwerk 10 so beschrieben wurde, daß die Identifizierung der Verschlüsselungs- und Entschlüsselungsalgorithmen und -schlüssel durch die Vorrichtung 12(m) und die Firewall 30 während des Dialogs, währenddessen der Sicherheitstunnel eingerichtet wird, ausgetauscht wird, versteht es sich, daß bei-

spielsweise Information durch die Vorrichtung **12(m)** und die Firewall **30** getrennt von dem Aufbau eines solchen Sicherheitstunnels bereitgestellt werden können.

Obwohl die Erfindung im Zusammenhang mit dem Internet beschrieben wurde, versteht es sich ferner, daß die Erfindung in Verbindung mit jedem, insbesondere globalen, Netzwerk verwendet werden kann. Obwohl die Erfindung im Zusammenhang mit einem Netzwerk beschrieben wurde, welches ein System von Klartext-Netzwerkadressen bereitstellt, versteht es sich ferner, daß die Erfindung nicht darauf beschränkt ist sondern in Verbindung mit jedem Netzwerk verwendet werden kann, welches irgendeine Form einer – den systemeigenen Netzwerkadressen übergeordnete – Sekundär-Netzwerkadresseneinrichtung oder vergleichbare nicht-formeller Netzwerkadresseneinrichtung vorsieht.

Es versteht sich ferner, daß ein erfindungsgemäßes System als ganzes oder in Teilen aus speziell hierfür geeigneter Hardware oder einem allgemein geeigneten Computersystem oder jeder Kombination davon aufgebaut werden kann, wobei jeder Abschnitt davon durch ein geeignetes Programm gesteuert werden kann. Jedes Programm kann als ganzes oder in Teilen einen Teil des Systems umfassen oder auf dem System in einer konventionellen Weise gespeichert sein, oder es kann als ganzes oder in Teilen in das System über ein Netzwerk oder andere Mechanismen zur Übertragung von Information in einer konventionellen Weise bereitgestellt werden. Zusätzlich versteht es sich, daß das System betrieben und/oder auf andere Art und Weise mittels Information gesteuert werden kann, welche durch einen Bediener mittels Bedieneingabelementen (nicht gezeigt) bereitgestellt wird, welche direkt an das System angeschlossen sein können oder welche die Information über ein Netzwerk oder andere Mechanismen zur Übertragung von Information in einer konventionellen Weise übertragen können.

Die vorstehende Beschreibung hat sich auf ein spezifisches Ausführungsbeispiel der Erfindung bezogen. Es versteht sich jedoch, daß verschiedene Variationen und Modifikationen der Erfindung gemacht werden können, bei welchen einige oder alle der Vorteile der Erfindung erreicht werden. Diese und andere Variationen und Modifikationen fallen in den Schutzbereich der vorliegenden Erfindung, der durch die nachfolgenden Ansprüche bestimmt ist.

#### Patentansprüche

1. System umfassend ein virtuelles privates Netzwerk (**15**) und eine externe Vorrichtung (**12(m)**), welche über ein digitales Netzwerk (**14**) kommunizieren, wobei:  
das virtuelle private Netzwerk (**15**) eine Firewall (**30**), wenigstens eine interne Vorrichtung (**31(s)**) und einen Namen-Server (**32**) aufweist, welche jeweils eine Netzwerkadresse besitzen, wobei die interne Vorrichtung (**31(s)**) auch eine Sekundäradresse besitzt und der Namen-Server (**32**) derart konfiguriert ist, daß er eine Zuordnung zwischen der Sekundäradresse und der Netzwerkadresse bereitstellt,  
die Firewall (**30**) derart konfiguriert ist, daß sie der externen Vorrichtung (**12(m)**) in Reaktion auf deren Anfrage zum Aufbau einer Verbindung zur Firewall (**30**) die Netzwerkadresse des Namen-Servers (**32**) liefert, und  
die externe Vorrichtung (**12(m)**) derart konfiguriert ist, daß sie in Reaktion auf eine Anfrage zum Zugriff auf die interne Vorrichtung (**31(s)**), welche die Sekundäradresse der internen Vorrichtung (**31(s)**) enthält, eine Netzwerkadressen-Anfragenachricht zur Übertragung über die Verbindung an die Firewall (**30**) erzeugt, wel-

che eine Auflösung der der Sekundäradresse zugeordneten Netzwerkadresse anfordert, wobei die Firewall (**30**) derart konfiguriert ist, daß sie die Adressenauflosungsanfrage an den Namen-Server (**32**) übermittelt, der Namen-Server (**32**) derart konfiguriert ist, daß er die der Sekundäradresse zugeordnete Netzwerkadresse bereitstellt, und die Firewall (**30**) daraufhin die Netzwerkadresse in einer Netzwerkadressen-Antwortnachricht zur Übertragung über die Verbindung an die externe Vorrichtung (**12(m)**) bereitstellt.

2. System nach Anspruch 1, bei welchem die externe Vorrichtung (**12(m)**) derart konfiguriert ist, daß sie die in der Netzwerkadressen-Antwortnachricht bereitgestellte Netzwerkadresse beim Erzeugen von wenigstens einer Nachricht zur Übertragung an die interne Vorrichtung (**31(s)**) verwendet.

3. System nach Anspruch 1 oder 2, bei welchem die externe Vorrichtung (**12(m)**) derart konfiguriert ist, daß sie mit dem Netzwerk (**14**) durch einen Netzwerk-Service-Provider (**11**) verbunden wird.

4. System nach Anspruch 3, bei welchem die externe Vorrichtung (**12(m)**) derart konfiguriert ist, daß sie eine Kommunikationssitzung mit dem Netzwerk-Service-Provider (**11**) aufbaut, wobei der Netzwerk-Service-Provider (**11**) der externen Vorrichtung (**12(m)**) die Identifizierung eines weiteren Namen-Servers übermittelt, wobei der weitere Namen-Server derart konfiguriert ist, daß er eine Zuordnung zwischen einer Sekundäradresse und einer Netzwerkadresse für wenigstens eine Vorrichtung bereitstellt.

5. System nach einem der vorstehenden Ansprüche, bei welchem die externe Vorrichtung (**12(m)**) derart konfiguriert ist, daß sie eine Liste von Namen-Servern erhält, welche der externen Vorrichtung (**12(m)**) identifiziert wurden, und die externe Vorrichtung (**12(m)**) die Namen-Server in der Liste nacheinander in Reaktion auf eine Anfrage zum Zugriff auf eine andere Vorrichtung abfragt, wobei die Anfrage eine Sekundäradresse der anderen Vorrichtung enthält, solange bis die externe Vorrichtung (**12(m)**) eine Netzwerkadresse empfängt, wobei die externe Vorrichtung (**12(m)**) in jedem Abfragevorgang eine Netzwerkadressen-Anfragenachricht zur Übertragung über das Netzwerk (**14**) erzeugt, welche durch einen der Namen-Server in der Liste zu beantworten ist, und von diesem eine Netzwerkadressen-Antwortnachricht empfängt.

6. System nach einem der vorstehenden Ansprüche, bei welchem die Verbindung zwischen der externen Vorrichtung (**12(m)**) und der Firewall (**30**) ein Sicherheitstunnel ist, in welchem wenigstens ein der zwischen der externen Vorrichtung (**12(m)**) und der Firewall (**30**) übertragenen Nachrichten verschlüsselt ist.

7. Verfahren zum Betreiben eines Systems umfassend ein virtuelles privates Netzwerk (**15**) und eine externe Vorrichtung (**12(m)**), welche durch ein digitales Netzwerk (**14**) miteinander verbunden sind, wobei das virtuelle private Netzwerk (**15**) eine Firewall (**30**), wenigstens eine interne Vorrichtung (**31(s)**) und einen Namen-Server (**32**) aufweist, welche jeweils eine Netzwerkadresse besitzen, wobei die interne Vorrichtung (**31(s)**) auch eine Sekundäradresse besitzt, und der Namen-Server (**32**) derart konfiguriert ist, daß er eine Zuordnung zwischen der Sekundäradresse und der Netzwerkadresse bereitstellt, wobei:

A. in Reaktion auf eine Anfrage der externen Vorrichtung (**12(m)**) zum Aufbau einer Verbindung zur Firewall (**30**) die Firewall (**30**) der externen Vorrichtung (**12(m)**) die Netzwerkadresse des

Namen-Servers (32) übermittelt; und

B. (i) in Reaktion auf eine Anfrage zum Zugriff auf die interne Vorrichtung (31(s)), welche die Sekundäradresse der internen Vorrichtung (31(s)) enthält, die externe Vorrichtung (12(m)) eine Netzwerkadressen-Anfragenachricht zur Übertragung über die Verbindung an die Firewall (30) erzeugt, welche eine Auflösung der Netzwerkadresse, welche der Sekundäradresse zugeordnet ist, anfordert,

(ii) die Firewall (30) die Adressenauflösungsanfrage an den Namen-Server (32) übermittelt, (iii) der Namen-Server (32) die der Sekundäradresse zugeordnete Netzwerkadresse bereitstellt, und

(iv) die Firewall (30) die Netzwerkadresse in einer Netzwerkadressen-Antwortnachricht zur Übertragung über die Verbindung an die externe Vorrichtung (12(m)) bereitstellt.

8. Verfahren nach Anspruch 7, bei welchem die externe Vorrichtung (12(m)) ferner die in der Netzwerkadressen-Antwortnachricht bereitgestellte Netzwerkadresse beim Erzeugen von wenigstens einer Nachricht zur Übertragung an die interne Vorrichtung (31(s)) verwendet.

9. Verfahren nach Anspruch 7 oder 8, bei welchem die externe Vorrichtung (12(m)) mit dem Netzwerk (14) durch einen Netzwerk-Service-Provider (11) verbunden werden kann.

10. Verfahren nach Anspruch 9, bei welchem die externe Vorrichtung (12(m)) eine Kommunikationssitzung mit dem Netzwerk-Service-Provider (11) aufbaut, wobei der Netzwerk-Service-Provider (11) der externen Vorrichtung (12(m)) die Identifizierung eines weiteren Namen-Servers übermittelt, wobei der weitere Namen-Server eine Zuordnung zwischen einer Sekundäradresse und einer Netzwerkadresse für wenigstens eine Vorrichtung bereitstellt.

11. Verfahren nach einem der Ansprüche 7 bis 10, bei welchem die externe Vorrichtung (12(m)) eine Liste von Namen-Servern erhält, welche der externen Vorrichtung (12(m)) identifiziert wurden, und die externe Vorrichtung (12(m)) die Namen-Server in der Liste nacheinander in Reaktion auf eine Anfrage zum Zugriff auf eine andere Vorrichtung abfragt, wobei die Anfrage eine Sekundäradresse der anderen Vorrichtung enthält, solange bis die externe Vorrichtung (12(m)) eine Netzwerkadresse empfängt, wobei die externe Vorrichtung (12(m)) in jedem Abfragevorgang eine Netzwerkadressen-Anfragenachricht zur Übertragung über das Netzwerk (14) erzeugt, welche durch einen der Namen-Server in der Liste zu beantworten ist, und von diesem eine Netzwerkadressen-Antwortnachricht empfängt.

12. Verfahren nach einem der Ansprüche 7 bis 11, bei welchem die Verbindung zwischen der externen Vorrichtung (12(m)) und der Firewall (30) ein Sicherheitstunnel ist, in welchem wenigstens ein Abschnitt der zwischen der externen Vorrichtung (12(m)) und der Firewall (30) übertragenen Nachrichten verschlüsselt ist.

13. Computerprogramm-Produkt zur gemeinsamen Verwendung mit einem virtuellen privaten Netzwerk (15) und einer externen Vorrichtung (12(m)), welche durch ein digitales Netzwerk (14) miteinander verbunden sind, wobei das virtuelle private Netzwerk eine Firewall (30), wenigstens eine interne Vorrichtung (31(s)) und einen Namen-Server (32) aufweist, welche jeweils eine Netzwerkadresse besitzen, wobei die interne Vorrichtung (31(s)) auch eine Sekundäradresse

besitzt, und der Namen-Server (32) derart konfiguriert ist, daß er eine Zuordnung zwischen der Sekundäradresse und der Netzwerkadresse bereitstellt, wobei das Computerprogrammprodukt ein maschinenlesbares Medium mit folgenden Codes aufweist:

A. ein Namen-Server-Identifizierungscodemodul, welches veranlaßt, daß die Firewall (30) der externen Vorrichtung (12(m)) in Reaktion auf deren Anfrage zum Aufbau einer Verbindung zur Firewall (30) die Netzwerkadresse des Namen-Servers (32) übermittelt,

B. ein Codemodul zur Erzeugung einer Netzwerkadressen-Anfragenachricht, welches veranlaßt, daß die externe Vorrichtung (12(m)) in Reaktion auf eine Anfrage zum Zugriff auf die interne Vorrichtung (31(s)), welche die Sekundäradresse der internen Vorrichtung (31(s)) enthält, eine Netzwerkadressen-Anfragenachricht zur Übertragung über die Verbindung an die Firewall (30) erzeugt, welche die Auflösung der der Sekundäradresse zugeordneten Netzwerkadresse anfordert,

C. ein Modul zur Übermittlung einer Adressenauflösungsanfrage, welches veranlaßt, daß die Firewall (30) die Adressenauflösungsanfrage an den Namen-Server (32) übermittelt,

D. ein Namen-Server-Steuerungsmodul, welches veranlaßt, daß der Namen-Server (32) die der Sekundäradresse zugeordnete Netzwerkadresse bereitstellt, und

E. ein Modul zur Übermittlung einer Netzwerkadressen-Antwortnachricht, welches veranlaßt, daß die Firewall (30) die Netzwerkadresse in einer Netzwerkadressen-Antwortnachricht zur Übertragung über die Verbindung an die externe Vorrichtung (12(m)) bereitstellt.

14. Computerprogramm-Produkt nach Anspruch 13, welches ferner ein Netzwerkadressenverwendungsmodul aufweist, welches veranlaßt, daß die externe Vorrichtung (12(m)) die in der Netzwerkadressen-Antwortnachricht übermittelte Netzwerkadresse beim Erzeugen von wenigstens einer Nachricht zur Übertragung an die interne Vorrichtung (31(s)) verwendet.

15. Computerprogramm-Produkt nach Anspruch 13 oder 14, welches ferner ein Netzwerk-Service-Provider-Steuerungsmodul aufweist, welches veranlaßt, daß die externe Vorrichtung (12(m)) mit dem Netzwerk (14) durch einen Netzwerk-Service-Provider (11) verbunden wird.

16. Computerprogramm-Produkt nach Anspruch 15, bei welchem das Netzwerk-Service-Provider-Steuerungsmodul ein Kommunikationssitzungsaufbaumodul umfaßt, welches veranlaßt, daß die externe Vorrichtung (12(m)) mit dem Netzwerk-Service-Provider (11) eine Kommunikationssitzung aufbaut und von diesem eine Identifizierung von einem weiteren Namen-Server empfängt.

17. Computerprogramm-Produkt nach einem der Ansprüche 13 bis 16, welches ferner ein Namen-Server-Abfragesteuerungsmodul aufweist, welches veranlaßt, daß die externe Vorrichtung (12(m)) eine Liste von Namen-Servern erhält, welche der externen Vorrichtung (12(m)) identifiziert wurden, und die Namen-Server in der Liste nacheinander in Reaktion auf eine Anfrage zum Zugriff auf eine andere Vorrichtung abfragt, wobei die Anfrage eine Sekundäradresse der anderen Vorrichtung enthält, solange bis die externe Vorrichtung (12(m)) eine Netzwerkadresse empfängt, und wobei die externe Vorrichtung (12(m)) in jedem Abfragevor-

gang eine Netzwerkadressen-Anfragesnachricht zur Übertragung über das Netzwerk (14) erzeugt, welche durch einen der Namen-Server in der Liste zu beantworten ist, und von diesem eine Netzwerkadressen-Antwortnachricht empfängt.

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18. Computerprogramm-Produkt nach einem der Ansprüche 13 bis 17, bei welchem die Verbindung zwischen der externen Vorrichtung (12(m)) und der Firewall (30) ein Sicherheitstunnel ist, in welchem wenigstens ein Abschnitt der zwischen der externen Vorrichtung (12(m)) und der Firewall (30) übertragenen Nachrichten verschlüsselt ist.

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Hierzu 1 Seite(n) Zeichnungen

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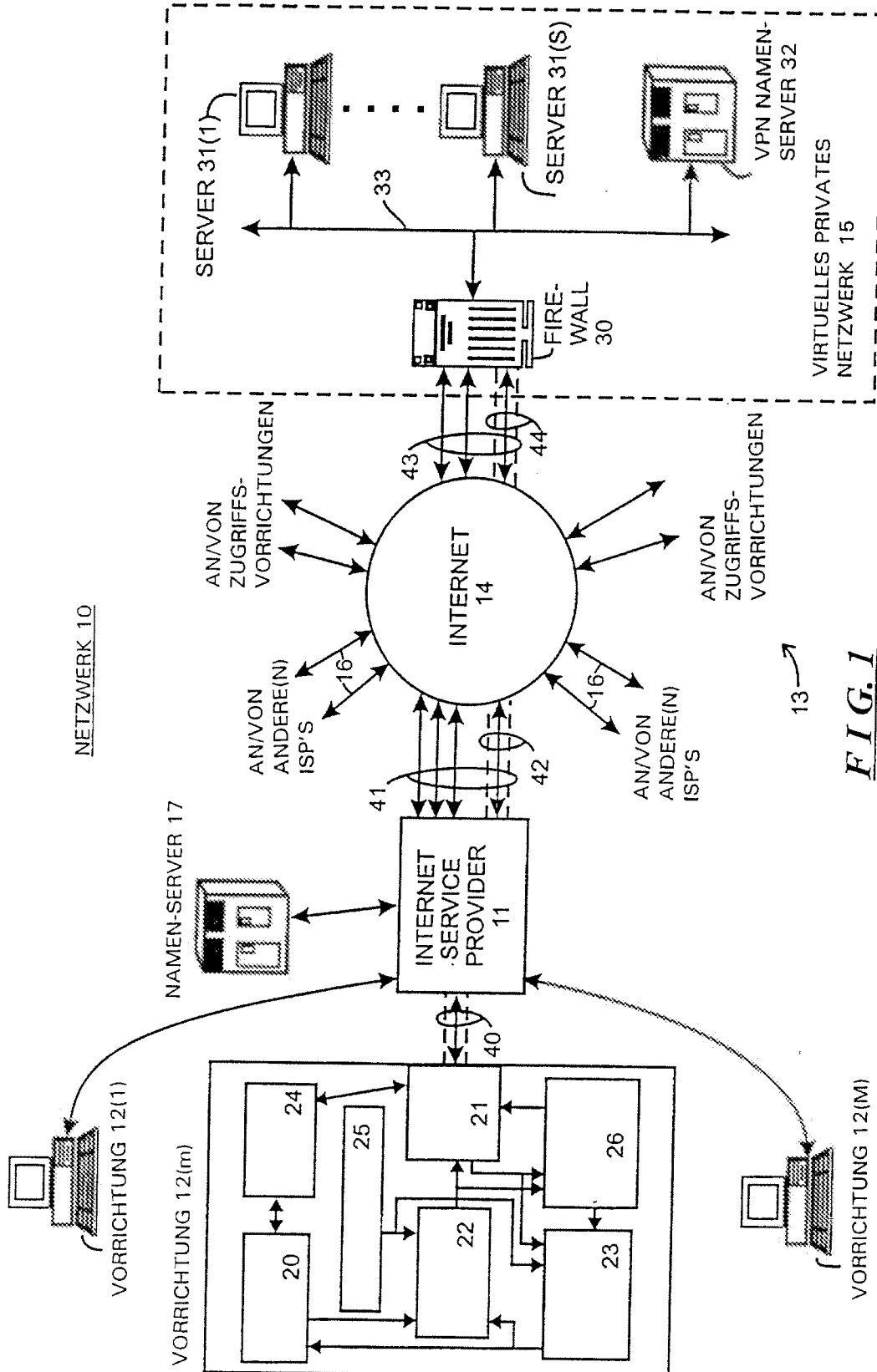
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<p>(84) Designated Contracting States:  <b>AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE</b>          Designated Extension States:  <b>AL LT LV MK RO SI</b></p> <p>(30) Priority: <b>05.02.1997 JP 2240297</b></p> <p>(71) Applicant: <b>Hitachi, Ltd.</b>  <b>Chiyoda-ku, Tokyo 101 (JP)</b></p> <p>(72) Inventors:          • <b>Maciel, Frederico Buchholz</b>  <b>Kokubunji-shi, Tokyo (JP)</b></p>	<ul style="list-style-type: none"> <li>• <b>Kitai, Katsuyoshi</b>  <b>Tokyo (JP)</b></li> <li>• <b>Higuchi, Tatsuo</b>  <b>Hillsboro, OR 97124 (US)</b></li> <li>• <b>Yoshizawa, Satoshi</b>  <b>Musashino-shi, Tokyo (JP)</b></li> <li>• <b>Murahashi, Hideki</b>  <b>Hachiouji-shi, Tokyo (JP)</b></li> </ul> <p>(74) Representative: <b>Beetz &amp; Partner Patentanwälte</b>  <b>Steinsdorfstrasse 10</b>  <b>80538 München (DE)</b></p>
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(54) **Networking method**

(57) This invention provides dynamic balance of the traffic among data processing devices interconnecting networks and thereby improve the networking performance. For network traffic flowing between a first network and a second network, the traffic is distributed among the data processing devices that act as routers according to the traffic amount. An algorithm for balancing the traffic is used to select appropriate data processing devices as routers.

TARGET	ROUTER			NEXT HOP	PRIORITY
	ID	PHYSICAL	NETWORK		
...	...	...	...	...	...
NETWORK 1	3a	31a-P	30a-N	31a	1
	3b	31b-P	30b-N	31b	1
	3c	—	30c-N	42b	2
...	...	...	...	...	...

**FIG. 6**

EP 0 858 189 A3





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Application Number  
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EP 98 10 1286

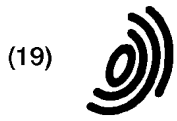
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• Terrasse, Denis  
 38320 Eybens (FR)

(74) Representative:  
 Squibbs, Robert Francis  
 Intellectual Property Section,  
 Legal Department,  
 Hewlett-Packard France,  
 Etablissements de Grenoble  
 F-38053 Grenoble Cédex 9 (FR)

(71) Applicant:  
 Hewlett-Packard Company  
 Palo Alto, California 94304 (US)

(72) Inventors:  
 • Sasyan, Serge  
 38170 Seyssinet (FR)  
 • Roger, Denis  
 38760 Varcès (FR)

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(54) System providing for multiple virtual circuits between two network entities

(57) Computers sending IP datagrams over an ATM network are generally capable of operating multiple simultaneous virtual circuits over the network. However, in doing so, they normally only set up one virtual circuit to each destination IP address so that in order to test the simultaneous operation of N virtual circuits by a computer under test, N target computers are needed. To enable a single computer (T) to provide the destination endpoints for multiple virtual circuits (SVC) from a computer (M) under test, both computers (M,T) are allo-

cated a plurality of virtual IP addresses ( $I_{M(i)}, I_{T(i)}$ ) and the target computer (T) is additionally provided with a module running address-changing processes (70,71) that avoids the IP layers (20) of both computers from rejecting IP datagrams (25A,25B) addressed with the virtual IP addresses. As a result, each computer (M,T) can be addressed with any of a plurality of IP addresses and each will result in the creation of a respective virtual circuit (SVC) between the computers (M,T).

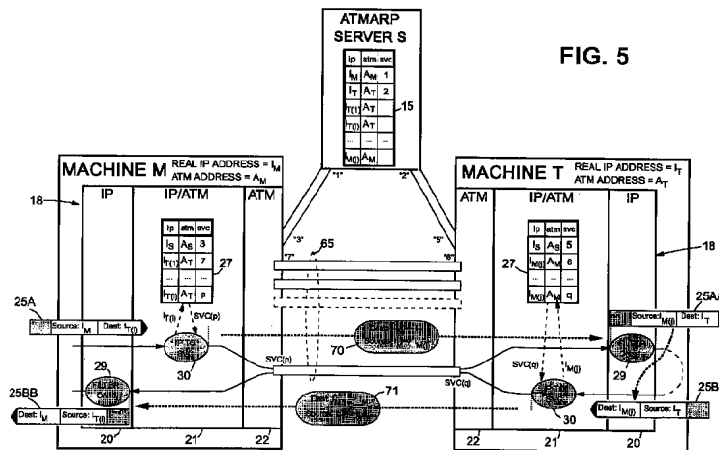


FIG. 5

## Description

### Field of the Invention

The present invention relates to a system providing for multiple virtual circuits between two network entities for use in particular, but not exclusively, in the testing of network node apparatus providing IP messaging over an ATM network.

### Background of the Invention

As is well-known, the Internet Protocol (IP) uses a scheme of IP addresses by which every connection of a node to the Internet has a unique IP address. IP addresses are high-level addresses in the sense that they are independent of the technology used for the underlying network to which a node is connected. Each node will also have a low-level, network-dependent address (often called the MAC address) that is actually used for addressing at the network level and the IP protocol suite includes an address resolution protocol (ARP), logically positioned below the IP layer itself, that is responsible for translating between IP addresses contained in a message and the local MAC addresses.

An increasingly important technology for local area networks is ATM. ATM (Asynchronous Transfer Mode) is a multiplexing and switching technique for transferring data across a network using fixed sized cells that are synchronous in the sense that they appear strictly periodically on the physical medium. Each cell comprises a payload portion and a header, the latter including a label that associates the cell with an instance of communication between sending and receiving network end systems; this instance of communication may involve the transfer of many cells from the sending end system, possibly to multiple receiving end systems. ATM is asynchronous in the sense that cells belonging to the same instance of communication will not necessarily appear at periodic intervals.

In ATM, the labels appended to the cells are fixed-size context dependent labels, that is, they are only understandable in the light of context information already established at the interpreting network node, the label generally being replaced at one node by the label required for the next node. In other words, ATM is a virtual circuit technology requiring a set up phase for each instance of communication to establish the appropriate label knowledge at each node. Of course, to set up a desired communication, it is still necessary to identify uniquely the nodes forming the communication end points and this is achieved by using ATM addresses, generally of a significance limited to the particular ATM network concerned.

The process of sending IP messages (datagrams) over a ATM network, including the operation of the required ATM ARP system, is set out in RFC 1577 of the IETF Internet Engineering Task Force) dated January

1993. This RFC assumes an arrangement in which a sending node will only establish a single virtual circuit to a given destination IP address (of course, this one virtual circuit may carry multiple connections between respective pairings of high-level end points in the nodes).

Figure 1 of the accompanying drawings is a diagram illustrating the basic mechanism by which two machines M and T exchange IP datagrams over a switched virtual circuit (SVC) established across an ATM network. The machines M and T have respective IP addresses  $I_M$  and  $I_T$  and respective ATM addresses  $A_M$  and  $A_T$ ; each machine knows its own addresses. An ATMARP server S knows the IP and ATM addresses of all active nodes on the network, including machines M and T; more particularly, server S maintains an ARP table 15 associating the IP address of each node with its ATM address. The server S maintains open a respective SVC (switched virtual circuit) to each active node and the identity of this SVC is held in the ARP table 15; thus, in the Figure 1 example, the server S is in communication with machine M over an SVC identified as SVC "1" at the server, and the server S is in communication with machine T over an SVC identified as SVC "2" at the server S. At machines M and T these virtual circuits are independently identified - thus at machine M its SVC to the server S is identified as SVC "3" whilst at machine T its SVC to the server S is identified as SVC "5".

The communications interface 18 in each of the machines M and T comprises three main layers, namely: an IP layer 20 responsible for forming IP datagrams (including source and destination IP addresses) for transmission and for filtering incoming datagrams; an intermediate IP/ATM layer 21 for determining the SVC corresponding to the destination IP address of an outgoing datagram; and an ATM layer 22, including the low-level network interface hardware, for sending and receiving datagrams packaged in ATM cells over SVCs.

The IP/ATM layer 21 maintains an ARP cache table 27 which like the table 15 of the server S contains associations between IP address, ATM address and SVC. Thus, table 27 of machine M contains an entry of the IP address  $I_S$ , ATM address  $A_S$ , and SVC identity "3" for the server S, and similarly, table 27 of machine T contains an entry of the IP address  $I_S$ , ATM address  $A_S$ , and SVC identity "5" for the server S. The cache table 27 only holds information relevant to current SVCs of the machine concerned so that during the initial establishment of a SVC to a new destination, the cache table must be updated with relevant information from the ATMARP server S; this general process will be described in more detail hereinafter with reference to Figure 2. For the present, it will be assumed that an SVC has already been established between machines M and T and that the cache tables contain the relevant information (in particular, cache table 27 of machine M contains an entry with the IP address  $I_T$ , ATM address  $A_T$ , and SVC identity "4" for machine T, and cache table

27 of machine T contains an entry with the IP address I<sub>M</sub>, ATM address A<sub>M</sub>, and SVC identity "9" for machine M).

Considering now the case of a high-level application in machine M wanting to send a message to machine T, this application passes the message to the IP layer 20 together with the destination IP address I<sub>T</sub>. IP layer 20 packages the message in one (or more) datagrams 25A with a destination IP address of I<sub>T</sub> and source I<sub>P</sub> address of I<sub>M</sub>. Datagram 25A is then passed to the IP/ATM layer 21 which executes an IP-to-SVC lookup task 30 to determine from table 27 the SVC to be used for sending the datagram to its destination address I<sub>T</sub>; in the present case, table 27 returns the SVC identity "4" and the layer 21 passes this identity together with the datagram 25A to the ATM layer 22 which then sends the datagram in ATM cells on SVC "4". The datagram is in due course received by machine T and passed up by layers 22 and 21 to the IP layer 20 where a filtering task 29 determines from the datagram destination address that the datagram is indeed intended for machine T; the contents of the datagram are then passed to the relevant high-level application. In the present example, this high-level application produces a reply message which it passes to the IP layer 20 together with the required return address, namely the source IP address in the received datagram 25A. IP layer 20 generates datagram 25B with the received return address as the destination address, the IP address I<sub>T</sub> of machine T being included as the source address. The datagram 25B is passed to IP/ATM layer 21 where IP-to-SVC lookup task 30 determines from cache table 27 that the required destination can be reached over SVC "9". This information together with datagram 25B is then passed to ATM layer 22 which transmits the datagram in ATM cells over SVC "9" to machine M. When the datagram is received at machine M it is passed up to the IP layer 20 where it is filtered by task 29 and its contents then passed on to the relevant high-level application.

Figure 2 of the accompanying drawings illustrates in more detail the functioning of the IP/ATM layers 21 of machines M and T in respect of datagram transmission from machine M to machine T, it being appreciated that the roles of the two layers 21 are reversed for transmission in the opposite direction. More particularly, upon the IP-to-SVC lookup task 30 being requested to send a datagram to IP address I<sub>T</sub>, it first carries out a check of the cache table 27 (step 31) to determine if there is an existing entry for I<sub>T</sub> (and thus an SVC, assuming that entries are only maintained whilst an SVC exists). Step 32 checks the result of this lookup - if an SVC already exists (in this case, SVC "4"), then step 39 is executed in which the datagram is passed together with the identity of the relevant SVC to the ATM layer 22; however, if the lookup was unsuccessful, task 30 executes steps 33 to 38 to set up an SVC to destination I<sub>T</sub> before executing step 39.

The first step 33 of the setup process involves the

sending of an ARP request to the ATMARP server S over the relevant SVC requesting the ATM address corresponding to I<sub>T</sub>. Server responds with ATM address A<sub>T</sub> which is received by task 30 at step 34.

Task 30 now updates the cache table 27 with the IP address I<sub>T</sub> and ATM address A<sub>T</sub> (step 35). Next, task 30 requests (step 36) the ATM layer 22 to establish a new SVC to ATM address A<sub>T</sub> and this initiates an SVC setup process 28 which may be executed in any appropriate manner and will not be described in detail herein. In due course, process 28 returns the identity of the SVC that has been set up to A<sub>T</sub> (in this case, SVC "4"), this identity being received at step 37 of task 30. Finally, cache table 30 is updated at step 38 by adding the SVC identity ("4") to the entry already containing I<sub>T</sub> and A<sub>T</sub>.

In machine T, the setup of the new SVC to the machine from machine M is handled by the setup process 28 of machine T. The process 28 informs the IP/ATM layer that a new SVC has been setup and this triggers execution of an update task 40 to update the cache table 27 of machine T. More particularly, on the new SVC indication being received (step 41), a first update step 42 is carried out to add an entry to the table confining the identity of the new SVC (in the present example "9"), and the ATM address A<sub>M</sub> of the node at the other end of the SVC; at this stage, the corresponding IP address is not known to machine T. In order to obtain this IP address, an inverse ARP request is now made to machine M (step 43). In due course a response is received (step 44) containing the IP address of machine M. The cache table 27 is then updated at step 45 with the IP address I<sub>M</sub> of machine M and the IP/ATM layer is now ready to effect IP-to-SVC translations for datagrams intended for machine M.

The inverse ARP request sent by machine T to machine M is handled by an inverse ARP task 50 that examines the request (step 51) and on finding that it contains the ATM address A<sub>M</sub>, responds with the IP address I<sub>M</sub> of machine M (step 52).

To facilitate explanation of the preferred embodiment of the invention hereinafter, the messages across the boundary between the IP/ATM layer 21 and the ATM layer 22 have been labelled in Figure 2 as follows where superscript "T" indicates an outgoing message (that is, from the IP/ATM layer to the ATM layer) and the superscript "R" indicates incoming messages (that is, from the ATM layer to the IP/ATM layer):

- X1<sup>T</sup> - outgoing ARP request;
- X2<sup>R</sup> - incoming ARP response;
- X3<sup>T</sup> - outgoing SVC setup request;
- X4<sup>R</sup> - incoming SVC setup done indication;
- X5<sup>R</sup> - incoming new SVC indication;
- X6<sup>T</sup> - outgoing INARP request;
- X6<sup>R</sup> - incoming INARP request;
- X7<sup>T</sup> - outgoing INARP response;
- X8<sup>T</sup> - outgoing datagram;
- X8<sup>R</sup> - incoming datagram.



It will be appreciated that machines connecting to an ATM network, such as machines M and T as well as the server S, are designed to handle a large number of virtual circuits simultaneously. If in testing such a machine (machine M in the following discussion) it is desired to fully stress the machine under test, then the design limit of concurrently operating virtual circuits must be simultaneously used. However, as already indicated, current practice is that only one virtual circuit is established to each distinct IP address. As a result, since generally each machine that might be used to test machine M has only one network connection and therefore only one IP address, if machine M is designed to operate up to N virtual circuits simultaneously, then it requires N machines to test machine M. Such an arrangement is illustrated in Figure 3 where the N machines are constituted by the server S and (N-1) other machines here represented as machines T1 to T(N-1). Such an arrangement is generally impractical as N may be as high as 1024 or more.

It is an object of the present invention to provide a mechanism that enables, inter alia, the foregoing test problem to be overcome.

### Summary of the Invention

According to the present invention, there is provided a system in which a plurality of entities are connected to a network and can exchange messages across virtual circuits set up over the network between said entities, each entity having an operative high-level address on the network, and each entity comprising:

-- high-level messaging means for handling message transmission and receipt on the basis of the aforesaid high-level addresses, the high-level messaging means comprising means for including in outgoing messages the operative high-level address of the entity as a source identifier and the operative high level address of the intended recipient entity as a destination identifier, and means for filtering incoming messages according to the destination identifier contained in the message:

-- virtual-circuit means for providing virtual circuits between the entity and other entities, there being a respective virtual circuit for each different destination identifier in use, and

-- intermediate means for passing an outgoing message from the high-level messaging means to that one of the virtual circuits provided by the virtual-circuit means which corresponds to the destination identifier of the message;

**characterised in that** each of a first and a second one of the entities has a plurality of virtual high-level addresses associated with it that are different from the operative high-level address of the entity, the virtual high-level addresses being usable by the messaging

means of the first and second entities as destination identifiers in outgoing messages; **and in that** between the intermediate means of the first and second entities, there are provided address-changing means responsive to each of at least some of the messages sent between these entities with a said virtual high-level address as its destination identifier, to change that address to the operative high-level address of the corresponding entity and to change the operative high-level address provided as the source identifier of the message into one of the said virtual high-level addresses associated with the sending entity in dependence on the virtual high-level address initially provided as the destination identifier of the same message.

By virtue of this arrangement, it is possible to establish a plurality of virtual circuits between the first and second entities by using the different virtual high-level addresses of the entities as the destination identifiers in messages exchanged between the entities, the receiving high-level addressing means accepting such messages due to the address-changing means having changed the destination identifier to the operative high-level address of the receiving entity. By also changing the source identifier, it is possible to retain in the message information sufficient to associate any reply message with a particular one of the virtual circuits established with the sending entity (in particular, the reply message can be sent back over the same virtual circuit as the message to which it is a reply - however, if desired, it is also possible to use a separate virtual circuit for the reply messages).

Preferably, the address-changing means comprises first address-changing functionality for effecting the aforesaid changes for messages sent from the first entity to the second entity, and second address-changing functionality for effecting these changes for messages sent from the second entity to the first entity, both the first and second address-changing functionalities being provided in the second entity. This configuration is well suited for testing the ability of network node apparatus to concurrently operate a plurality of virtual circuits where the network node apparatus is operative to establish a virtual circuit for each different high-level destination address being handled; more particularly, the network node apparatus serves as the aforesaid first entity, and is caused to send messages to at least some of the virtual high-level addresses associated with the second entity. By placing the address-changing means in the second entity, no modifications are needed to the network node apparatus in order for it to be able to establish a plurality of virtual circuits with the second entity.

Advantageously, the address-changing means effects a predetermined transformation on the virtual high-level address forming the initial destination identifier of a said message in order to form the virtual high-level address to be used for the source identifier of that message. For example, this transformation may simply

involved changing the address by one (where the address is numeric in form).

The present invention is particularly applicable to systems in which the high-level addresses are IP addresses and the network is an ATM network.

### Brief Description of the Drawings

A system embodying the invention will now be described, by way of non-limiting example, with reference to the accompanying diagrammatic drawings, in which:

- . **Figure 1** is a diagram of a known system for sending IP datagrams over a ATM network between two machines M and T;
- . **Figure 2** is a diagram illustrating the steps carried out by the Figure 1 system in establishing a virtual circuit between machines M and T;
- . **Figure 3** is a diagram of a known test arrangement for testing the ability of a machine M to concurrently operate multiple virtual circuits;
- . **Figure 4** is a diagram showing a test arrangement embodying the invention for testing the ability of a machine M to concurrently operate multiple virtual circuits;
- . **Figure 5** is a diagram similar to Figure 1 but showing a system embodying the invention in which multiple virtual circuits are established between machines M and T;
- . **Figure 6** is a diagram illustrating the processing effected by a module VNS disposed in machine T of the Figure 5 system when machine M initiates the opening of a new virtual circuit between machines M and T; and
- . **Figure 7** is a diagram illustrating the processing effected by a module VNS disposed in machine T of the Figure 5 system when machine T initiates the opening of a new virtual circuit between machines M and T.

### Best Mode of Carrying Out the Invention

The embodiment of the invention now to be described provides a system in which it is possible to establish a plurality of SVCs (switched virtual circuits) across an ATM network for the exchange of IP datagrams between two machines M and T whereby it is possible to test the ability of machine M to concurrently operate a plurality of virtual circuits without needing to provide a respective destination machine for each SVC operated by machine M. The overall test arrangement is illustrated in Figure 4 where machine M operates N SVCs over ATM network 10, one SVC being with ATMARP server S and (N-1) SVCs being with machine

T. According to the preferred embodiment, the establishment of multiple concurrent SVCs between machine M and T is effected without modification to machine M.

Figure 5 shows a system embodying the present invention, this system being similar to that of Figure 1 but being operative to provide a plurality of concurrent SVCs 65 between machines M and T. In the Figure 5 system, the machines M and T and the server S are assumed to operate in the same way and have the same IP and ATM addresses as in Figure 1; in addition, in Figure 5 the same SVCs are established between the server S and the machines M and T as in Figure 1. The Figure 5 system includes, however, added functionality provided by processes 70 and 71 which in Figure 5 are shown independent of machines M and T but in practice would be provided either distributed between machines M and T or wholly in one of these machines; in a preferred embodiment, the processes 70 and 71 are provided in machine T.

In accordance with the present invention, each machine M and T is allocated a number of virtual IP addresses different from its operative (or "real") IP address (this latter address being the one which the IP layer knows about for inclusion as the source address in outgoing datagrams and upon which filtering is carried out by task 29). Thus, machine M is allocated virtual IP addresses  $I_{M(1)}, I_{M(2)}, \dots, I_{M(j)}, \dots$ ; similarly, machine T is allocated virtual IP addresses  $I_{T(1)}, I_{T(2)}, \dots, I_{T(i)}, \dots$

Each of these virtual IP addresses is entered into table 15 of ATMARP server S together with the ATM address of the corresponding one of the machines M, T; thus virtual IP address  $I_{M(j)}$  is associated with ATM address  $A_M$  and virtual IP address  $I_{T(i)}$  is associated with ATM address  $A_T$ .

Now, if the communications interface 18 of machine M is asked to send a message to IP address  $I_{T(i)}$ , IP layer 20 will construct a datagram 25A having a destination address of  $I_{T(i)}$  and a source address of  $I_M$ . The IP-to-SVC task 30 of IP/ATM layer 21 then acts in the manner already described to fetch the ATM address corresponding to  $I_{T(i)}$  from server S and set up an SVC (here identified by "p") towards machine T; the cache table 27 is updated appropriately. The datagram 25A is now sent by ATM layer over SVC(p) to machine T.

If no further action is taken, the datagram 25A, after receipt at machine T, will be rejected by the filter task 29 as the destination address  $I_{T(i)}$  of the datagram differs from the operative IP address  $I_T$  known to task 29 of machine T. Accordingly, a process 70 is provided that recognises the destination address of datagram 25A as being a virtual IP address of machine T and substitutes the real IP address of machine T for the virtual address in the destination field of the datagram 25A. The datagram will now be allowed through by filter task 29 of machine T.

However, a further difficulty remains. If only the destination address is changed, the resultant datagram contains no indication that the datagram was not ordi-

narly sent with the real IP address of machine T; any reply will therefore be sent on an SVC set up to take datagrams from machine M to the real IP address of machine M. This SVC would end up taking all the reply messages for messages sent from machine M to machine T over all the SVCs set up in respect of the virtual IP addresses allocated to machine T. This is clearly undesirable. To avoid this, the source address of datagram 25A is also changed by process 70. More particularly, the source address is changed from the real IP address of machine M to one of the virtual IP addresses  $I_{M(i)}$  of this machine, the virtual address chosen being dependent on the original virtual IP address forming the destination address of the datagram. As a result, all datagrams 25A having the same virtual destination address end up after operation of process 70 as datagrams 25AA with the same virtual source address, whereas datagrams 25A having different initial virtual destination addresses end up as datagrams 25AA with different source addresses. The process of changing the source address preferably involves a predetermined transformation of the virtual destination address - for example, to obtain the required virtual source address, the virtual destination address can simply be incremented by one (there would thus exist, for example, a set of even virtual IP addresses for machine M and a corresponding set of odd virtual IP addresses for machine T, each even virtual IP address of machine M being associated with the immediately adjacent, lower-valued, odd virtual IP address of machine T).

The address-changing process 70 must be carried out on datagram 25A after operation of the IP-to-SVC task 30 in machine M and prior to the filter task 29 in machine T. In addition, whilst the two address-changing operations of process 70 need not be carried out at the same time or at the same location (though it is, of course, convenient to do so), the changing of the source address must be done whilst the initial virtual destination address is still available.

The contents of datagram 25AA are passed by IP layer 20 of machine T to a high-level application which, in the present example, produces a reply that it passes to layer 20 for sending back to IP address  $I_{M(i)}$ , that is, to the source address contained in datagram 25AA. Layer 20 produces a datagram 25B with source address  $I_T$  and destination address  $I_{M(i)}$ . Next, IP-to-SVC task 30 of layer 21 looks up the destination address in the cache table 27 to find out the SVC to be used for the reply. If, as will normally be the case, the same SVC is to be used for the reply as carried the original datagram 25A with destination address  $I_{T(i)}$ , then the SVC setup process will have been arranged to enter the address  $I_{M(i)}$  in cache table 27 against that SVC (in present case, identified to machine T by "q"); a lookup on  $I_{M(i)}$  will thus return "q" as the required SVC. However, if it is desired to use a different SVC for datagrams 25B passing from T to M as used for datagrams 25A passing from M to T, then the first lookup on  $I_{M(i)}$  by task 30 will not identify an

SVC and task 30 must then initiate set up of a new SVC.

Assuming that the same SVC is to be used for the datagrams 25B with destination address  $I_{M(i)}$  as for the datagrams 25A with destination address  $I_{T(i)}$ , then alter task 30 has identified SVC(q) as the appropriate SVC, the datagram 25B is passed to the ATM layer 22 for sending out over SVC(q). In due course, machine M receives this datagram and passes it up to IP layer 20; however, before the datagram reaches this layer, it must undergo address-change processing similar to that carried out on datagram 25A. More particularly, the virtual destination address  $I_{M(i)}$  must be changed to the real IP address  $I_M$  of machine M, and the real source address  $I_T$  of machine T must be changed to the virtual IP address  $I_{T(i)}$  of machine T associated with the virtual destination address  $I_{M(i)}$ . This address-change processing is carried out by process 71.

With regard to the source address change, where the corresponding change was effected for datagram 25A by incrementing by one the virtual destination address  $I_{T(i)}$  of that datagram, then for datagram 25B, the source address is changed to the destination address  $I_{M(i)}$  decremented by one.

In a similar manner to process 70, process 71 must be carried out on datagram 25B after operation of the IP-to-SVC task 30 in machine T and prior to the filter task 29 in machine M. In addition, whilst the two address-changing operations of process 71 need not be carried out at the same time or at the same location, the changing of the source address must be done whilst the initial virtual destination address is still available.

Following operation of process 71, datagram 25BB with source address  $I_{T(i)}$  and destination address  $I_M$  is allowed through by filter task 29 and the contents of the datagram are passed to the relevant high-level application.

Having described the general mechanism by which virtual IP addresses can be used for exchanging datagrams 25A and 25B across a SVC between machines M and T, the issue will now be addressed as to how the cache table 27 in machine T is updated on SVC setup to associate the new SVC (that is, SVC(q) at machine T) with the virtual IP address  $I_{M(i)}$  of machine M (this is required where the same SVC is to be used for the reply datagram 25B as for the original datagram 25A). It will be appreciated that when the task 40 (see Figure 2) is executed, the INARP request sent to machine M will only return the real IP address  $I_M$  of machine M, there being no other information available to the update task 40 by which any other result could be obtained from the INARP task 50; clearly, something additional needs to be done for update task 40 to be able to associate the virtual IP address  $I_{M(i)}$  with the newly created SVC(q) in table 27. In fact, there are a number of ways in which the update task could be informed that the IP address to be associated with SVC(q) is  $I_{M(i)}$ . For example, the update task 40 could be arranged to send a request back over the newly-created SVC(q) asking machine M to identify

the destination IP address  $I_{T(i)}$  it associates with that SVC; from this information, the update task could determine the associated virtual IP address  $I_{M(i)}$  of machine M (assuming there is a predetermined relation between the two as is the case in the described embodiment) and then update table 27 accordingly. An alternative approach that avoids sending a special request to machine M is to wait for machine M to supply the destination IP address  $I_{T(i)}$  in the first IP datagram 25A sent over the new SVC(q), the update task then deriving the required address  $I_{M(i)}$  as described above.

A variant of this latter approach is to leave the update task 40 unchanged but provide an additional process that:

- (a) delays the INARP request until the destination address  $I_{T(i)}$  of the first datagram from machine M to machine T can be captured;
- (b) uses the captured address  $I_{T(i)}$  as the source address of the INARP request that is now sent on to machine M.

The INARP response from machine M will therefore have a destination address  $I_{T(i)}$  and a source address (that forms the substance of the INARP response) of  $I_M$ . By ensuring that this response datagram is subject to the processing effected by process 70, the source data in the INARP response will be changed to  $I_{M(i)}$  by the time the response reaches the update task 40. Thus, the required updating of the table 27 of machine T can be achieved without modification to the existing tasks of machines M and T but simply by the addition of a further process for effecting steps (a) and (b) described above. This approach is the preferred one for updating table 27 and is the one used in the module described below with reference to Figures 6 and 7.

The above-described system involving the allocation of multiple virtual IP addresses to machines M and T and the provision of the address-changing processes 70 and 71, permits multiple SVCs to be concurrently operated between the machines M and T thereby enabling implementation of the test arrangement depicted in Figure 4. Of course, when testing the machine M, it is desirable that no changes are made to this machine; accordingly, it is preferred for such a test arrangement to implement the address-changing processes 70 and 71 in machine T.

The implementation of the address-changing processes 70 and 71, and of the INARP request modification process, can conveniently be done by inserting a module (hereinafter called the VNS module) between the IP/ATM layer 21 and the ATM layer 22 of machine T; in fact, an instance of this module is created for each SVC, this being relatively easy to implement when using a STREAMS type I/O implementation as provided in most UNIX systems (conveniently one stream is provided for each SVC and the VNS module is pushed onto each stream when the stream is created).

The messages passing across the boundary between layers 21 and 22 have already been described above with reference to Figure 2 and the processing effected by the VNS module on each of these messages will next be described. First, the situation of Figure 5 will be considered where it is machine M that initiates the setting up of a new SVC to machine T. The first message received by the VNS module will be the SVC setup indication message  $X5^R$  and this is passed through the VNS module without modification (see Figure 6). Next, the INARP request  $X6^T$  is received and is subject to the modification process 82 described above, namely it is delayed until the first IP datagram 25A is received and the address  $I_{T(i)}$  extracted and used for the source address of the INARP request. The INARP response  $X7^R$  is then received and subject to the address-changing process 70. IP datagrams  $X8^R$  from machine M to machine T are also subject to the address-changing process 70. IP datagrams  $X8^T$  from machine T to machine M are subject to address-changing process 71.

Figure 7 depicts the processing effected by the VNS module in the situation where it is the machine T rather than the machine M that initiates SVC setup. The messages passing through the VNS module in this case are those shown crossing the boundary between layers 21 and 22 in Figure 2 for machine M. The first four messages  $X1^T$ ,  $X3^T$ ,  $X2^R$ , and  $X4^R$  are passed through without modification. The INARP request received from machine M is subject to the modification process 82, being delayed until the destination address of the first IP datagram from machine T to machine M can be captured and used as the source address of the INARP request. The INARP response  $X7^T$  is subjected to process 71 as are IP datagrams  $X8^T$  from machine T to machine M. IP datagrams  $X8^R$  from machine M to machine T are subjected to process 70.

It will be appreciated that many variants are possible to the above-described embodiment of the invention. It will also be appreciated that the invention is not limited to switched virtual circuits but can equally be applied to permanent virtual circuits. Furthermore, the setting up of multiple virtual circuits between two machines can be used not only for implementing the test arrangement described above with reference to Figure 4 but also for other purposes.

Although the present invention has been described in the context of high-level addresses constituted by IP addresses and virtual circuits set up across an ATM network, the invention can be applied to other types high-level addresses and other types of virtual-circuit network. For example, the high-level addresses could be MAC addresses in the case of a network in the form of an emulated LAN (ELAN) over an ATM network.

## Claims

1. A system in which a plurality of entities are con-

nected to a network and can exchange messages across virtual circuits set up over the network between said entities, each entity having an operative high-level address on the network, and each said entity comprising:

-- high-level messaging means for handling message transmission and receipt on the basis of said high-level addresses, said high-level messaging means comprising means for including in outgoing ones of said messages the operative high-level address of the entity as a source identifier and the operative high level address of the intended recipient entity as a destination identifier, and means for filtering incoming ones of said messages according to the destination identifier contained in the message:

-- virtual-circuit means for providing virtual circuits between the entity and other said entities, there being a respective virtual circuit for each different destination identifier in use, and

-- intermediate means for passing an outgoing message from said high-level messaging means to that one of the virtual circuits provided by the virtual-circuit means which corresponds to the destination identifier of the message;

**characterised in that** each of a first and a second said entity has a plurality of virtual high-level addresses associated with it that are different from said operative high-level address of the entity, said virtual high-level addresses being usable by the messaging means of said first and second entities as destination identifiers in outgoing messages; **and in that** between said intermediate means of said first and second entities, there are provided address-changing means responsive to each of at least some of said messages sent between these entities with a said virtual high-level address as its destination identifier to change that address to the said operative high-level address of the corresponding entity, and to change the operative high-level address provided as the source identifier of the message into one of the said virtual high-level addresses associated with the sending entity in dependence on the virtual high-level address initially provided as the destination identifier of the same message.

2. A system according to claim 1, wherein said address-changing means effects a predetermined transformation on the virtual high-level address forming the initial destination identifier of a said message to which the address-changing means is responsive in order to form the virtual high-level address to be used for the source identifier of that

message.

3. A system according to claim 2, wherein said address-changing means is responsive to messages sent in both directions between said first and second entities with virtual high-level addresses as destination identifiers, the said transformation effected in respect of such messages sent in one said direction being the reverse of the transformation effected in respect of other such messages sent in the opposite said direction.

4. A system according to claim 1, wherein said address-changing means comprises first address-changing functionality for effecting said changes for messages sent from said first entity to said second entity, and second address-changing functionality for effecting said changes for messages sent from said second entity to said first entity, both said first and second address-changing functionalities being provided in said second entity.

5. A system according to claim 1, wherein said address-changing means comprises first address-changing functionality for effecting said changes for messages sent from said first entity to said second entity, and second address-changing functionality for effecting said changes for messages sent from said second entity to said first entity, the two said address-changing functionalities being provided in respective ones of said first and second entities.

6. A system according to claim 1, wherein:

-- each said entity has a low-level address on the network;

-- said intermediate means of each entity further comprises:

-- first association means for providing an association between the destination identifier of a outgoing message and the low-level address of the corresponding said entity,

-- second association means for providing an association between the destination identifier of an outgoing message and a said virtual circuit,

said intermediate means using its second association means to identify from the destination identifier of a said outgoing message which virtual circuit is to be passed the message where such virtual circuit exists, and otherwise first passing a request to the said virtual circuit means of the same entity to establish a virtual circuit to the entity having the low-level address identified by said first association means as

associated with the destination identifier of the outgoing message; and

-- the said virtual-circuit means of each entity includes setup means responsive to a said request from the intermediate means of the same entity to establish a virtual circuit to the said entity having the low-level address provided in said request, said setup means causing the intermediate means to update its second association means to associate the newly-established virtual circuit with the said destination identifier relevant to said request;

the first association means of each of said first and second entities serving to provide an association between the virtual high-level addresses of the other of said first and second entities and the low-level address of that other entity.

**8.** A system according to claim 7, further comprising a network server containing associations between high-level addresses and low-level addresses, said first association means of each said entity comprising means for interrogating said network server for a required association.

**9.** A system according to claim 7, wherein said second association means comprises cache means for temporarily holding said associations between said destination identifiers and currently corresponding virtual circuits.

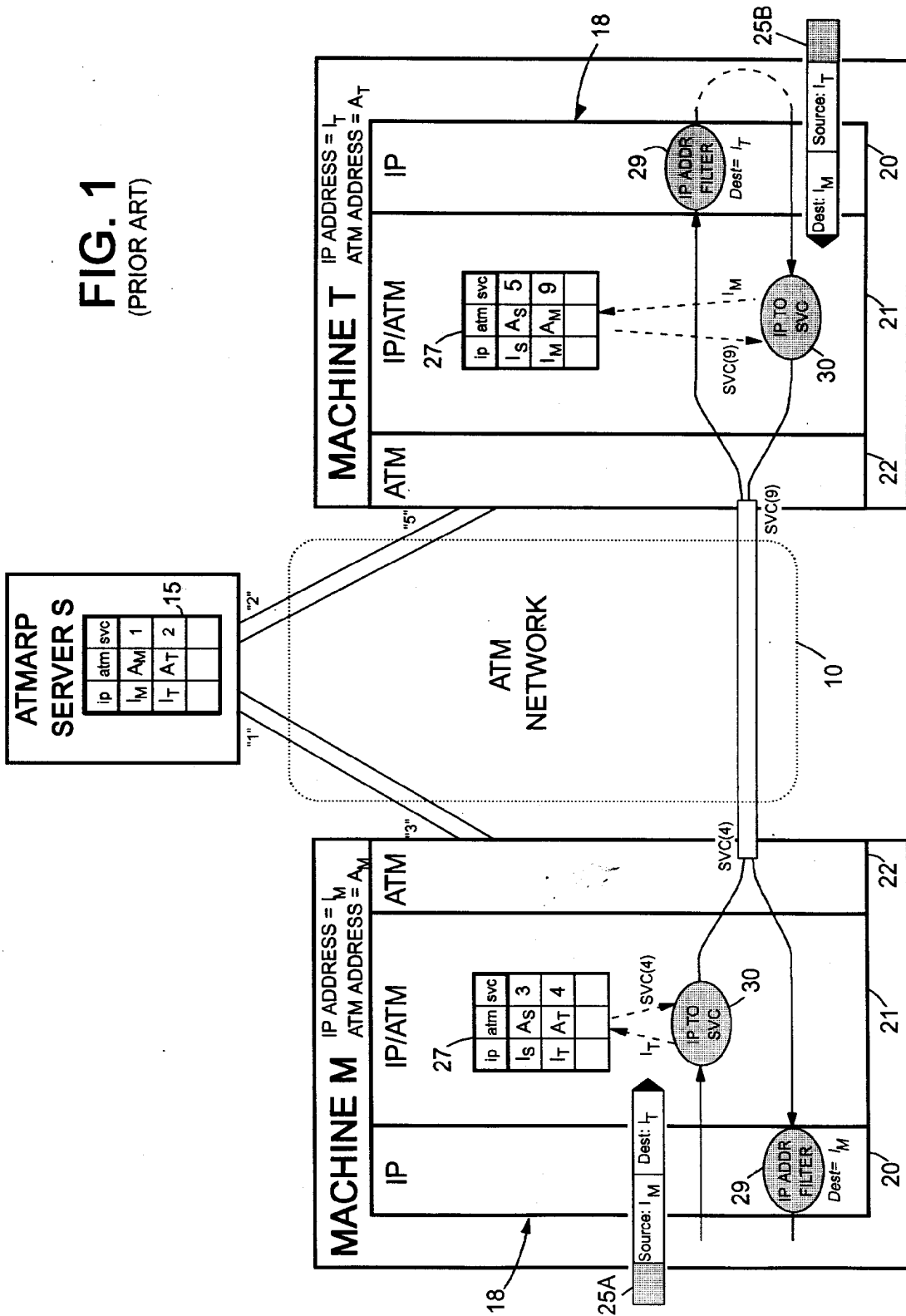
**10.** A system according to any one of claims 1 to 9, wherein said high-level addresses are IP addresses and said network is a ATM network.

**11.** A system according to any one of claims 1 to 9, wherein said high-level addresses are MAC addresses and said network is a emulated LAN over an ATM network.

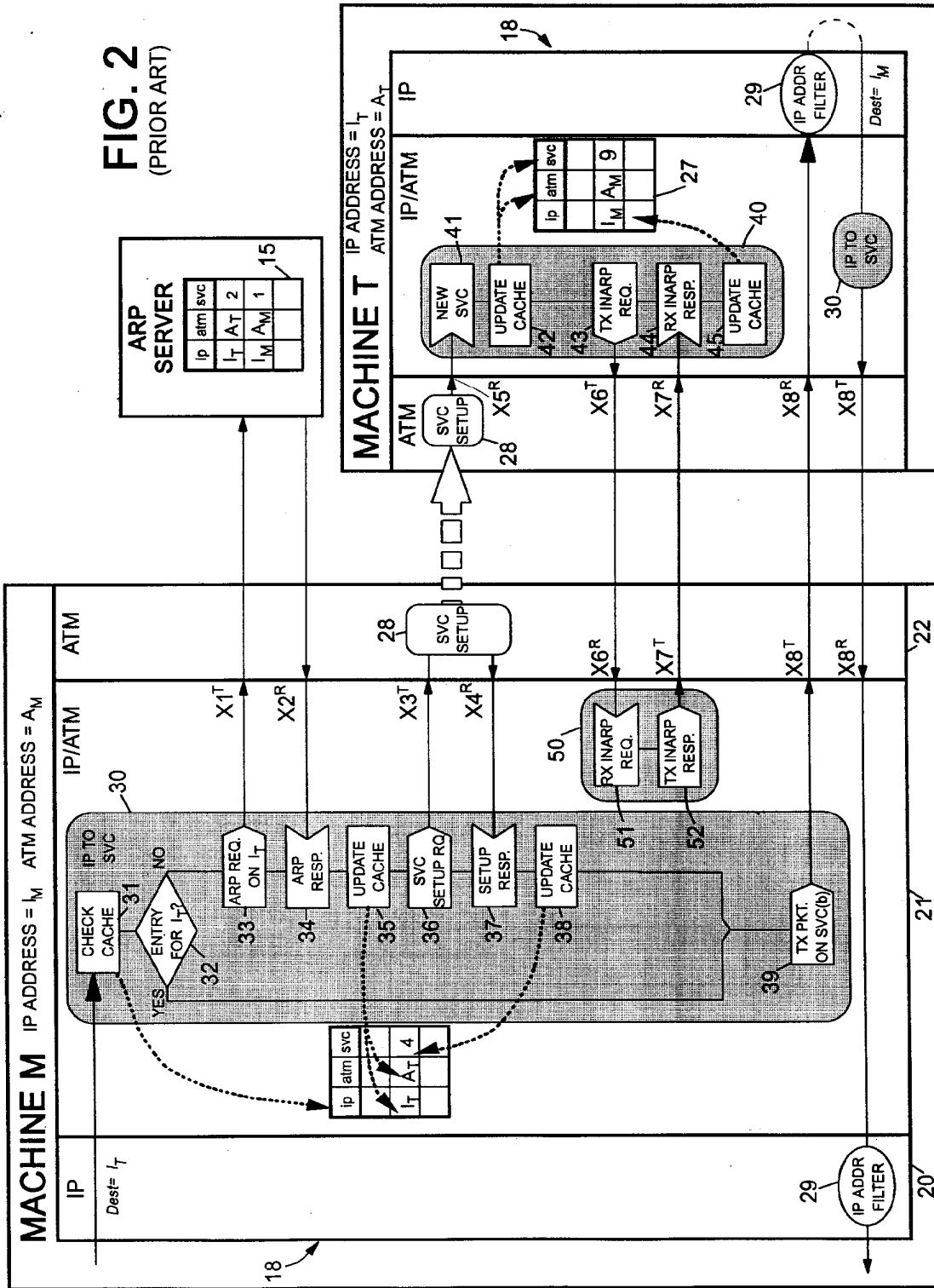
**12.** A method of testing the ability of network node apparatus to operate a plurality of virtual circuits at the same time, said network node apparatus being arranged to establish a virtual circuit for each different high-level destination address being handled, said method involving setting up a system according to claim 4 with said network node apparatus as said first entity, and causing the network node apparatus to send messages to at least some of said virtual high-level addresses associated with said second entity.

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**FIG. 1**  
(PRIOR ART)

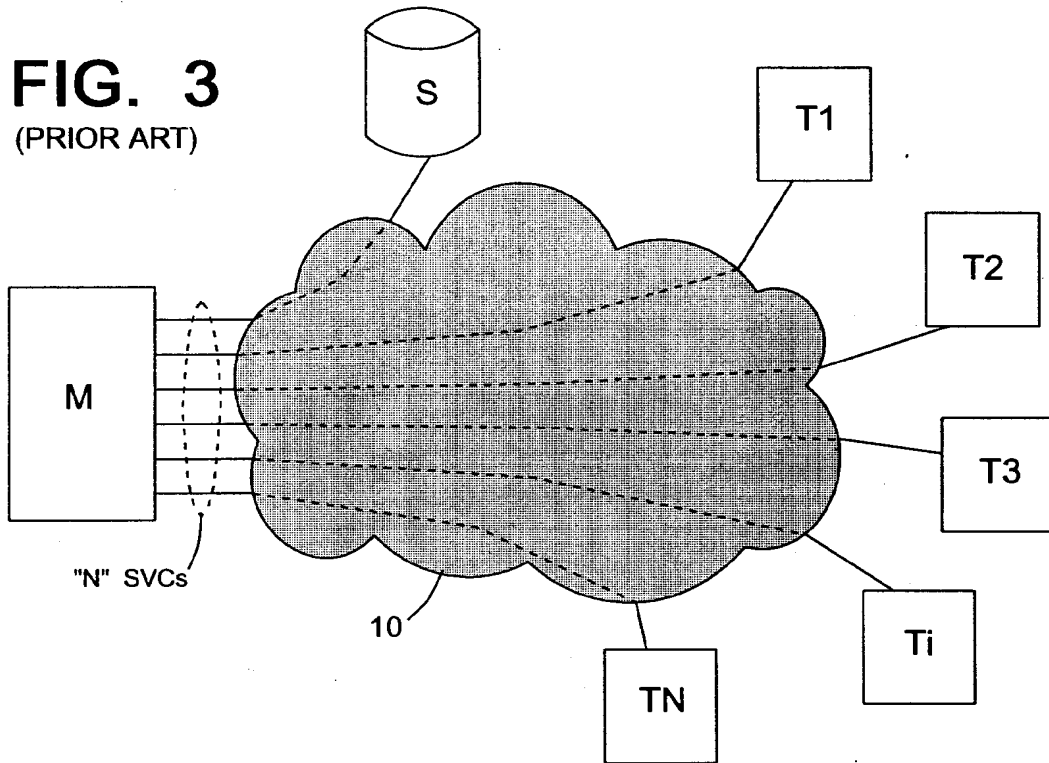


**FIG. 2**  
(PRIOR ART)





**FIG. 3**  
(PRIOR ART)



**FIG. 4**

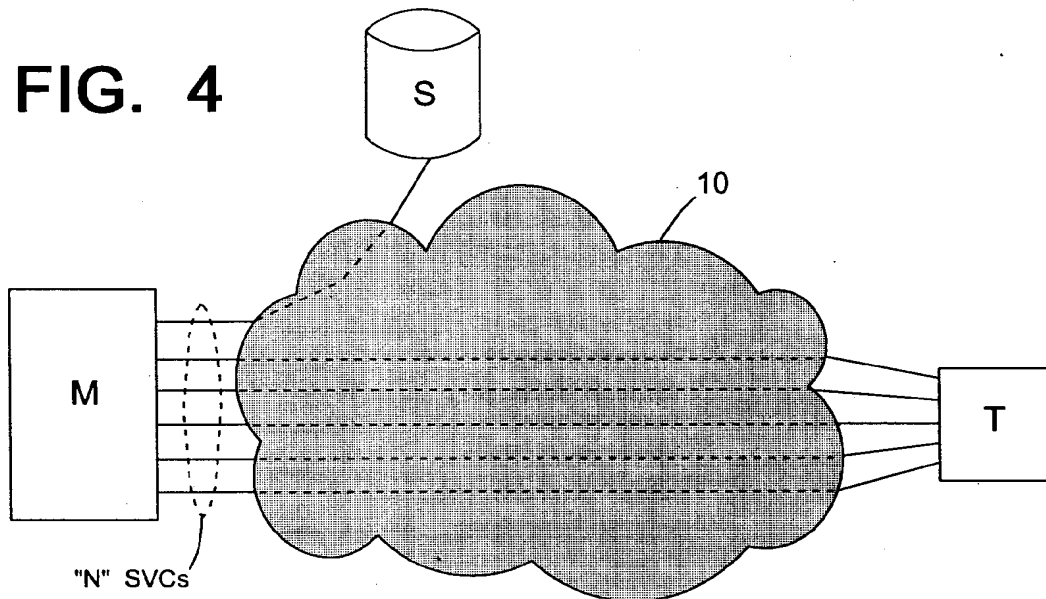
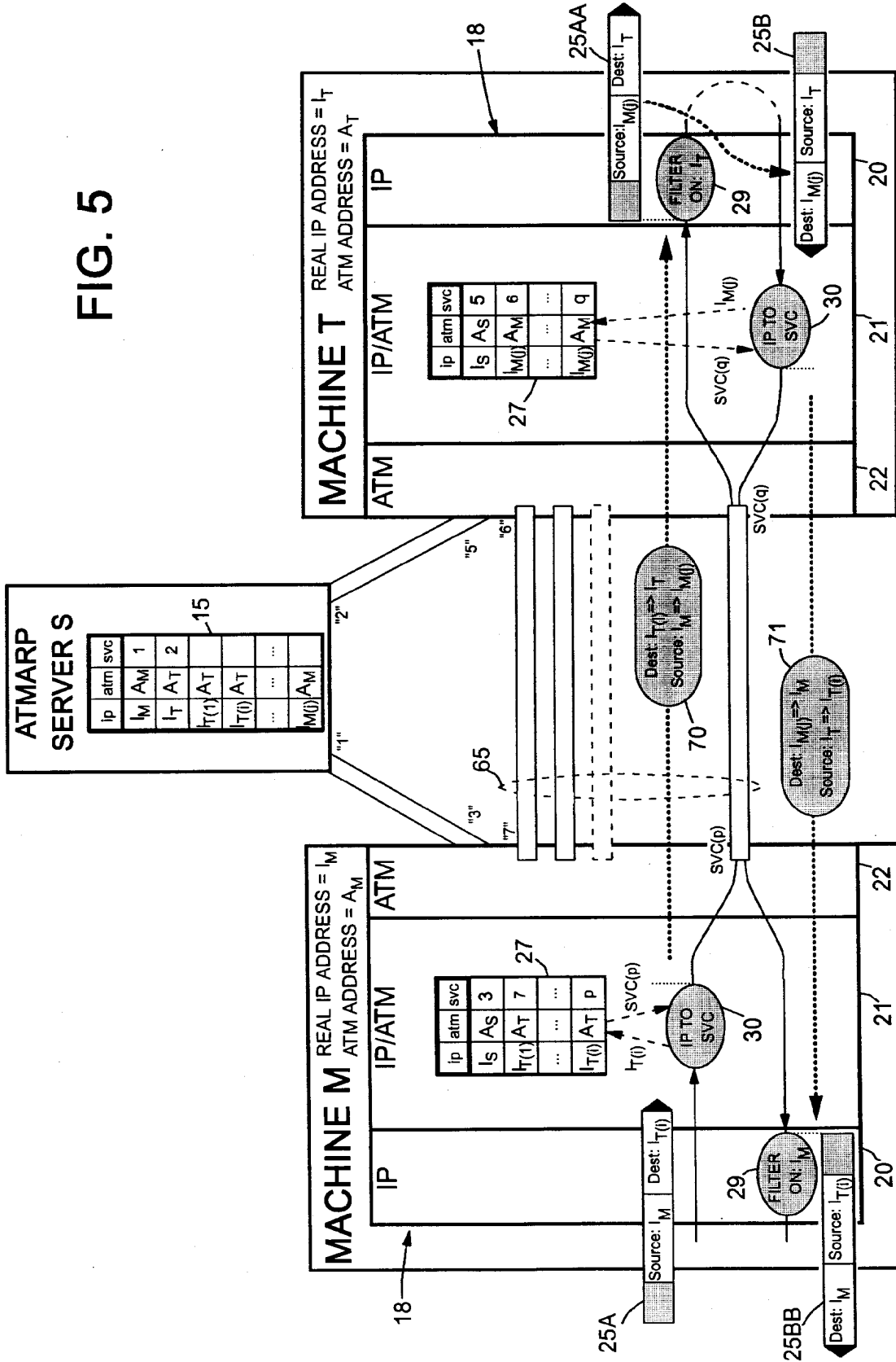
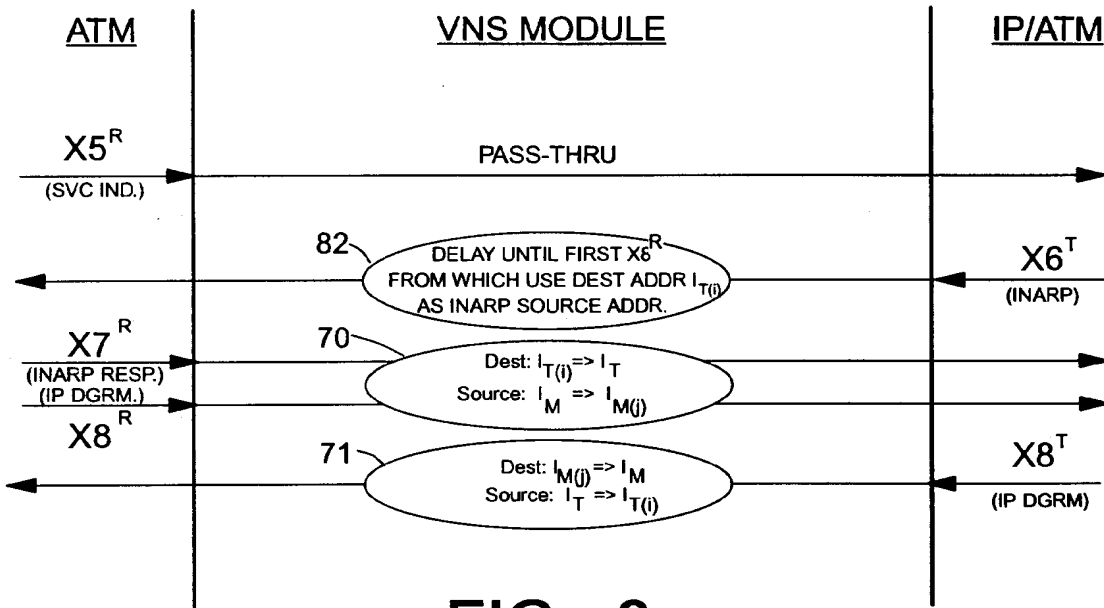
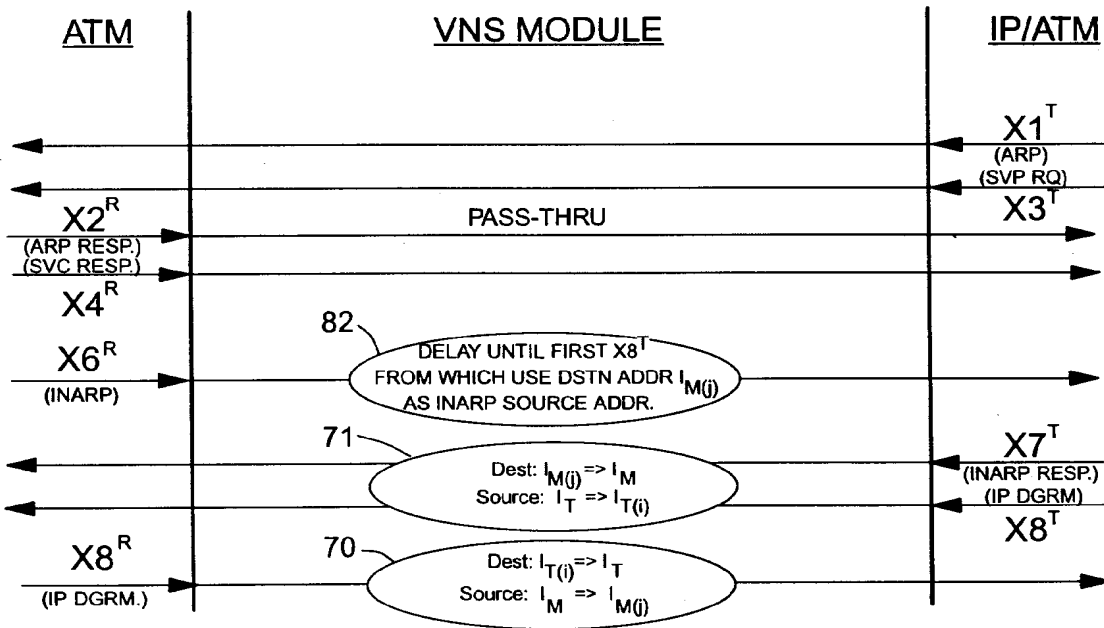


FIG. 5





**FIG. 6**



**FIG. 7**



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EUROPEAN SEARCH REPORT

Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	COMPUTER COMMUNICATIONS REVIEW, vol. 25, no. 4, 1 October 1995, pages 49-58, XP000541650 PARULKAR G ET AL: "AITPM: A STRATEGY FOR INTEGRATING IP WITH ATM" * paragraph 2.1 *	1,10	H04L29/06 H04Q11/04
A	PROCEEDINGS OF THE ANNUAL SYMPOSIUM ON FOUNDATIONS OF COMPUTER SCIE, SANTA FE, NOV. 20 - 22, 1994, no. SYMP. 35, 20 November 1994, GOLDWASSER S (EDITOR), pages 424-434, XP000531950 LUND C ET AL: "IP OVER CONNECTION-ORIENTED NETWORKS AND DISTRIBUTIONAL PAGING" * paragraph 1 - paragraph 1.1 *	1,10	
A	DATA COMMUNICATIONS, vol. 24, no. 17, 1 December 1995, page 103/104, 106, 108, 110 XP000547618 MARSHALL G: "CLASSICAL IP OVER ARM:A STATUS REPORT" paragraph "Simple virtues"	1,10,11	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04L H04Q
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 35, no. 4A, 1 September 1992, pages 28-31, XP000314666 "COORDINATED ADDRESS RESOLUTION PROTOCOL PROCESSING" * the whole document *	6,8,9	
A	EP 0 523 386 A (FUJITSU) * page 4, line 20 - page 5, line 14; figure 3 *	12	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 March 1997	Examiner Staessen, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ.) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventor: KRIENS, Peter; Finnasandsvägen 22, S-439 33 Onsala (SE).

(74) Agents: BERGENTALL, Annika et al.; Cegumark AB, P.O. Box 53047, S-400 14 Göteborg (SE).

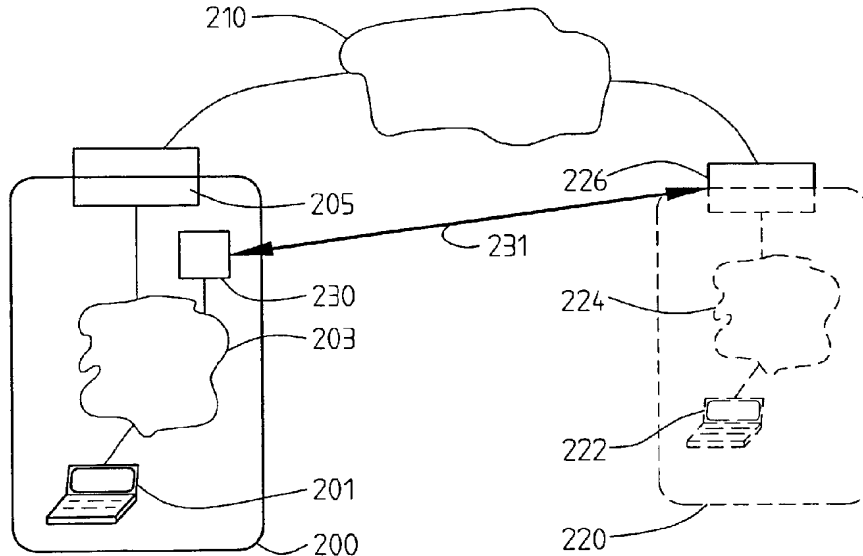
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(54) Title: METHOD AND SYSTEM FOR COMMUNICATION



(57) Abstract: A method and a system for establishing a connection between a first computer of a first computer network and a resource of a second computer network via a third network through a gateway intervening between the second computer network and the third network. A requester issues a request for a connection from the first computer to the resource by specifying a name of the resource. A temporary IP number is returned to the first computer in answer to the request. The temporary IP number is mapped to a tunnel to the gateway. The gateway administers the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource and data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer.



WO 01/50688 A1

Method and system for communication

5

FIELD OF THE INVENTION

The present invention relates generally to a method and a system for communicating between different networks, especially from one network to a host within a private network.

10

BACKGROUND TO THE INVENTION

The Internet is a collection of networks that can interwork. Clients connected to one network can access resources on other networks because data packets are routed from one network to the other. The Internet Protocol (IP) makes this possible. The same protocol can also be used to create private networks that are not directly connected to the Internet. These networks are called intranets. These intranets can be extended over a large area to remote offices using private lines. They are in a way the same intranet because there is a single authority that controls the network. Instead of private lines, an intranet can also be extended using the public internet as a tunneling medium. Instead of coupling an intranet directly to the Internet, the data traffic for a remote office is encapsulated and encrypted before being forwarded over the internet to the remote office. At the remote office, the reverse is done and the data package is placed in the local network. This is usually called a Virtual Private Network (VPN). For the end users it looks like a single private network, but the public Internet is used to securely transport data traffic between remote places.

25

In the Internet Protocol (IP) routing decisions are made on addresses. An address in IP is a 32-bit number. On the Internet, every host requires at least one unique number to be able to communicate. This unique number cannot be used by any other host on the Internet. A special official body allocates these IP numbers, and Internet routers all over the world must know how to map these IP numbers to the correct hosts. To simplify the routing and due to some original design choices the 4294967296 possible

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numbers are running out. For this reason there are a number of number ranges that are reserved which anybody can use privately in e.g. a private intranet. However, IP packets cannot be routed over the Internet with a number within these ranges, and consequently must remain within the private intranet. This creates a problem when  
5 users of such an intranet with host numbers in these number ranges want to access the Internet.

There are two basic very close solutions to this problem, one is the use of a firewall and the other is using network address translation (NAT). Using a firewall, all access to the  
10 Internet is terminated at a firewall computer that is connected both to the Internet and to the intranet. This firewall then looks at the access from the intranet and acts as a proxy to the Internet using its own public IP number that is valid on the internet. However, a proxy requires a program that knows about the protocol. The other solution using NAT has a computer acting as a gateway between the Internet and the intranet. Every packet  
15 directed to the Internet is processed by a program that replaces/translates the address and port of the packet, and keeps a track of on who's behalf this translation is done. If the return packet comes, the address is translated back to the original address. NAT is a very transparent solution but unfortunately has some problems with some protocols, which then requires special measures.

20  
A user does not have to use IP numbers to address a packet. When a user uses a name as an address then a special application, a name server, is used to translate the name into an IP number. On the Internet the Domain Name System (DNS) is used for naming. This is a hierarchical scheme where a DNS server can provide the translation  
25 for a domain or it can look up the name via/in another name server. If a DNS server comprises tables for a domain, then it is authoritative for that domain. Each DNS server is registered in a parent DNS server, this is done recursively until the root DNS servers are reached. Private intranets also require special handling of the DNS. A host on the inside of the intranet should not be visible on the outside, i.e. on the Internet,  
30 because it has a private number. However, when NAT is used, hosts on the outside of

the intranet are required to be present in the local intranet DNS. This is called a split universe DNS.

The real problems start when someone on the Internet wants private access to a host on  
5 an intranet with a private numbering scheme, or when two intranets with private  
numbering schemes want to connect privately. For example, assume that two  
companies, each with their own private intranet, decide to co-operate on a project and  
that they therefore want to share a number of resources on their respective intranets.  
This will cause a number of problems. The intranets cannot directly be routed to each  
10 other because the IP numbers used potentially overlap. Most probably the respective  
DNS of both companies are set-up as split universe DNSs and thus have no knowledge  
of each other's hosts. The normal forwarding to the internet DNS does not help since  
the domain of the other company does not expose the internal hosts with private IP  
numbers. Thus, since the internal hosts cannot see each other, it is impossible to route  
15 anything between them.

There have been a number of different solutions put forward. Unfortunately the known  
solutions either does not work for all protocols or they require complex administration  
or suffer from both disadvantages. For example, proxying is a solution to the problem.  
20 For each service that the companies want to share they have a publicly addressable host  
that contains a proxy for this service. This proxy does the mapping from the outside to  
the inside. A disadvantage of proxying is that it requires a significant amount of  
administration to set them up and then to keep them aligned with the original resources.  
Another disadvantage is that not all protocols are easy to proxy or have existing  
25 proxies. Another solution to the problem is to renumber the intranets so that a non-  
overlapping address space is created. A single DNS can then be used. However, this is  
a very complicated and heavy operation making it virtually impossible if the companies  
only co-operate on a project basis. This solution also requires a significant amount of  
trust between the parties in question.

30



A suggestion has also been disclosed in US patent number 5,898,830 to Wesinger, Jr. et al. (Wesinger). The Wesinger patent discloses a method of setting up virtual hosts in firewalls and using name based routing. The solution allegedly provides a full transparency for the users. However, this solution also only forwards hosts and not  
5 networks and it also requires quite a bit of administration.

There is thus a need to improve the methods of providing access to one or more hosts of a private intranet from the outside of the intranet with full transparency to users and a simple administration.  
10

#### SUMMARY OF THE INVENTION

An object of the invention is to define a method and a system for transparently accessing hosts within a private intranet.

15 Another object of the invention is to define a method and a system for transparently accessing a host within private intranet by name.

A further object of the invention is to define a method and a system for accessing hosts within a private intranet with minimal administration.  
20

A still further object of the invention is to define a method and a system for accessing hosts within a private intranet with security control and access control administration at the private intranet.

25 The aforementioned objects are achieved according to the invention by a method and a system for establishing a connection between a first computer of a first computer network and a resource, such as a second computer, of a second computer network via a third network through a gateway, such as a firewall, intervening between the second computer network and the third network. A requester issues a request for a connection  
30 from the first computer to the resource by specifying a name of the resource. A

temporary IP number is returned to the first computer in answer to the request. The temporary IP number is mapped to a tunnel to the gateway. The gateway administrates the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource and  
5 data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer.

The aforementioned objects are also achieved according to the invention by a method of establishing a connection between a first computer of a first computer network and a  
10 resource of a second computer network via a third network. The connection is established along a route through an intermediate system having an interface to the first computer network, and through a gateway intervening between the second computer network and the third network. The resource belongs to the domain of the gateway. According to the invention the method comprises a number of steps. A first step  
15 configuring the intermediate system with a tunnel from the intermediate system to the gateway. A second step mapping the tunnel with a requester and a domain name of the gateway. A third step wherein the requester issues a request for a connection from the first computer to the resource by specifying a name of the resource. A fourth step  
20 receiving the request at the intermediate system via the interface. A fifth step using a rule for matching the name of the resource with the gateway. A sixth step mapping the name of the resource to the tunnel. A seventh step returning a temporary IP number to the first computer in answer to the request. An eighth step mapping the temporary IP number to the name of the resource. A ninth step wherein the gateway administrates the  
25 handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource. And a tenth step wherein the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer via the intermediate system. It is to be understood that the steps according to the invention do not indicate any sequential  
30 execution, but is merely a manner to distinguish them.

The method can advantageously further comprise the step of transmitting a message with the mapping of the temporary IP number to the gateway by means of the tunnel.

- 5 Preferably the step of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, comprises the substep of directing the intermediate system to translate source addresses of data packets addressed to the temporary IP number to be sent through the tunnel. The step of the gateway  
10 administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, can comprise the substep of directing the intermediate system to translate destination addresses of data packets addressed to the temporary IP number to be sent through the tunnel, by means of at least a partial DNS function in the intermediate  
15 system.

- Advantageously the step of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, can comprise the substep of the  
20 gateway translating source addresses of data packets arriving through the tunnel addressed to the temporary IP number and routing these data packets to the resource. The step of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, can comprise the substep of the gateway  
25 translating destination addresses of data packets arriving through the tunnel addressed to the temporary IP number and routing these data packets to the resource. The step of the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer via the intermediate system, can comprise the substep of the gateway  
30 translating source and destination addresses of data packets arriving from the resource

destined to the first computer, and routing these data packets through the tunnel to the first computer via the intermediate system.

5 In some versions the step of the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer via the intermediate system, can comprise the substep of directing the intermediate system to translate source and destination addresses of data packets arriving from the resource via the tunnel destined to the first computer.

10

In some versions the third network is a telecommunications network, in other versions it is the Internet, i.e. a computer network.

15 Advantageously the rule for matching the name of the resource with the gateway can be based on a mapping, and/or based on a list of hosts, and/or based on a regular or wildcard expression, and/or based on matching a domain name of the name of the resource with the domain name of the gateway.

20 Preferably the method further comprises the step of authenticating the requester at the first computer for access to the tunnel.

25 In some versions the name of the resource corresponds to a second computer within the second computer network, the second computer belonging to the domain of the gateway and comprising the resource. Then preferably the gateway administrates the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource residing on the second computer. Otherwise in other versions the gateway administrates the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, the  
30 resource residing on a proxy of the second computer. Advantageously the proxy to

which the gateway routes data packets addressed by the first computer to the temporary IP number, is in dependence on an identity of the requester.

One or more of the features of the above described different methods according to the invention can be combined in any desired manner, as long as the features are not contradictory.

The aforementioned objects are achieved in accordance with the invention also by a device arranged to establish a connection between a first computer of a first computer network and a resource of a second computer network via a third network. The connection being established along a route through the device having an interface to the first computer network, and through a gateway intervening between the second computer network and the third network. The resource belongs to the domain of the gateway. According to the invention the device comprises a number of means arranged to carry out the invention. A first means arranged to configure a tunnel from the device to the gateway. A second means arranged to map the tunnel with a requester and a domain name of the gateway. A third means arranged to receive a request, issued by the requester, via the interface for a connection from the first computer to the resource by specifying a name of the resource. A fourth means arranged to use a rule for matching the name of the resource with the gateway. A fifth means arranged to map the name of the resource to the tunnel. A sixth means arranged to return a temporary IP number to the first computer in answer to the request. A seventh means arranged to map the temporary IP number to the name of the resource. An eighth means arranged to cooperate with the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel at the gateway, are routed to the resource. A ninth means arranged to cooperate with the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are at the gateway routed through the tunnel to the first computer via the device.

Different embodiments of the device according to the invention can be reached according to additional features mentioned above in connection with the description of the method according to the invention. The features of the above described different  
5 embodiments of a device according to the invention can be combined in any desired manner, as long as no conflict occurs.

By providing a device and a method for accessing one or more hosts within a private intranet, a plurality of advantages over prior art systems are obtained. According to the  
10 invention a route process/connection is made within a requesters network, which could also be a private intranet. Complete transparency is achieved; there is no restriction as to what protocol is used. The requester/user does not have to have any understanding of the set-up, such as the use of special ports or hosts and other network issues. The routing is name based; a requester/user requests access to a name of a host and will get  
15 an IP number in return to be used for access to the requested host. A requester is totally unaware that the request was intercepted and a route was set-up to respond to the IP number that was returned to the requester. All authentication and security issues such as access control can be handled by the private intranet to which access is desired. All the set-up at the requester's side that is required is some means of intercepting DNS  
20 requests before they are transferred to the internet. This means can, for example, be located in a gateway to the internet or at some other point logically before the gateway. This intercept means will have one or more tunnels configured to one or more private intranets and will determine if a DNS request is for one of the private intranets or not. If it determines that the DNS request is for one of the private intranets then a route  
25 process is set-up with an arbitrary but for the requestor valid IP number and a mapping to the corresponding tunnel is made. All access control can be handled at the other end of the tunnel, but in some embodiments some authentication and security is handled by the intercept means. Preferably all address translation is also done at the private intranet side of the tunnel, but in some embodiments at least some of the address  
30 translations can be handled directly by the intercept means, preferably under complete

control of the private intranet side of the tunnel. Further advantages and variations of the invention will become apparent from the following.

#### DESCRIPTION OF THE FIGURES

5 The invention will now be described in more detail for explanatory, and in no sense limiting, purposes, with reference to the following figures, in which

Fig. 1 shows a diagram of communication situation to which the invention is suitable,

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Fig. 2 shows a diagram of an implementation of the invention,

Fig. 3 shows a flow chart of an example of an intermediate system processing,

15 Fig. 4 shows a flow chart of an example of a firewall/gateway processing when receiving from a tunnel,

Fig. 5 shows a flow chart of an example of a firewall/gateway processing when transferring a data packet from a second computer to a first computer.

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#### DESCRIPTION OF PREFERRED EMBODIMENTS

In order to clarify the system according to the invention, some examples of its use will now be described in connection with Figures 1 to 5.

25 Figure 1 shows a diagram of a communication situation to which the invention is suitable. A user/requestor which is situated at a first computer 101 connected to a first computer network 103, which network can comprise several computer networks, within a first domain 100, which can be open or private, desires to communicate/gain  
30 network 124, which network can also comprise several networks, which in turn is

within a second domain 120 which is private. A private domain is a domain which uses a private numbering scheme, i.e. hosts within the domain are not visible from the outside and can thus have the same number as a host on the internet. The first computer 101 and the second computer 122 are interconnected via, for example, an internet 110, a third computer network, a network, which will most likely comprise many networks, by means of a gateway/firewall 105 between the first computer network 103 and the third computer network 110, and a firewall/gateway 126 between the second computer network 124 and the third computer network 110. Other types of interconnections between the gateway/firewall 105 of the first computer network and the firewall/gateway 126 of the second computer network 124 are possible according to the invention. However, any direct ways of ordinary connection between the first computer 101 and the second computer 122 is not possible. The second computer 122 is not visible to the first computer 101 or to an internet 110, and if it is not visible then it is not ordinarily possible to route data packages from the first computer 101 to the second computer 122. Several known, less suitable, solutions to this situation have been discussed previously.

Figure 2 shows a diagram of an implementation of the invention. The set-up is the same as in figure 1 with a first computer 201, with a user/requestor, connected to a first computer network 203, which can comprise several computer networks, which in turn is connected to a gateway/firewall 205, all 201, 203, 205 of a first domain 200 which can be open or private. The gateway/firewall 205 is connected between the first computer network 203 and a third computer network 210. The third computer network 210, for example the Internet, will most likely comprise many networks. There is also a second computer 222, a desired destination, which is connected to a second computer network 224, which can comprise several networks, which in turn is connected to a firewall/gateway 226, all of a second domain 220 which is a private domain. The firewall/gateway 226 is connected between the third computer network 210 and the second computer network 224.

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According to the invention there is also an intermediate system 230, an intercept means, connected somewhere into the first computer network 203. The intermediate system can be placed anywhere in the first domain 200, as long as it can intercept any DNS request from the first computer 201 before the request reaches the third computer network 210. To give a few examples, the intermediate system 230 can be a process running on the gateway/firewall 205, an intelligent connection box logically connected between the first computer 201 and the gateway/firewall 205, or even a process running on the first computer 201. The intermediate system 230 is preferably implemented as close as possible to, if not within, the gateway/firewall 205 to enable as many users/computers in the first domain 200 to have access to it, and thus have the possibilities of the invention. The intermediate system 230 will configure at least one tunnel 231 from the intermediate system to the firewall/gateway 226 of the second domain 220. A tunnel is a logical network connection between two processes, encapsulating the traffic during transport. Traffic over such a connection is traditionally encrypted to prevent eavesdropping. The tunnel or tunnels are preferably authenticated at regular, or irregular, intervals.

The intermediate system 230 will intercept DNS requests at least from the user or users and associate connection points/connected computers for which the intermediate system is set-up, in this example the first computer 201. The intermediate system must at least intercept DNS requests from the first computer 201 before the requests leave the domain 200. A user wanting a permitted access from the first computer 201 to the second computer 222 requests this by naming the second computer 222. The DNS request will then be intercepted by the intermediate system 230 which will determine if the requested name has any association with any tunnel 231 that is previously set-up. The determination can be based on a mapping, a list of hosts, or a regular or wildcard expression. In a preferred method the intermediate system 230 will try to match a domain name suffix of the second domain 220 to a domain name suffix of the DNS request for a match to the tunnel 231 of the example. As can be seen, the intermediate system does not have to be set-up with any details as to exactly which host or hosts are

requested for within the second domain 220. If there is a match the intermediate system will set-up a route to the second domain 220 via a tunnel 231 in view of the match, in this case the described tunnel 231. An IP number, a temporary random IP number, will be generated/made and associated to the route. The generated/given temporary random

5 IP number must at least be valid within the first domain 200 so that communication addressed to that temporary random IP number will be correctly routed to the associated tunnel 231 of the intermediate system 230. The first computer 201 will get the temporary random IP number back as an answer to its DNS request and then use this temporary random IP number for all communication to the second computer 222,

10 at least during this session. The communication will end up at the route interface, which in turn will send it down the tunnel for correct routing to the desired destination, the second computer 222. The temporary random IP number is mapped to the complete name of the DNS request and sent as a message to the gateway/firewall 226 at the other end of the tunnel. The gateway/firewall 226 at the other end of the tunnel 231 will deal

15 with all the details of routing packages to and from the correct desired host, in this case the second computer 222. Return communications will either have the correct destination, the first computer 201, when they emerge from the tunnel 231, or there has been some address translation in the intermediate system 230, governed by the gateway/firewall 226 of the second domain 220, in which case the intermediate system

20 230 will retranslate the communication so that it will be routed correctly within the first domain 200 to the first computer 201.

For an even better understanding of the invention, it will be explained in relation to flow diagrams of a specific implementation of the invention. Flow diagrams describe

25 something as a string of events, one after another. The different processes according to the invention are mostly independent event-driven processes. The major difference is that the processes of the invention might not appear in the order described below, but it is believed that the flow diagrams can however provide an easier understanding of the invention.

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Figure 3 shows a flow chart of an example of the processes of an intermediate system according to one specific implementation of the invention. In a first step 340 one or more predetermined tunnels are configured and tables/mappings are generated/set-up. A table can, for example, be set-up in a matrix where each line comprises; a user (optionally), a source IP number, a destination domain (e.g. \*.ericsson.se), access time or times to the destination domain (optionally), a tunnel to the destination domain. The amount of information comprised in a table and the manner it is stored and mutually associated will vary in dependence of an implementation in question. A table/mapping can preferably be dynamically updated, i.e. information/entries added or deleted from for example a destination domain. In a second step 341 after the first step 340, authentication of the configured tunnel(s) and of configured users/requesters is done, for example, from which source IP number(s), e.g. the first computer, when, and to which domains access is allowed. In a third step 342 after the second step 341 it is determined if there is any communication to intercept or not, if there is none then it simply returns to itself. If there is some communication to intercept, the procedure continues with a fourth step 343 after the third step 342. The fourth step 343 determines if the communication was a DNS request or not. If the communication was determined to be a DNS request, then the procedure continues with a fifth step 344 after the fourth step 343. The fifth step 344 determines if the DNS request is from a configured user, e.g. the first computer, or not. If the DNS request is determined to have originated from a configured user then the procedure continues with a sixth step 345 after the fifth step 344. The sixth step 345 tries to match domains, in the configured user's map/table, with the domain of the DNS request. Thereafter the procedure continues with a seventh step 346 after the sixth step 345. The seventh step 346 determines if there is a match or not. If there is a match, then the procedure continues with an eighth step 347 after the seventh step 346. The eighth step 347 retrieves the entries of the user's map/table which correspond to the match of the seventh step 346 and also generates a temporary IP number, a temporary random IP number, which is a valid IP number in view of the place of the intermediate system. The intermediate system dynamically allocates a temporary IP number. Thereafter the procedure continues with

a ninth step 348 after the eighth step 347. The ninth step 348 maps the temporary random IP number to a tunnel according to the retrieved entries in the user's map/table. Thereafter the procedure continues with a tenth step 349 after the ninth step 348. The tenth step 349 will send a message through the tunnel with a mapping of the temporary  
5 random IP number with the complete DNS request, i.e. the complete name of the desired destination, e.g. the second computer. Thereafter the procedure continues with an eleventh step 350 after the tenth step 349. The eleventh step 350 returns the temporary random IP number to the requester, e.g. the first computer, in answer to the DNS request.

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If in the fourth step 343 it was determined that it was not a DNS request, then the procedure continues with a twelfth step 351 after the fourth step 343. The twelfth step determines if the communication is a data packet or not. If it is determined to be a data packet then the procedure continues with a thirteenth step 352 after the twelfth step  
15 351. The thirteenth step 352 determines if the destination IP number of the data packet matches with any temporary random IP number which is mapped with the source IP number of the data packet. If there is a match, then the procedure continues with a fourteenth step 353 after the thirteenth step 352. The fourteenth step 353 sends the data packet in a tunnel according to the match and corresponding mapping/table entry. If it  
20 was determined in the twelfth step 351 that it was not a data packet, then the procedure continues with a fifteenth step 354 after the twelfth step 351. The fifteenth step 354 will ensure that the communication gets attention by means of some other processing. If it was determined in the thirteenth step 352 that there was no match, then the procedure continues with a sixteenth step 355 after the thirteenth step 352. The  
25 sixteenth step 355 provides normal routing of the data packet. If it was determined in the fifth step 344 that the DNS request was not from a configured user or if it was determined in the seventh step 346 that there is no match in the users domain name table, then the procedure continues with a seventeenth step 356 after the fifth step 344 or after the seventh step 346. The seventeenth step 356 provides a normal DNS request  
30 processing.

What happens next? We have opened a route interface process at the intermediate system and are now sending data packets and messages down a tunnel. Figure 4 shows a flow chart of an example of a second domain firewall/gateway processing when receiving from a tunnel. In a first step 460 the procedure waits for some communication received from a tunnel, and returns to itself as long as there is none. However when there is some communication received from a tunnel then the procedure continues with a second step 461 after the first step 460. The second step 461 determines if the communication is a message with a mapping of a temporary random IP number with a DNS request, or not, e.g. a message sent by the tenth step 349 of Figure 3. If it is determined that it is not a message with a mapping then the procedure continues with a third step 462 after the second step 461. The third step 462 determines if the communication is a data packet to be routed or not. If it is determined that it is a data packet to be routed then the procedure continues with a fourth step 463 after the third step 462. The fourth step 463 determines if there exists a mapping/table or not for the destination IP number, i.e. a temporary random IP number, of the data packet. If there exists a mapping/table for the destination IP number then the procedure continues with a fifth step 464 after the fourth step 463. The fifth step 464 determines if security control of the tunnel through which the communication came is OK and still valid. If it is determined that the security of the tunnel is satisfactory, then the procedure continues with a sixth step 465 after the fifth step 464. The sixth step 465 determines if, according to the table/map, the source IP number, e.g. the IP number of the first computer, of the data packet have allowed access to the destination IP number, i.e. the temporary random IP number, of the data packet. If it is determined that the data packet from the source IP number has access to the destination IP number then the procedure continues with a seventh step 466 after the sixth step 465. The seventh step 466 translates/re-maps the source IP number, e.g. the IP number of the first computer, to a temporary locally valid IP number, a temporary local IP number. This is done so that the packet can be routed properly in the second domain. After the seventh step 466 the procedure continues with an eighth step 467 which lookups the real local IP number

of the destination, e.g. the second computer, by doing a DNS request in the second domain on the name received with the mapping to the temporary random IP number. The procedure then continues with a ninth step 468 after the eighth step 467. The ninth step 468 translates/re-maps the destination IP number, i.e. the temporary random IP number, of the data packet to the real local IP number of the destination, e.g. the second computer. Thereafter the procedure continues with a tenth step 469 after the ninth step 468. The tenth step 469 routes the data packet in the second domain to the destination, e.g. the second computer, with the real local IP number as destination and the temporary local IP number as the source.

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If it was determined in the second step 461 that the communication was a map/table message then the procedure continues with an eleventh step 470 after the second step 461. The eleventh step 470 receives a mapping of a temporary random IP number with a DNS name, e.g. the second computer, of the second domain, and adds this to its mapping. If it was determined in the third step 462 that it was not a data packet to be routed that was received through the tunnel, then the procedure continues with a twelfth step 471 after the third step 462. The twelfth step 471 does other appropriate processing. If it was determined in the fifth step 464 that the security of the tunnel is not valid then the procedure could continue with a thirteenth step 472 after the fifth step 464. The thirteenth step 472 will then try to authenticate the tunnel, and then return and continue with the fifth step. If it was determined in the fourth step 463 that there does not exist a mapping/table or if it was determined in the sixth step 465 that the source IP number is not allowed access to the destination IP number, then the procedure continues with a fourteenth step 473 after either the fourth step 463 or the sixth step 465. The fourteenth will reject request, and not route the data packet, the “destination is unknown”. Preferably security will also be alerted of an attempted breach of security.

As mentioned, packets must be able to be sent back to the original requester. Figure 5 shows a flow chart of an example of firewall/gateway processing when transferring a

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data packet from a second computer to a first computer. In a first step 580 it is checked if there is any communication from within the second computer network, and if not then just return to itself. If there is communication from within the second computer network, then the procedure continues with a second step 581 after the first step 580.

5 The second step 581 determines if it is a data packet that should be routed. If it is a data packet to be routed then the procedure continues with a third step 582 after the second step 581. The third step 582 determines if the destination IP number of the data packet is equal to any valid temporary local IP number. If the destination IP number is matched then the procedure continues with a fourth step 583 after the third step 582.

10 The fourth step retrieves the mapping/table that corresponds to the matched temporary local IP number to thereby find out where, which tunnel, to route the data package. After the fourth step 583 the procedure continues with a fifth step 584 which translates (re-maps) the source IP number, the IP number of the second computer, of the data packet to the temporary random IP number according to table (map). After the fifth

15 step 584 the procedure continues with a sixth step 585 which translates (re-maps) the destination IP number, the temporary local IP number, of the data packet to the IP number of the first computer according to the table (map). Thereafter in a seventh step 586 after the sixth step 585 the data packet is transferred in an appropriate tunnel according to the table (map). If it was determined in the second step 581 that it is not a

20 data packet that is to be routed then the procedure continues with an eighth step 587 after the second step 581 and does some other processing. If it was determined in the third step 582 that the destination IP number of the data packet is not equal to any valid temporary local IP number then the procedure continues with a ninth step 588 after the third step 582 and does a normal routing of the data packet.

25

The present invention can be put into apparatus-form either as pure hardware, as pure software or as a combination of both hardware and software. If the method according to the invention is realized in the form of software, it can be completely independent or it can be one part of a larger program. The software can suitably be located in a

30 general-purpose computer or in a dedicated computer.

As a summary, the invention can basically be described as a method of accessing one or more hosts within a private network by means of a route interface process.

- 5 The invention is not limited to the embodiments described above but may be varied within the scope of the appended patent claims.



FIG 1 a diagram of communication situation to which the invention is suitable,  
5 100 open or private first domain  
101 user/requestor, a first computer,  
103 a first computer network, can comprise several computer networks,  
105 gateway/firewall between the first computer network and a third  
computer network,  
10 110 internet, the third network, will most likely comprise many networks  
120 private second domain,  
122 a second computer, a destination,  
124 a second computer network, can comprise several networks,  
126 a firewall/gateway between the second computer network and the third  
15 computer network.

FIG 2 a diagram of an implementation of the invention,  
200 open or private first domain,  
201 user/requestor, a first computer, a source,  
20 203 a first computer network, can comprise several computer networks,  
205 gateway/firewall between the first computer network and a third  
computer network,  
210 internet, the third computer network, will most likely comprise many  
networks,  
25 220 private second domain,  
222 a second computer, a destination,  
224 a second computer network, can comprise several networks, to which  
the second computer is connected,  
226 a firewall/gateway between the third computer network and the second  
30 computer network, the second computer,

230 an intermediate system between the third computer network and the first  
computer, the source,  
231 a tunnel from the intermediate system to the firewall.

5 FIG 3 flow chart of an example of intermediate system processing,  
340 : configure tunnels and generate tables/mappings  
341 from 340: authentication of tunnel(s) and of users/requesters, for  
example from which source IP number(s), e.g. the first computer, when,  
and to which domains,  
10 342 from 341 or no from itself: any communication ?  
343 yes from 342: is it a DNS request ?  
344 yes from 343: is it from a configured user, e.g. the first computer ?  
345 yes from 344: try to match domains, in the configured user's table, with  
the domain of the DNS request,  
15 346 from 345: is there a match,  
347 yes from 346: get map/table and also generate a temporary IP number, a  
temporary random IP number, which is a valid IP number in view of the  
place of the intermediate system,  
348 from 347: map the temporary IP number to a tunnel according to the  
20 retrieved map/table,  
349 from 348: send message through tunnel with mapping of temporary  
random IP number with the DNS request,  
350 from 349: return temporary random IP number to requester, e.g. the first  
computer, in answer to the DNS request,  
25 351 no from 343: is it a data packet ?  
352 yes from 351: does destination IP number of the data packet match with  
any temporary random IP number which is mapped with the source IP  
number of the data packet,  
353 yes from 352: send data packet in a tunnel according to mapping/table  
30 entry,

354 no from 351: other processing,  
355 no from 352: normal routing of data packet,  
356 no from 344 or no from 346: do a normal DNS request processing.

5 FIG 4 flow chart of an example of firewall processing when receiving from a tunnel,  
460 no from itself: communication received from a tunnel?  
461 yes from 460: is the communication a map/table message?  
462 no from 461: is the communication a data packet to be routed?  
10 463 yes from 462: does there exist a mapping/table for the destination IP number, i.e. a temporary random IP number, of the data packet?  
464 yes from 463 or from 472: security control of tunnel, through which the communication came, is it OK, still valid ?  
465 yes from 464: does, according to the table/map, the source IP number, e.g. the IP number of the first computer, of the data packet have allowed  
15 access to the destination IP number, i.e. the temporary random IP number, of the data packet ?  
466 yes from 465: translate/remap source IP number, e.g. the IP number of first computer, to a temporary locally valid IP number, a temporary local  
20 IP number,  
467 from 466: lookup of real local IP number of destination, e.g. the second computer, by DNS in the second domain,  
468 from 467: translate/remap destination IP number, i.e. the temporary random IP number, of the data packet to the real local IP number of the  
25 destination, e.g. the second computer,  
469 from 468: route the data packet in the second domain to the destination, e.g. the second computer, with the real local IP number as destination and the temporary local IP number as the source,  
470 yes from 461: receive a mapping of a temporary random IP number with a DNS name, e.g. the second computer, of the second domain,  
30

- 471 no from 462: do other processing,  
472 no from 464: authenticate tunnel,  
473 no from 463 or no from 465: reject request, do not route data packet,  
“destination unknown”, alarm security of an attempted break in.
- 5
- FIG 5 flow chart of an example of firewall processing when transferring a data  
packet from a second computer to a first computer,
- 580 no from itself: communication from within the second computer  
network ?
- 10 581 yes from 580: is it a data packet that should be routed ?  
582 yes from 581: is the destination IP number of the data packet equal any  
valid temporary local IP number ?
- 583 yes from 582: get mapping/table to find out where, which tunnel, to  
route the data package,
- 15 584 from 583: translate (remap) the source IP number, the IP number of the  
second computer, of the data packet to temporary random IP number  
according to table (map),  
585 from 584: translate (remap) the destination IP number, the temporary  
local IP number, of the data packet to the IP number of the first  
20 computer according to the table (map),  
586 from 585: transfer data packet in appropriate tunnel according to table  
(map)
- 587 no from 581: other processing,  
588 no from 582: normal routing.

## CLAIMS

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1. A method of establishing a connection between a first computer of a first computer network and a resource of a second computer network via a third network, along a route through an intermediate system having an interface to the first computer network, and through a gateway intervening between the second computer network and the third network, the resource belonging to the domain of the gateway  
10 **characterized in that** the method comprises the following steps:

- configuring the intermediate system with a tunnel from the intermediate system to the gateway;
- mapping the tunnel with a requester and a domain name of the gateway;
- 15 - the requester issuing a request for a connection from the first computer to the resource by specifying a name of the resource;
- receiving the request at the intermediate system via the interface;
- using a rule for matching the name of the resource with the gateway;
- mapping the name of the resource to the tunnel;
- 20 - returning a temporary IP number to the first computer in answer to the request;
- mapping the temporary IP number to the name of the resource;
- the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource;
- 25 - the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer via the intermediate system.

2. The method according to claim 1, **characterized in that** the method  
30 further comprises the step of:

- transmitting a message with the mapping of the temporary IP number to the gateway by means of the tunnel.

3. The method according to claim 1 or 2, **characterized in that** the step  
5 of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, comprises the substep of:

- directing the intermediate system to translate source addresses of data packets addressed to the temporary IP number to be sent through the tunnel.

10

4. The method according to any one of claims 1 to 3, **characterized in that** the step of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, comprises the substep of:

- 15 - directing the intermediate system to translate destination addresses of data packets addressed to the temporary IP number to be sent through the tunnel, by means of at least a partial DNS function in the intermediate system.

5. The method according to claim 1 or 2, **characterized in that** the step  
20 of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, comprises the substep of:

- the gateway translating source addresses of data packets arriving through the tunnel addressed to the temporary IP number and routing these data packets to  
25 the resource.

6. The method according to claim 1, 2, 3 or 5, **characterized in that** the  
step of the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the  
30 tunnel, are routed to the resource, comprises the substep of:

- the gateway translating destination addresses of data packets arriving through the tunnel addressed to the temporary IP number and routing these data packets to the resource.

5 7. The method according to any one of claims 1 to 6, **characterized in that** the step of the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer via the intermediate system, comprises the substep of:

- the gateway translating source and destination addresses of data packets  
10 arriving from the resource destined to the first computer, and routing these data packets through the tunnel to the first computer via the intermediate system.

8. The method according to any one of claims 1 to 6, **characterized in that** the step of the gateway administrating the handling of data packets such that data  
15 packets arriving from the resource destined to the first computer, are routed through the tunnel to the first computer via the intermediate system, comprises the substep of:

- directing the intermediate system to translate source and destination addresses of data packets arriving from the resource via the tunnel destined to the first  
20 computer.

9. The method according to any one of claims 1 to 8, **characterized in that** the third network is a telecommunications network.

10. The method according to any one of claims 1 to 8, **characterized in that**  
25 **that** the third network is the Internet.

11. The method according to any one of claims 1 to 10, **characterized in that** the rule for matching the name of the resource with the gateway is based on a  
30 mapping.

12. The method according to any one of claims 1 to 10, **characterized in that** the rule for matching the name of the resource with the gateway is based on a list of hosts.
- 5 13. The method according to any one of claims 1 to 10, **characterized in that** the rule for matching the name of the resource with the gateway is based on a regular or wildcard expression.
- 10 14. The method according to any one of claims 1 to 10, **characterized in that** the rule for matching the name of the resource with the gateway is based on matching a domain name of the name of the resource with the domain name of the gateway.
- 15 15. The method according to any one of claims 1 to 14, **characterized in that** the method further comprises the step of:
- authenticating the requester at the first computer for access to the tunnel.
- 20 16. The method according to any one of claims 1 to 15, **characterized in that** the name of the resource corresponds to a second computer within the second computer network, the second computer belonging to the domain of the gateway and comprising the resource.
- 25 17. The method according to claim 16, **characterized in that** the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource residing on the second computer.
18. The method according to claim 16, **characterized in that** the gateway administrating the handling of data packets such that data packets addressed by



the first computer to the temporary IP number, arriving through the tunnel, are routed to the resource, the resource residing on a proxy of the second computer.

19. The method according to claim 18, **characterized in that** the proxy  
5 to which the gateway routes data packets addressed by the first computer to the temporary IP number, is in dependence on an identity of the requester.

20. A device arranged to establish a connection between a first computer  
of a first computer network and a resource of a second computer network via a third  
10 network, along a route through the device having an interface to the first computer network, and through a gateway intervening between the second computer network and the third network, the resource belonging to the domain of the gateway **characterized in that** the device comprises:

- means arranged to configure a tunnel from the device to the gateway,
- 15 - means arranged to map the tunnel with a requester and a domain name of the gateway,
- means arranged to receive a request, issued by the requester, via the interface for a connection from the first computer to the resource by specifying a name of the resource,
- 20 - means arranged to use a rule for matching the name of the resource with the gateway,
- means arranged to map the name of the resource to the tunnel,
- means arranged to return a temporary IP number to the first computer in answer to the request,
- 25 - means arranged to map the temporary IP number to the name of the resource,
- means arranged to cooperate with the gateway administrating the handling of data packets such that data packets addressed by the first computer to the temporary IP number, arriving through the tunnel at the gateway, are routed to the resource,

- means arranged to cooperate with the gateway administrating the handling of data packets such that data packets arriving from the resource destined to the first computer, are at the gateway routed through the tunnel to the first computer via the device.

1/4

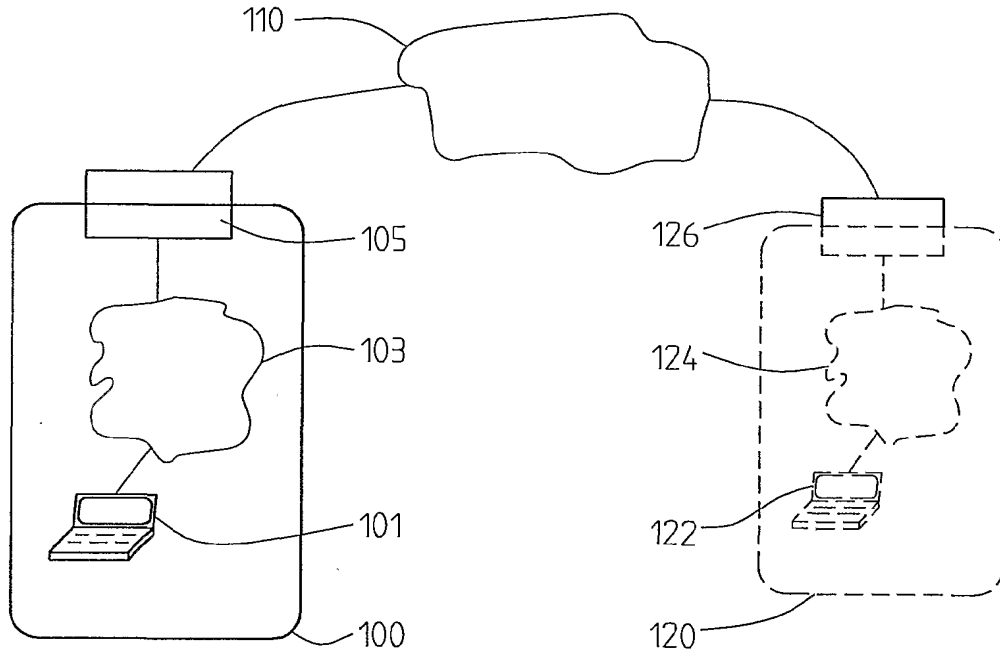


Fig. 1

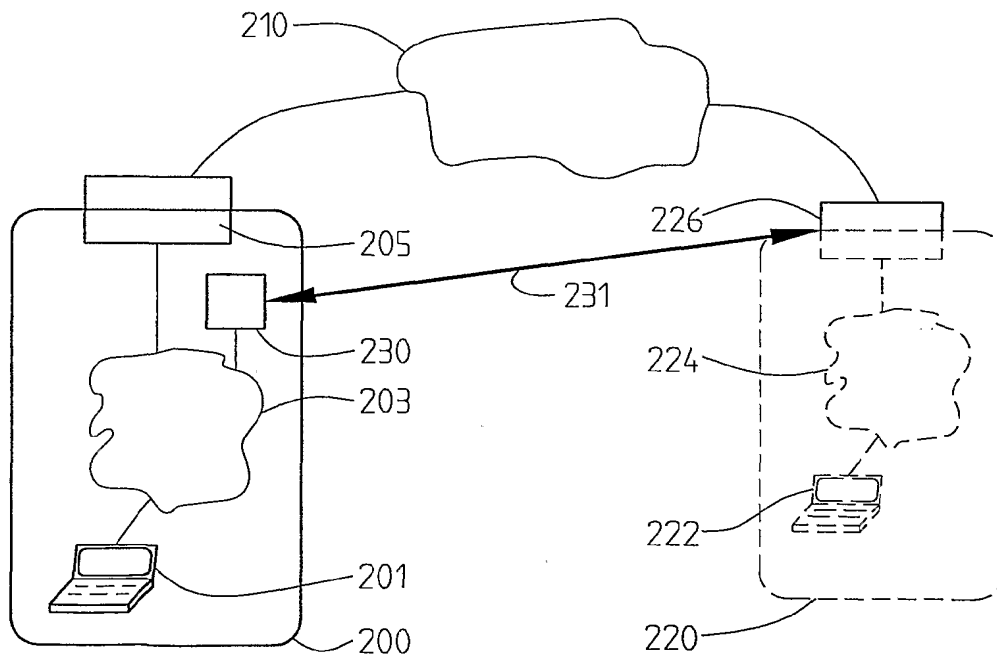


Fig. 2

2/4

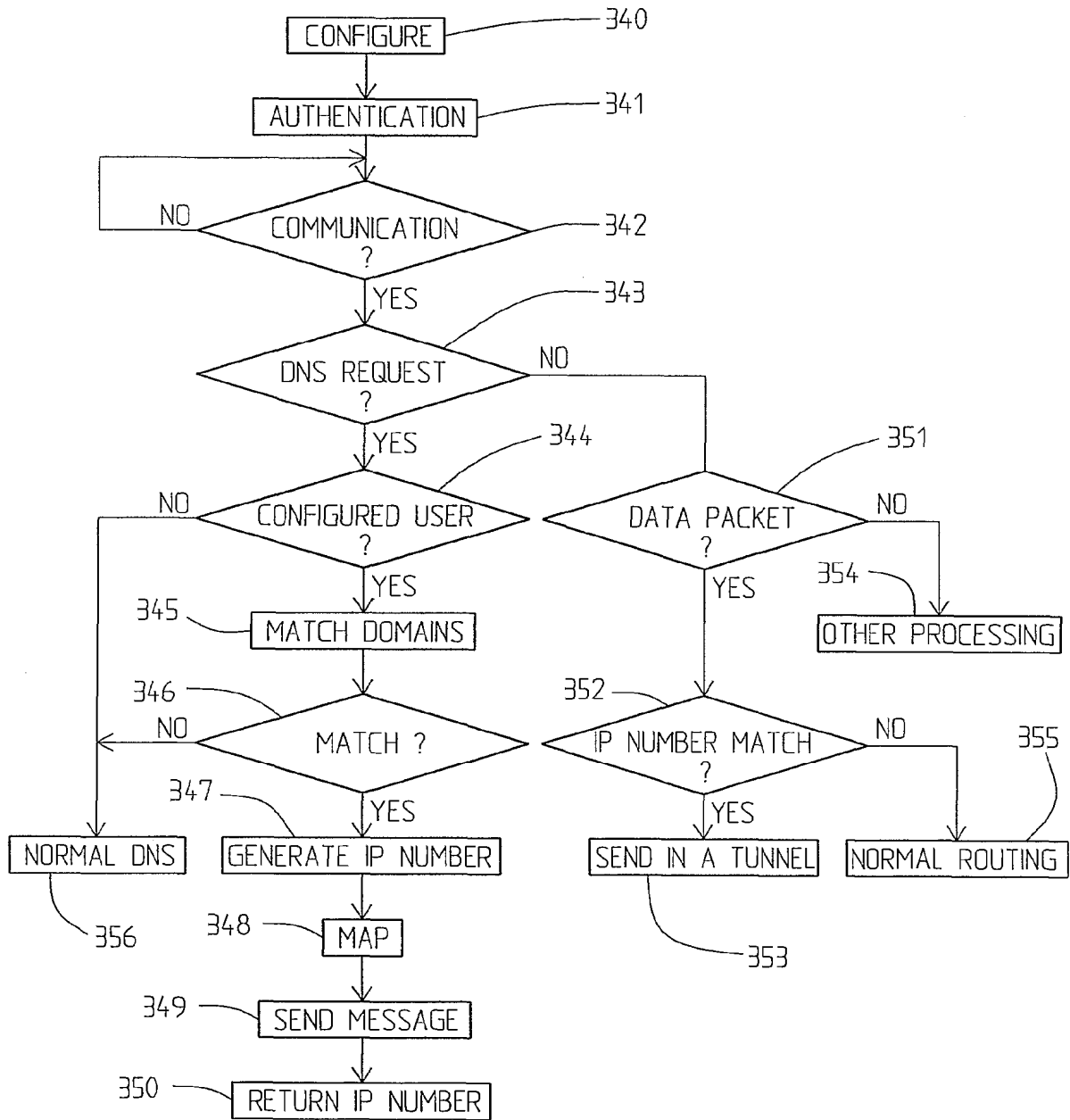


Fig. 3

3/4

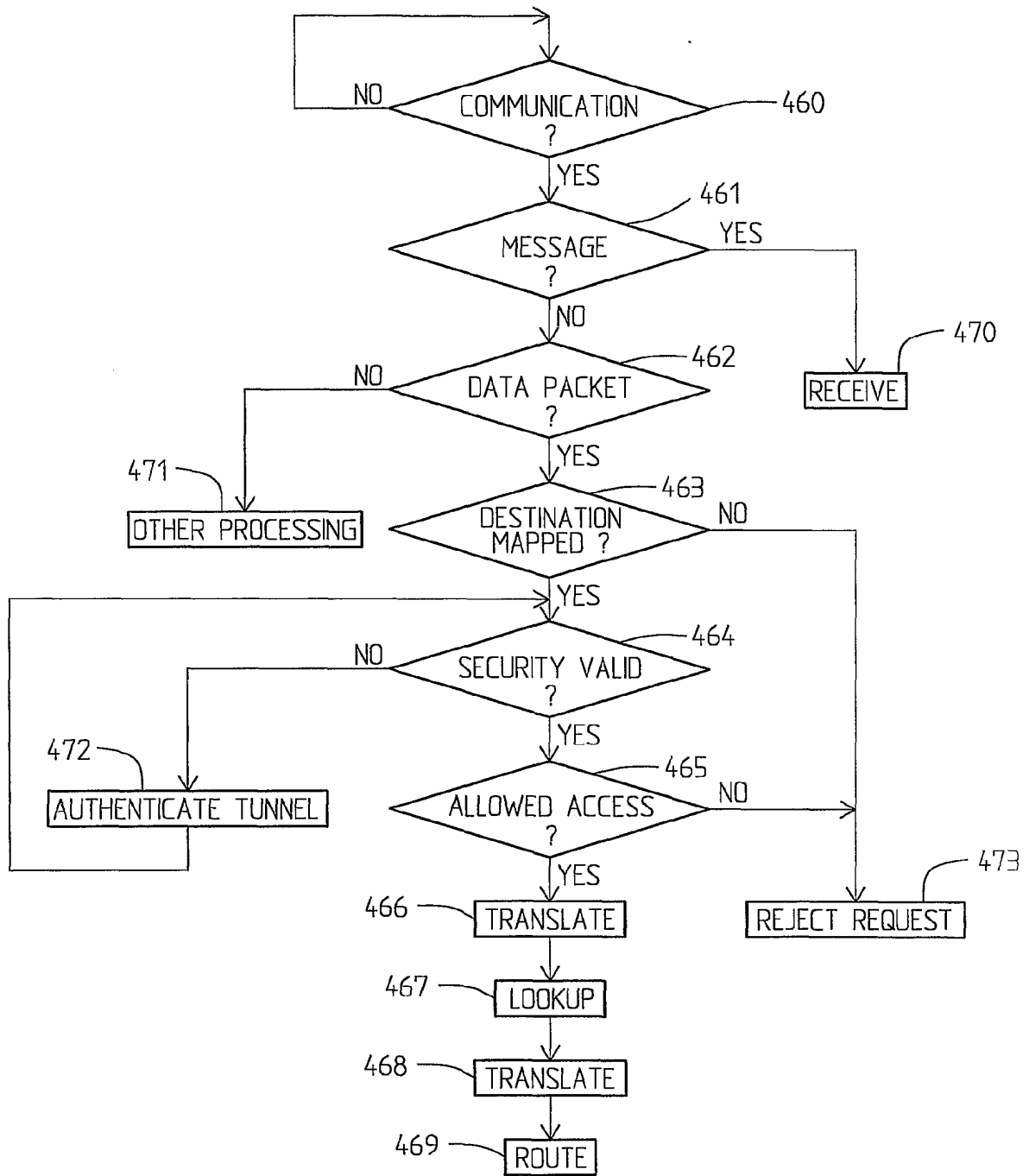


Fig. 4

4/4

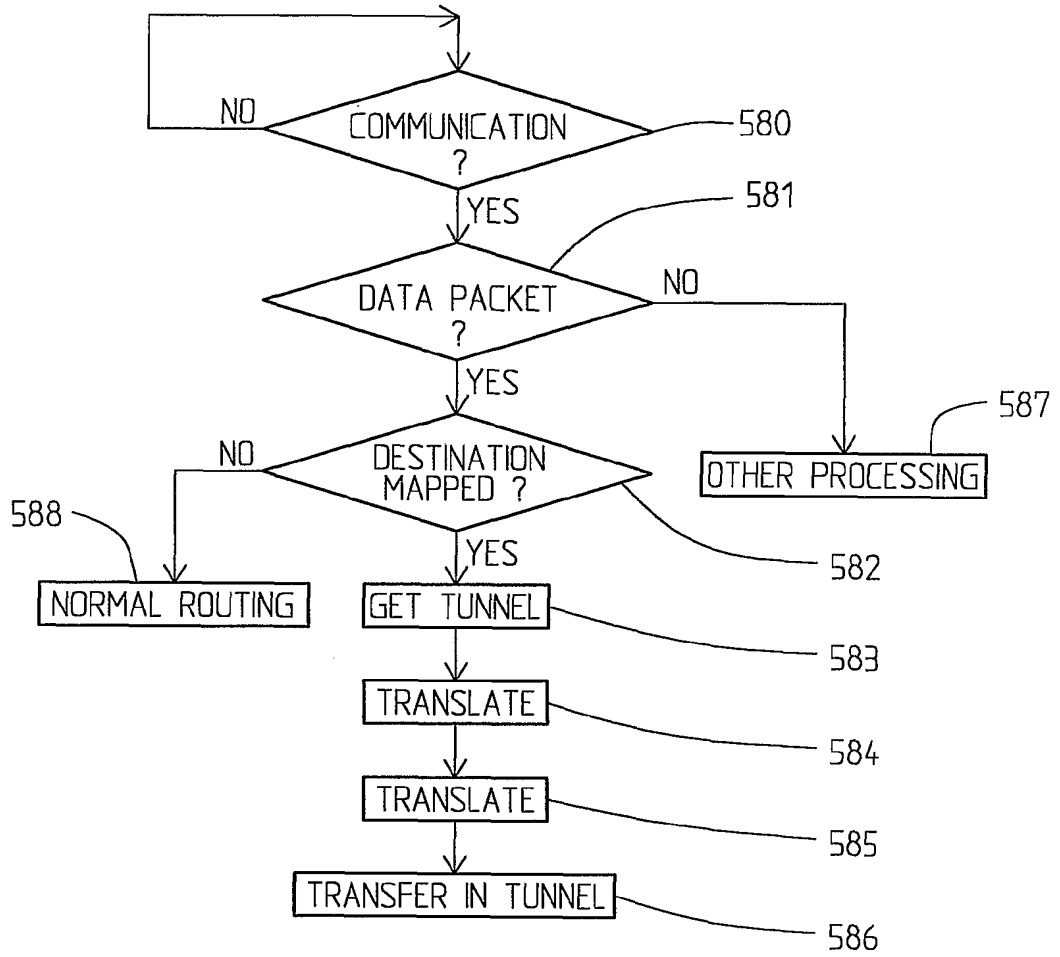


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/02565

<p><b>A. CLASSIFICATION OF SUBJECT MATTER</b></p> <p>IPC7: H04L 12/46, H04L 12/56, H04L 9/00 According to International Patent Classification (IPC) or to both national classification and IPC</p>																							
<p><b>B. FIELDS SEARCHED</b></p> <p>Minimum documentation searched (classification system followed by classification symbols)</p> <p>IPC7: H04L, G09F, H04Q</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>SE,DK,FI,NO classes as above</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>																							
<p><b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b></p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>US 5898830 A (R.E.WESINGER, JR. ET AL), 27 April 1999 (27.04.99), column 3, line 47 - column 4, line 52, figure 1, claims 1-10, abstract, cited in Application</td> <td>1-20</td> </tr> <tr> <td></td> <td>---</td> <td></td> </tr> <tr> <td>A</td> <td>C. HUITEMA: An Experiment in DNS Based IP Routing. K B Labs Kashpureff Boling Laboratories, Inc., Network Working Group, rfc 1383, INRIA dec. 1992. <a href="http://www.kblabs.com/lab/lib/rfcs/1300/rfc1383.txt.html">http://www.kblabs.com/lab/lib/rfcs/1300/rfc1383.txt.html</a></td> <td>1-20</td> </tr> <tr> <td></td> <td>---</td> <td></td> </tr> <tr> <td>A</td> <td>WO 9859470 A2 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 30 December 1998 (30.12.98), page 1, line 13 - page 3, line 16, figures 1-2, claims 1-12</td> <td>1, 20</td> </tr> <tr> <td></td> <td>---</td> <td></td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	US 5898830 A (R.E.WESINGER, JR. ET AL), 27 April 1999 (27.04.99), column 3, line 47 - column 4, line 52, figure 1, claims 1-10, abstract, cited in Application	1-20		---		A	C. HUITEMA: An Experiment in DNS Based IP Routing. K B Labs Kashpureff Boling Laboratories, Inc., Network Working Group, rfc 1383, INRIA dec. 1992. <a href="http://www.kblabs.com/lab/lib/rfcs/1300/rfc1383.txt.html">http://www.kblabs.com/lab/lib/rfcs/1300/rfc1383.txt.html</a>	1-20		---		A	WO 9859470 A2 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)), 30 December 1998 (30.12.98), page 1, line 13 - page 3, line 16, figures 1-2, claims 1-12	1, 20		---	
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<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed												
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<p>Date of the actual completion of the international search</p> <p><b>17 April 2001</b></p>		<p>Date of mailing of the international search report</p> <p><b>18-04-2001</b></p>																					
<p>Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86</p>		<p>Authorized officer</p> <p><b>Roger Bou Faisal/LR</b> Telephone No. +46 8 782 25 00</p>																					

INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9726731 A1 (RAPTOR SYSTEMS, INC.), 24 July 1997 (24.07.97), see whole document  -----  -----	1,20

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

25/02/01

International application No.

PCT/SE 00/02565

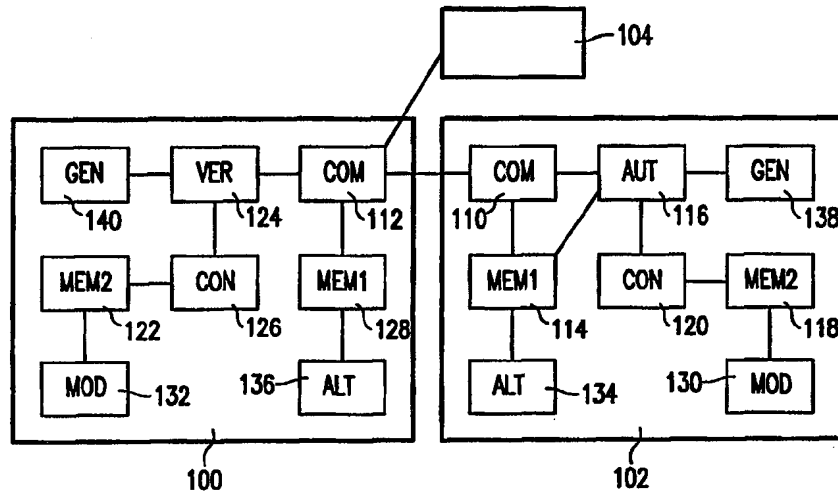
Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5898830 A	27/04/99	US 6052788 A	18/04/00
WO 9859470 A2	30/12/98	AU 8052398 A SE 9702385 A	04/01/99 24/12/98
WO 9726731 A1	24/07/97	AU 2242697 A	11/08/97



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/IB98/00578 (22) International Filing Date: 20 April 1998 (20.04.98) (30) Priority Data: 97201667.9 3 June 1997 (03.06.97) EP (34) Countries for which the regional or international application was filed: NL et al. (71) Applicant: KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). (71) Applicant (for SE only): PHILIPS AB [SE/SE]; Kottbygatan 7, Kista, S-164 85 Stockholm (SE). (72) Inventor: TANG, Wei-Jin; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). (74) Agent: GROENENDAAL, Antonius, W., M.; Internationaal Octrooibureau B.V., P.O. Box 220, NL-5600 AE Eindhoven (NL).</p>		<p>(81) Designated States: JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: AUTHENTICATION SYSTEM



(57) Abstract

The authentication system comprises at least one station (102) and a host (104). The station (102) comprises a memory (118) for electronically storing a plurality of authentication items. Constructing means (120) are used to construct an authentication control element, such as a key, from a part of the authentication items which is selected for each message. Authentication means (116) authenticate the message substantially uniquely under control of the authentication control element constructed for the message. The authenticated message is sent to the host. The host comprises a memory (122) for electronically storing the authentication items of the station. The host comprises constructing means (126) for constructing for each received authenticated message an authentication control element in the same way as the station. Verification means (124) are used for, under control of the authentication control element, verifying the authenticity of the received message.

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Authentication system.

The invention relates to an authentication system comprising at least one station and a host; the station comprising: authentication means for, based upon an authentication algorithm, authenticating a message; and communication means for sending the authenticated message to the host; the host comprising: communication means for receiving  
5 an authenticated message; and verification means for verifying the authenticity of the received message by checking the received message with an authentication algorithm corresponding to a station which sent the message.

10 With the increase of electronic communication and electronic financial transactions, identification and authentication has become an essential aspect of many systems. Normally in an authenticated transaction three parties are involved: a host, a station and a user of the station. The host may, for example, be a central computer at a bank, at a retailer, or at a company providing services via Internet, or be a file server. The station may  
15 be a personal computer (PC), a Personal Digital Assistant (PDA) or a hand-held PC (HPC), usually connected or connectable via telecommunications to the host computer. The message may be a digital representation of a user generated message, including an instruction to a bank, but may also be computer data or computer code, such as a Java applet. In many applications, the station is split into two parts: a user station and an access station.

20 An identification, such as a communication address, which uniquely identifies the station is stored in the memory of the station. A message generated in the station, usually at the request of the user, is authenticated using an authentication algorithm. Typically, the message is authenticated by generating an additional digital signature. The authenticated message is sent to the host together with the identification of the station. The  
25 host uses the same or a complementary authentication algorithm to verify the authenticity of the message.

For certain applications, like a user instructing a bank to transfer money from a bank account, it may be required that the station performs some form of access

control ensuring that only an authorised user can issue the instruction. The access control may, for instance, be based on a PIN-code or password. Also more advanced methods, for instance based on biometrical information, may be used. The access information may be passed on to the host as part of the message. For other applications, like a transfer of a small amount of electronic money, it may not be required or, in view of privacy or safety, even be undesired that additional access control is performed or that the access information is transferred to the host. The access control is not part of the invention.

Most authentication algorithms are based on encryption algorithms, such as the symmetrical DES algorithm or the asymmetrical public-key RSA algorithm. Typically, the same algorithm is used for each station and a dedicated key is used to make the algorithm act in a manner specific for the station. The security provided by such algorithms is mainly based in the algorithmic strength of the involved algorithms, which are, as a consequence, complicated and costly to implement, which is a particular drawback for simple consumer electronic products.

It is an object of the invention to provide an authentication system of the kind set forth, which is simple to develop. It is a further object to provide such a system which can be cost-effectively implemented in consumer electronic products. It is a further object to provide such an authentication system which offers a high level of security.

To achieve this object, the authentication system according to the invention is characterised in that the station comprises a memory for electronically storing a plurality of authentication items; the host comprises a memory for electronically storing the authentication items of the station in association with an identification of the station;

the station comprises constructing means for constructing for each message a corresponding authentication control element; the constructing means being operable to select for the message a part of the plurality of authentication items and to construct the authentication control element from the selected part, where the authentication control element in practical circumstances causes the authentication algorithm to substantially authenticate the corresponding message uniquely; and

the host comprises constructing means for constructing for each received authenticated message an authentication control element from the authentication items associated with a station which sent the message; the construction being the same as performed by the associated station.

The system according to the invention is based on the insight that the

simple manner in which parents and children identify each other when they are not in direct contact, such as in the case of a kidnapping, can form the basis of an automatic authentication system. If for instance a child is kidnapped, the parents want to be sure that the kidnapers indeed hold the child and that, for instance, a ransom demand genuinely  
5 relates to their child. At the moment when identification of, for instance, the child is required, the child informs the kidnapers of a few events from a large set of events known to the child and parents and unknown to others (or at least to the kidnapers). For each communication with the kidnapers, the parents may request that the child recalls other events. This ensures that the kidnapers have to keep the child alive. It also ensures that no  
10 fraudulent kidnapers, who in one way or another intercepted a set of identifying events, can re-use this set for authenticating a fraudulent demand.

Based on this insight, the host (parent) and the station (child) share a large set of authentication items. For each message which needs to be authenticated, a small subset from the authentication items is selected and used to form an authentication control  
15 element which controls an authentication algorithm. In practical circumstances the authentication algorithm authenticates with a high likelihood the corresponding message uniquely under control of the authentication control element. A main strength of the system according to the invention lies in unpredictably authenticating messages by selecting a subset of authentication items from a relatively large set, where for each next message other items  
20 may be selected. This allows the use of a simple authentication algorithm, where the emphasis is not on the algorithmic strength of the algorithm, such as the difficulty of predicting for a message the corresponding authenticated message, but on using the algorithm in an unpredictable manner. A correlation which might occur in the authentications generated for successive messages can be broken by using an authentication control element, which is  
25 not related to the authentication algorithm. The authentication items, which determine the authentication control element can be generated in advance using sophisticated means, such as real random sequence generators, if desired. For a fraudulent party to be able to break the system, the fraudulent party needs not only to intercept sufficient messages to be able to break the authentication algorithm but also to determine the entire set of authentication items.  
30 The size of the set of authentication items and the size of the subset used to generate an authentication control element can be chosen to optimally suit the application in which the system is used. As an example, for a not very demanding application, a set of authentication items formed by a couple of hundred random bytes may be used, where the authentication algorithm may be based on a substitution, using a substitution table. Some or all elements of

the substitution table which have been used during the substitution are replaced by new elements derived from the random bytes. These new elements form the authentication control element. The new elements may, for instance, be selected using a (pseudo-)random number generator. For more demanding applications, more authentication items may be used. If  
5 desired, also the complexity of the involved algorithm may be increased, for instance by basing the authentication algorithm on algorithmically strong encryption algorithms, such as DES, where the authentication control element forms a key for DES. For applications which require a high level of security, the authentication items and the algorithms are preferably stored in, respectively, executed in a secure module, such as a tamper-proof IC.

10           It should be noted that the Dutch Giro (Postbank) uses the TAN (Transaction Number) system for electronic payments by customers using a PC and a modem. The customers of the Postbank receive via regular mail several transaction numbers printed on a piece of paper. For each transaction the client has to enter a next transaction number until all numbers have been used, at which moment the client receives a new set of  
15 numbers. A fraudulent party has, in general, easy access to the transaction numbers at the customers premises. Furthermore, the distribution of the transaction numbers from the host to the customer makes the system vulnerable for fraudulent parties intercepting the list.

          For simple systems, for instance used to check the authenticity of an entry ticket to a sporting event or concert, it may be sufficient to differentiate between authentic  
20 and non-authentic stations. The station, such as an electronic ticket, may be re-used for authenticating a series of events by using an event-specific message. For a more demanding system, such as involving financial transactions, a message is advantageously authenticated in a manner unique for the station.

          The measure as defined in the dependent claim 2 has the advantage that  
25 the uniqueness of the station identification is used for authenticating a message in a manner unique for the station. The station identification, which is used to distinguish the station amongst the other stations of the system with respect to the host, may, for instance, be a communication address or an account number.

          The measure as defined in the dependent claim 3 has the advantage that a  
30 fraudulent party needs to intercept messages for each station in order to determine the authentication items specific for the station, making the task of the fraudulent party more complicated.

          The measure as defined in the dependent claim 4 has the advantage that the set of shared information (the authentication item) is updated as the station and the host

experience more shared events, like authenticating a message. In this way a fraudulent party not only has to determine the set of authentication items but also how the items are modified over time.

In a further embodiment of the system according to the invention, the system is characterised in that the modification means is operative to modify an authentication item at least partly based on an event independent of the authentication items. In this way it becomes even more important for a fraudulent party to intercept and record all messages in order to be able to determine the authentication items. In a simple form the modification may be (partly) based on the previously authenticated message(s). This has the advantage that the message is already transferred to the host allowing the host to perform the same modification. In some systems the content of the message may be too predictable to significantly increase the task of a fraudulent party in breaking the authentication. In such systems more unpredictable events, such as the time at which the last message was authenticated, may be used. To allow the host to perform the same modification, the event has to be informed to the host, for instance, in the form of a time-stamp. Preferably, the modification is at least partly based a random or pseudo-random event. Advantageously, the least-significant bits of a clock are used, giving for most systems a sufficiently random event, particularly if messages are authenticated individually and not processed in a sequential batch.

The measure as defined in the dependent claim 6 has the advantage that it becomes more difficult for a fraudulent party to collect messages relating to the same station. The identification may, for instance, be a conventional communication identification, such as a communication address or a telephone number. Instead of in addition to such a communication identification, the station identification may also be based on an identification, such as an indication of an account number, which is chosen independent of the communication identification. For such a combined identification only part of the identification, e.g. only the account number, may be modified, whereas the other part remains fixed. Preferably, the host locates information, such as the authentication items, used for verifying the authentication at least partially based on the variable part of the identification. As an example, the host may locate the relevant information for verifying a message in dependence on a bank account number. Instead of using the real bank account number as the identification (and exchanging the real bank account number), a virtual bank account number is used. The station and the host are initially loaded with the same virtual account number. The host also knows how to associate (map) the virtual number with the



real bank account number. Usually, the station also knows the real bank account number for local operations, such as display to the user, and preferably hides the virtual number from the user. The virtual number is exchanged and not the real number. Only in exceptional cases, e.g. when the synchronisation in updating the virtual number is lost between the host and the station, it may be required to re-synchronise to a new virtual number using the real number for once as an identification. Both the station and the host can alter the virtual number in the same way, keeping the real underlying bank account number fixed (i.e. only the mapping between a variable virtual number and a fixed real number is changed). In such a scenario, the virtual number acts as the identification according to the invention.

10 Particularly, for mobile stations, such as a PDA or a smart-card, with no fixed communication link to the host, it becomes practically impossible for a fraudulent party to collect messages related to a specific station or a specific application within the station, such as an application for financial transfers/information retrieval, downloading of software or playing of a network game, where each application uses an application-specific authentication

15 algorithm or set of authentication items. This allows the use of less authentication items or a simpler authentication algorithm. It further allows to detect fraudulent messages in an early stage. As an example, in a system where no more than 65,000 stations need to distinguished (implying that in principle a two-byte identification would be sufficient) a larger identification of, for instance, four of six bytes may be used, where the identification is

20 chosen dynamically. If a four-byte identification is used, the host can identify almost all received fraudulent messages as being fraudulent simply by checking the identification. Only for in average 1 out of 65,000 fraudulent messages the authentication of the message (which typically involves more processing) needs to be checked. This makes the system suitable for use in environments, such as Internet, where brute-force attacks by generating many different

25 fraudulent messages may occur. Preferably, the response time of the host is similar regardless of the station identification being valid or not, ensuring that fraudulent parties can not distinguish between valid and invalid station identifications. Advantageously, the alteration means alters the station identification at least partly based on a message and/or a time-stamp. In this way it becomes even more important for a fraudulent party to intercept

30 and record all messages in order to be able to determine the current station identification.

The measure as defined in the dependent claim 7 has the advantage that in a simple way it can be ensured that messages, even the same messages, are with a high likelihood authenticated differently. Furthermore, it limits the possibilities of a fraudulent party, including the legitimate owner or designer of the station, to generate known messages

and from the corresponding authenticated message derive the authentication items of the station.

The measure as defined in the dependent claim 8 has the advantage that the host independently generates the same additional data, providing a further check of the authenticity of the message.

The measure as defined in the dependent claim 9 has the advantage that by incorporating the additional data into the message, for instance by mixing the additional data with the message, and authenticating the resulting message, the host only needs to verify the resulting message as before and can then discard the additional data, without being able to generate the additional data. Advantageously, each station generates the additional data in a manner unique for the station.

The measure as defined in the dependent claim 10 has the advantage that by using a state variable, such as a feedback state for a random number generator, the construction means can autonomously select different parts of the authentication items for a large sequence of messages. Preferably any periodicity in the selection is sufficiently large in view of the application. By ensuring that the selection also depends on the authentication items (for instance on a subset of the authentication items), which have been generated independent of the construction means, a correlation which might occur in successive selections can be reduced. As an example, the control vector could be one authentication item which is XOR-ed over the basic output, such as a random number, of the construction means. The control vector itself may be each time randomly selected from the set of authentication items.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments shown in the drawings.

Fig. 1 shows a block diagram of a system according to the invention, Fig 2 shows a flow-chart of a possible operation in the station 102, and Fig. 3 shows a flow diagram of a basic operation which can be used in steps of Fig. 2.

Fig. 1 shows a block diagram of a system according to the invention. The authentication system comprises a host 100 and at least one station. As an example two stations 102 and 104 are shown. Further details of the stations will be given with reference to station 102 only. Typically, the host 100 is implemented on a computer suitable for acting as

a server. The station may be implemented on, for instance, a Personal Computer (PC), a Personal Digital Assistant (PDA) or a hand-held PC (HPC). In an exemplary application, a user instructs a bank to perform a financial transaction. The user enters the instruction in his station. The station generates a corresponding message, authenticates the message and  
5 transfers the message to the host computer at the bank. The host checks the authentication and, if valid, proceeds with processing the instruction. The authentication serves various well-known purposes, such as reducing the chance of a third party, pretending to be another party, transmitting a message on behalf of the other party (the third party may have generated the fraudulent message or may be a re-transmitting an intercepted message which  
10 has been validly transmitted by the original party) and reducing the chance of the original party repudiating the message. The system may also be used for various other forms of electronic communication, such as for authenticating electronic mail, the exchange of electronic documents (such as an HTML document) or program modules (such as Java applets), or the communication between software objects located in different computers. If  
15 the receiving party can trust the sending party, the authentication ensures that the receiving party can safely use the received digital data, without having any risk of, for instance, having received virus-infected data or data which may adversely effect the local station (e.g. by discarding locally stored data). Particularly in situations where stations do not share prior knowledge and wish to safely communicate, the communication preferably takes place via a  
20 trusted party. With respect to the sending station the trusted party acts like a host according to the invention and the sending station acts like a station according to the invention. With respect to the receiving station the trusted party acts like a station according to the invention and the receiving station acts like a host according to the invention. The trusted party relays a message received from a sending station to a receiving station if the trusted party has  
25 successfully verified the authenticity of the received message, using a verification procedure matching the authentication procedure of the sending station. The trusted party authenticates the received message, using a procedure agreed with the receiving station, before transmitting the message to the receiving station.

It will be understood that, particularly for mobile applications, the station  
30 102 may be split into, for instance, a user station and an access station. The access station establishes the communication with the host 100 and may, for instance, be fixedly located in a shop, a petrol station or integrated with an automatic teller machine of a bank. The access station may also be located at the premises of the user and, for instance, be integrated with a personal computer or audio/video set-top box. The user station ensures a station-specific

authentication. The user station may, for instance, be formed by a PDA communicating via IrDA to another PDA or personal computer acting as an access station. As another example, the user station may be formed by a smart-card, where the access station includes a smart-card reader.

5           The station 102 and the host computer 100 can communicate digitally. To this end, the station comprises communication means 110 for digitally communicating with the host 100. Similarly, the host 100 comprises communication means 112 for digital communication with the station. Usually, the communication will take place using telecommunication, either wired or wireless. The communication means 110 and 112 may be  
10 formed by a conventional modem, operated under control of the processor of the station or, respectively, the host. The communication may also be based on local communication, such as a Local Area Network (LAN), infra-red communication or local RF communication, such as for instance used in walkie-talkies. Conventional hardware/software, such as a LAN interface and driver software, may be used for implementing locally operating  
15 communication means 110 and 112.

          Using the communication facilities, digital data can be exchanged between the station and the host. Typically, the exchange is bi-directional. In certain simple systems, it may be sufficient if communication is only possible from the station to the host. The station 102 comprises a memory 114 for electronically storing a station identification, which  
20 uniquely identifies the station to the host. The identification may take several forms. For instance the identification may be an identification at communication level, such as a communication address or a telephone number. The identification may also take the form of an account number, which may also be used in combination with a communication identification. For each communication session, the identification of the station 102 is  
25 transferred to the host 100, allowing the host 100 to correlate data exchanged during the session to the identified station 102. It will be appreciated that in certain circumstances, such as where the station is fixedly connected to the host, the identification may be implicit (e.g. which port the station is connected to).

          The station 102 comprises authentication means 116 for authenticating a  
30 message. As described above, the message may, for instance, be a digital representation of a user generated message, including an instruction to a bank, but may also be computer data or computer code, such as a Java applet, or messages generated by computers (e.g. for playing a multi-user game on several computers). The authentication is based upon an authentication algorithm. In principle the authentication algorithm may be chosen to suit the security

requirements of the application. Many techniques for authenticating a message are known. One way is to use a symmetrical encryption algorithm like DES, where the station and the host share the same private key. The station encrypts the message using the key and transmits the encrypted message to the host, along with the station identification. The host  
5 uses the station identification to retrieve the key corresponding to the station and uses this key to decrypt the message. Various schemes, such as encryption feedback, message counters or time-stamps, may be used to ensure that the same message is authenticated differently, eliminating the possibility of intercepting and re-transmitting the same message, which then would be accepted again as a valid message by the host. In situations where it is preferred  
10 that the entire message (or part of it) is readable, the message may be transmitted in addition to the encrypted message. In such a case, the host can also verify the authenticity of the received data by encrypting the received plain message and comparing it to the received encrypted message. To reduce the length of the data to be transmitted, the authentication part may also be smaller. It is well-known that this can be achieved by using a one-way hash  
15 function and encrypting the resulting hash value. The algorithm itself may simple and based on basic techniques, like confusion and diffusion. Using a confusion technique, such as substitution, the relationship between the plain text and the cipher text is obscured. For high security applications, it may be preferred to use a substitution scheme which operates on blocks of more than one letter. Using a diffusion technique, such as a transposition (also  
20 called permutation), the redundancy of the plain text is spread out over the cipher text. It is preferred that linear operations are used in combination with at least one non-linear operation. Whatever authentication algorithm is used, for the system according to the invention it is assumed that the algorithm is used under control of a so-called authentication control element. For an authentication algorithm using DES, this could be the private key.  
25 For an authentication algorithm based on substitution this may be (part of) a substitution table. For an authentication algorithm based on a permutation this may be (part of) a permutation matrix. In general, using a different authentication control element will with a high likelihood cause the authentication algorithm to authenticate a same message differently. For most algorithms it will hold that if the same authentication control element is used, the  
30 same messages will be authenticated in the same way. However, some authentication algorithms may have measures, such as an internal feedback, ensuring that this is not the case. For such algorithms, the authentication control element can, for instance, play the role of an initial seed, where the algorithm is (at least partly) reset each time a new authentication control element is provided, or the authentication control element may act as a supplementary

control vector, which is, for instance, combined with the internal state variable or to the output of the algorithm. The combination may, for instance, take the form of an XOR operation or an operation in  $GF(2^8)$  for byte-oriented algorithms. Depending on the algorithm, the authentication control element may be regarded as data or more as an operation.

According to the invention, the station 102 electronically stores a plurality of authentication items in a memory 118. It will be appreciated that the memories 114 and 118 may be combined. The station further comprises constructing means 120 for constructing the authentication control element. The construction means 120 derives the authentication control element from a small part of the entire set of authentication items. This may be done in various ways, like randomly selecting some items or some bits of some items and using the selected parts directly or after a mixing operation as the authentication control element. For each message a corresponding authentication control element is constructed. The authentication items are independent of the authentication algorithm, and as a consequence also the authentication control element is independent of the authentication algorithm. In this way any correlation which might occur when the authentication algorithm were to be used for authenticating a sequence of messages under control of the same authentication control element is broken by the unrelated authentication control element. It will be understood that the size of a small part with respect to the entire set of authentication items has to be determined in view of the requirements of the application in which the system is used and in view of further improvements as described below for further embodiments. In systems where the set of authentication items is highly static, a small part may correspond to a few percent or less of the entire set. In a system where the set is highly dynamic (i.e. regularly updated), a small part may be over 50% of the current set of authentication items, where the selected part is small compared to the superset of authentication items formed by the current authentication items and future changed authentication items. Such a higher percentage can particularly be used if the influence of an update of authentication items is spread over substantially all authentication items of an involved set of authentication items. Preferably, the authentication items have been generated randomly or selected randomly from a very large set of suitable authentication items. For instance, for a system used for financial transactions the authentication items may be generated in a secure manner using a high quality (real-)random sequence generator located at secure premises of a bank. The authentication items are loaded into the memory 118 of the station 102. The host 100 electronically stores a copy of the authentication items of the station in a memory 122. It will

be appreciated that, depending on the authentication algorithm, the authentication item may be a data element, such as a bit or a byte, or an operation, such as a byte-wise XOR or a GF(2<sup>8</sup>) multiplication.

5 The authentication control element in practical circumstances causes the authentication algorithm with a high likelihood to authenticate the corresponding message uniquely. For high demanding systems, preferably each authentication control element is derived from at least one authentication item which has not been used before. Such a new authentication item may be combined with (e.g. mixed in with) authentication items which have been used before. In less demanding systems, a same selection of authentication items  
10 may be used a number of times for constructing an authentication control element. The construction means 120 should be such that even then the authentication control elements are different.

The host 100 comprises verification means 124 for verifying the authenticity of the received message. The verification means 124 checks the received  
15 message with an authentication algorithm which corresponds to the algorithm used by the station which send the message. The algorithm may be the same for all stations. If more than one algorithm is used, the host can locate the algorithm based on the received station identification. To this end, the station identification may be stored in a memory 128 of the host. It will be appreciated that the host may perform the verification by using the same  
20 authentication algorithm as used by the station to generate an authentication from the message and checks whether this matches the received authentication. For certain algorithms, the host may need to use an inverse algorithm of the algorithm used by the station. The host 100 comprises constructing means 126 for constructing for each received authenticated message an authentication control element from the authentication items for the identified station in a  
25 same manner as the station identified for the message.

In a further embodiment, the authentication algorithm authenticates each message in a manner unique for the station. This may be achieved by making the message authentication dependent on the station identification, which is unique for the station. Such a dependency may be obtained by deriving a key of the authentication algorithm or the  
30 authentication control element (partly) from the station identification.

Preferably, the authentication is made unique for the station by using authentication items which are unique for the station. The host 100 associates the copy of the authentication items of the station with the station, for instance, by combining the memories 122 and 128 and storing the station identification together with the authentication items. The

construction means 126 of the host uses the received station identification to locate a matching station identification in memory 128 and via the matching identification locate the authentication items in memory 122 corresponding to the station.

In a further embodiment, the station 102 comprises modification means 5 130 for modifying at least one of the authentication items after the authenticating means has authenticated a message. The host comprises modification means 132 for modifying at least one of the authentication items for the station in the same way as the modification means 130 of the station. Preferably, the station 102 effectuates the modification after the station has received a confirmation from the host 100 that the host has successfully received the message 10 and verified the authentication of the message. It is preferred that any confirmation message is also authenticated in a manner similar to a message transferred from the station to the host. The modification means 132 performs the modification if the verification means 124 has successfully verified an authenticated message received from the station. Also, additional transaction and roll-back mechanisms as used for distributed databases may be used to ensure 15 that the station 102 and the host 100 remain synchronised. The modification may take place in any suitable form. One way would be to combine a selection of other authentication items to one new authentication item and to replace an existing authentication item with the new item. Preferably, the modification means 130, 132 is operative to modify an authentication item at least partly based on an event independent of the authentication items.

20 Advantageously, the modification is based on the content of one or more of the preceding messages. As an alternative or in combination, the modification may also be based on a time-stamp of one or more of the preceding messages. If a time-stamp is used, the time-stamp is also transferred to the host 100. The host 100 and the station 102 may also share an algorithm for generating or collecting the same random data elements, where information 25 exchanged between the station 102 and the host 100 determines which of the random data elements is used for generating the new authentication item.

In a further embodiment, the station 102 comprises alteration means 134 for altering the station identification after the authenticating means 116 has authenticated a message. The host 100 comprises alteration means 136 for altering the station identification 30 for the station in the same way as the station after the verification means 124 has successfully verified a received authenticated message. Preferably, as described for generating the authentication control element, the altering is performed under control of a set of authentication items, which are independent of the altering algorithm. For instance, a selection of the authentication items may be 'mixed-in' with the station identification to



obtain a new station identification. Preferably, a separate set of authentication items is used for generating the station identifications. Similarly as described for the modification means 130, the alteration means 134, 136 may alter the station identification at least partly based on a message and/or a time-stamp. This may, for instance, be achieved by modifying the set of authentication items used for generating the station identifications. The identification associated with the station may be a communication identification, such as a communication address or a telephone number, which is also used for the communication hardware/software to transfer messages between the desired devices. Preferably, the identification is a higher level identification, which is independent of the communication identification. An example of such a higher level identification is a bank account number. Both types of identification may also be used in combination. For such a combination, the communication identification may be kept the same whereas the higher level identification may be altered. If an identification, such as a virtual bank account number representing a real bank account number, is changed the underlying item (e.g. the real bank account number) is preferably kept the same, implying that in the host only the mapping of the representation (virtual number) to the actual underlying item is changed. Particularly, if the station interfaces to the user using the real underlying item, also the mapping in the station is updated. In some systems it may not be required that the station is aware of the real underlying item. It will be appreciated that a station (and as a consequence also the host) may have several different identifications, e.g. several bank account numbers, associated with the station, where each identification corresponds to its own unique set of authentication items. In order to exchange messages with several hosts, preferably the station has several identifications (at least one for each host) with corresponding set of authentication items.

In a further embodiment, the station 102 comprises data generation means 138 for generating additional data. The authentication means 116 is operative to authenticate a message in dependence on the additional data. The generated additional data is such that in practical circumstances with a high likelihood the additional data is different for each message. The additional data may be used in various ways. One way is to use the additional data in a manner 'invisible' to the outside world, except to the host 100. This can, for instance, be achieved, by first concatenating the original message and the additional data. Next, the authentication of the message with the additional data is determined, followed by removing the additional data before transferring the authenticated message (i.e. the original message plus the authentication for both the original message and the additional data) to the host 100. In this scenario, the host 100 also comprises data generation means 140 for

generating additional data for a received authenticated message in a same manner as the identified station. The verification means 124 is operative to verify the authenticity of the received authenticated message in dependence on the additional data. The verification may be done similar to the authentication by first adding the additional data before checking the authentication. If the use of additional data is optional, it is preferred that the station 102 informs the host 100 whether the option is used for a message or not. This can be achieved by using an additional field, of for instance only one bit, in the message.

As an alternative to using the 'invisible' additional data, the authentication means 116 may also incorporate the additional data into the message before authenticating the message. In this scenario the additional data is not removed from the message by the station 102. The additional data may be simply concatenated to or may be mixed in with the original message. The verification means 124 verifies the authentication of the entire message (original message plus the additional data). For the purpose of verification, the entire message can be regarded as the message. After the verification, the additional data is removed and the original message is passed on for further processing. The removal may be straightforward, particularly if the additional data is simply concatenated. For a more complex mix operation, the host 100 may need to perform a same mixing operation as the station in order to be able to determine at which positions in the message the data elements of the additional data are located or an inverse mixing operation to be able to remove the additional data from the message.

It will be appreciated that also a combination of using 'visible' and 'invisible' additional data can be advantageously used. In such a combination, for instance, the station 102 and the host 100 share some information A. The station 102 generates an additional part B and uses both parts A and B to generate additional data. The authentication is based on the entire additional data. The station 102 transfers in combination with the message the additional data as well as the additional part B to the host 100. The host 100 generates in the same way the additional data using the received part B and the part A, which was already stored in the host 100. The host 100 checks whether the generated additional data matches the received additional data. If so, the authenticity of the data is checked further. Particularly if the additional data and the parts A and B are relatively small compared to the message, this provides an effective filter for the host 100 for fraudulent messages without requiring a full verification of the entire message.

In a further embodiment, the construction means 120 and 126 comprise at least one state variable which influences the construction of the authentication control

element. The construction means 120 and 126 update the state variable at least each time a message has been authenticated. The use of a state variable allows the construction means to autonomously select different parts of the authentication items for a large sequence of messages. The construction means may, for instance, be based on a (pseudo-)random  
5 sequence generator, where the state variable corresponds to a feedback state of the generator. Preferably, any periodicity in the sequence is sufficiently large in view of the application. For instance, the periodicity is larger than the expected number of messages authenticated by the station 102. The state variable may also be a pointer to an authentication item (in the set of authentication items), which has been last used for generating the authentication control  
10 element. If more than one authentication items is used for constructing the authentication control element, a separate state variable may be used for all of them. The construction means 120 and 126 construct the authentication control element under control of a control vector. The control vector may directly influence the operation of the construction means 120, 126, or, alternatively, may influence the output of the construction means 120,126 in a  
15 different manner, for instance by XOR-ing the control vector over the basic output (e.g. random number) of the construction means 120,126. The control vector is derived from a selection of the authentication items, for instance by 'randomly' selecting an authentication item from a given set of authentication items and using the selected item as the control vector. Preferably a separate set of authentication items are used for forming the control  
20 vector. Like described earlier, these authentication items may also be modified.

Fig. 2 shows a flow-chart of a possible operation in the station 102. In step 200, the station collects information regarding the identification of the user of the station, such as a user name and password, or a fingerprint. In step 202 the identification is checked. If not accepted, the previous steps are repeated one or more times, if required with  
25 a time delay and a limit on the number of retries. (Preferably, the station 102 reports a failed attempt when the legitimate owner successfully gains access). If accepted, in step 204 information is collected from the user based on which a message is compiled. Next, in step 206 it is checked whether additional data is required. If so, in step 208 the additional data is generated and added (for instance appended) in step 210 to the message. In step 212 it is  
30 checked whether the message needs to be scrambled. If so, the scrambling occurs in step 213. The scrambling may be restricted to the original message generated at step 204 or may cover the entire message created at step 210. In step 214 the authentication for the message is generated and added to the message (e.g. appended) in step 216. In step 218 it is checked whether the option of dynamically changing the station identification is used. If so, in step

220 a new station identification is created. In both cases, in step 222 the station identification is added (e.g. prefixed) to the message. In step 224, one or more of the authentication items are changed. Preferably, authentication items which have been involved in any of the preceding steps are modified. Finally, in step 226 the message is sent to the host 100. Steps  
5 may be added to ensure that the host 100 and the station 102 stay synchronised (i.e. that authentication items and shared state variables are updated synchronously). In the exceptional case that the synchronisation in updating the virtual number used as the station identification is lost between the host and the station, it may be required to re-synchronise to a new virtual number by once using the real number as an identification. It will be appreciated that a  
10 similar corresponding flow-chart can be used to describe the activities of the host 100.

Fig. 3 shows a flow diagram of a basic operation which can be used in various steps of Fig. 2. The core operation is performed in block 300, where a (pseudo-)random number is generated. In block 302 a seed for the generator is selected from a first set of authentication items. A correlation which might occur in the sequence of generated  
15 numbers is broken by using a feedback and combining in block 304 the feedback with at least one authentication item. The combination may simply be an XOR operation. The authentication item is selected in block 306 from a second set of authentication items. It will be appreciated that the combination may also be in the output path 308 of the generator 304 instead of in the feedback path. The sets of authentication items may, for instance, consist of  
20 100 authentication items each. The actual number is preferably chosen to optimally suit the need of the application. The selection performed in blocks 302 and 306 may be straightforward, like each time selecting a next one of the authentication items. Using such a scheme, preferably the first authentication items have been changed, by the time all authentication items have been used. The basic operation of Fig. 3 may be used directly to  
25 generate the additional data of step 208 or the new station identification of step 220 in Fig. 2. For the scrambling of step 214, the random numbers can be used as entries in a substitution matrix. For instance, assuming that the data elements of a message are bytes, a substitution table may be used with 256 entries each with a byte value, where each byte value specifies a substitution value for a data element with a value matching the entry  
30 number in the table. Alternatively, the substitution byte may be selected based on the position of the byte in the original message, if desired, in combination with the value of the byte in the original message. As an example, a pointer which (logically) points to an element in the substitution matrix is loaded with an initial offset. This offset may be selected using the basic operation of Fig. 3. The value of the first byte of the message is combined with the

pointer value (e.g. added to it). The value of the element in the substitution matrix to which the pointer points at that moment is chosen as the substitution value. For the next byte of the message, similarly the value of the next byte of the message is combined with the then valid pointer value, etc.. The pointer may be one-dimensional, where the substitution matrix is

5 logically arranged as a sequence where each row follows the previous row to form a long row (alternatively the columns may be logically concatenated). Such arrangement usually matches the physical arrangement for storing a matrix in a memory. Using a suitable modulo operation the pointer can be kept within the desired range of, in the example, 256 matrix elements. It will be appreciated that instead of a one dimensional pointer also a separate row

10 and column index may be used. Instead of using the pointer or index value directly for selecting the substitution element, the value may also be fed through a randomiser, such as a random sequence generator, whose output is used as a pointer into the substitution table. In these examples it is assumed that the output of the generation 300 is a byte value. If not, a conversion may be required. The random numbers may also be used to create a permutation

15 matrix for permuting the positions of data elements in the message. The basic operation can also be used for changing an authentication item in step 224. Since the changing, preferably, also depends on an external event, additional information, such as a message, and/or a time-stamp and/or a message counter, is fed into the random number generator 300. The output of the generator 300 may directly replace a constituent element (e.g. a value) of an

20 authentication item.

For generating the authentication in step 214 of Fig. 2, a similar routine as described for the substitution may be used. In such a routine, in one round one data element (one signature element) is selected from a matrix (or long row) with data elements. Preferably, the initial data elements of the matrix have been generated randomly, where the

25 data elements are refreshed by using the output of basic operation of Fig. 3 as a new data element (preferably in combination with a historical influence, such as the content of a previous message or a time-stamp, as described before). Alternatively, the output of the basic operation may be used to randomly shuffle the data elements of the matrix. A pointer which (logically) points to an element in the matrix is loaded with an initial offset. This offset may

30 be selected using the basic operation of Fig. 3, which is preferably used under control of different sets of authentication items as used for generating the elements of the matrix. The value of the first byte of the message is combined with the pointer value (e.g. added to it). Next, the value of the next byte of the message is combined with the then valid pointer value, etc.. When all bytes of the message have been processed, the value of the element in

the matrix to which the pointer points at that moment is chosen as the signature value. The security can be improved by repeating the routine to generate further signature values. Preferably, for each successive round of generating a signature value a different initial offset value is chosen. Alternatively, a subsequent rounds continues using the last obtained pointer  
5 value of the previous as the starting value for the new round.

It will be appreciated that, although the description focuses on the communication from the station 102 to the host 100, the same authentication items can also be used for communication from the host 100 to the station 102.

CLAIMS

1. An authentication system comprising at least one station and a host;  
the station comprising authentication means for, based upon an authentication algorithm, authenticating a message; and communication means for sending the authenticated message to the host;
- 5 the host comprising communication means for receiving an authenticated message; and verification means for verifying the authenticity of the received message by checking the received message with an authentication algorithm corresponding to a station which sent the message;  
characterised in that:
- 10 the station comprises a memory for electronically storing a plurality of authentication items;  
the host comprises a memory for electronically storing the authentication items of the station in association with an identification of the station;  
the station comprises constructing means for constructing for each message a  
15 corresponding authentication control element; the constructing means being operable to select for the message a part of the plurality of authentication items and to construct the authentication control element from the selected part, where the authentication control element in practical circumstances causes the authentication algorithm to substantially authenticate the corresponding message uniquely; and
- 20 the host comprises constructing means for constructing for each received authenticated message an authentication control element from the authentication items associated with a station which sent the message; the construction being the same as performed by the associated station.
2. A system as claimed in claim 1, characterised in that the station comprises  
25 a further memory for electronically storing an identification uniquely identifying the station with respect to the host; the authentication means is operative to authenticate the message in dependence on the identification; and the verification means is operative to verify the authenticity of the received message in dependence on an identification of the station which sent the message.

3. A system as claimed in claim 1, characterised in that the authentication items are unique for the station; the station comprises a further memory for electronically storing an identification uniquely identifying the station with respect to the host; the communication means of the station being operative to send the identification to the host in association with an authenticated message; and the host comprises means for locating the authentication items of a station in dependence on an identification received in association with an authenticated message.

4. A system as claimed in claim 1, characterised in that the station comprises modification means for modifying at least one of the authentication items after the authenticating means has authenticated a message and in that the host comprises modification means for modifying at least one of the authentication items for the station in the same way as the station after the verification means has successfully verified an authenticated message received from the station.

5. A system as claimed in claim 4, characterised in that the modification means is operative to modify an authentication item at least partly based on an event independent of the authentication items.

6. A system as claimed in claim 2 or 3, characterised in that the station comprises alteration means for altering the identification associated with the station after the authenticating means has authenticated a message and in that the host comprises alteration means for altering the identification associated with the station in the same way as the station after the verification means has successfully verified a received authenticated message.

7. A system as claimed in claim 1, characterised in that the authentication means comprises data generation means for generating additional data and in that the authentication means is operative to authenticate a message in dependence on the additional data; the additional data in practical circumstances with a high likelihood being different for each message.

8. A system as claimed in claim 7, characterised in that the verification means comprises data generation means for generating additional data for a received authenticated message in a same manner as the identified station and in that the verification means is operative to verify the authenticity of the received authenticated message in dependence on the additional data.

9. A system as claimed in claim 7, characterised in that the authentication means is operative to incorporate the additional data into the message before authenticating the message; and in that the verification means is operative to remove the additional data



from a received authenticated message after having successfully verified the authentication of the message.

10. A system as claimed in claim 1, characterised in that:

the construction means comprises at least one state variable influencing the  
5 construction of the authentication control element;

the construction means is operative to update the state variable at least each time a message has been authenticated; and to construct the authentication control element under control of a control vector derived from a selection of the authentication items.

1/2

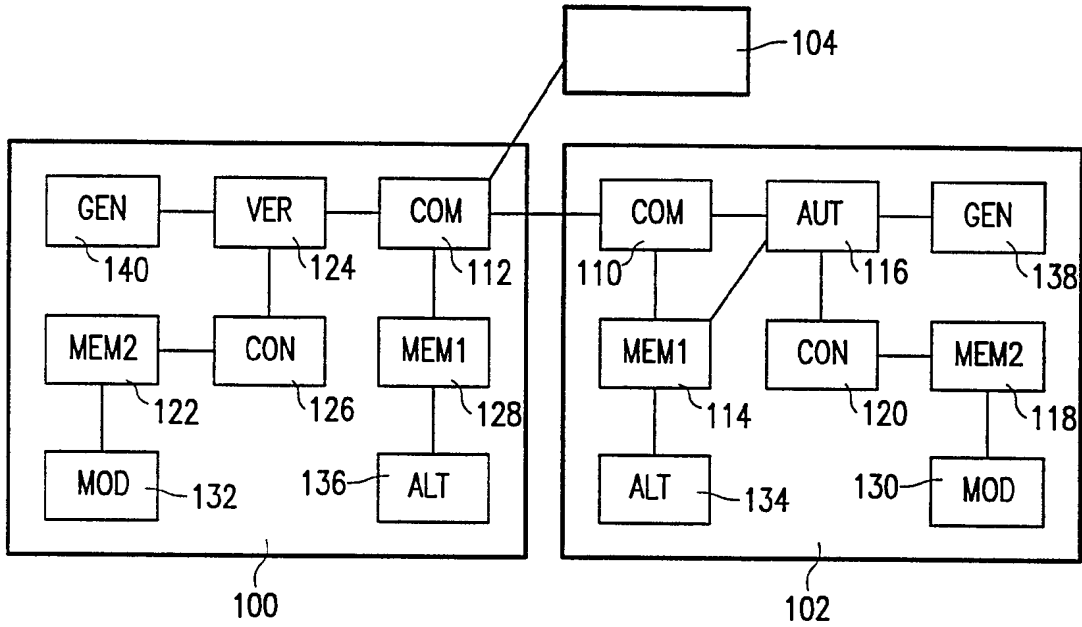


FIG. 1

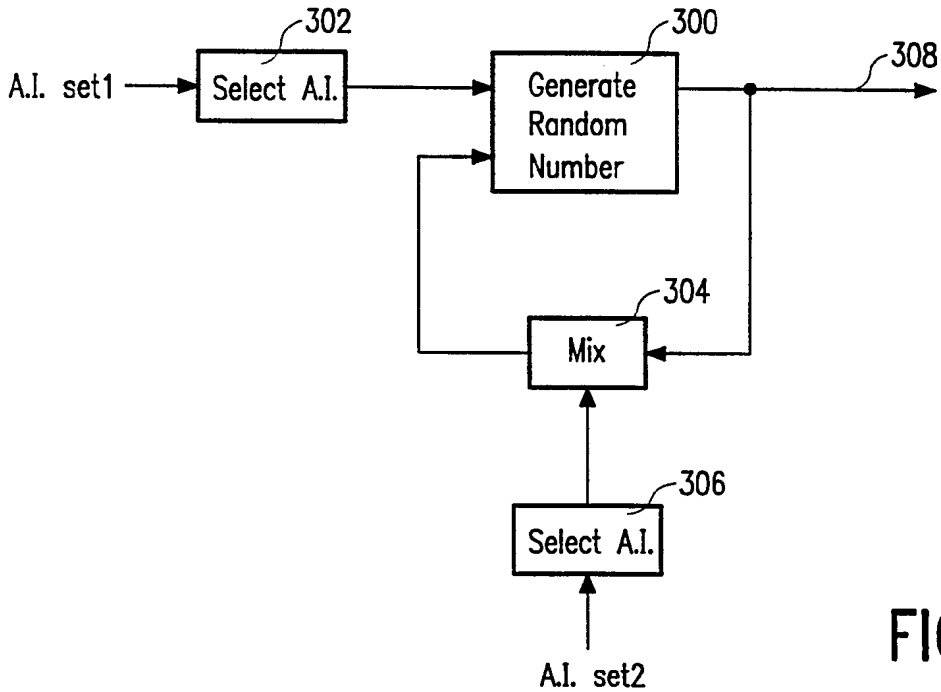


FIG. 3

2/2

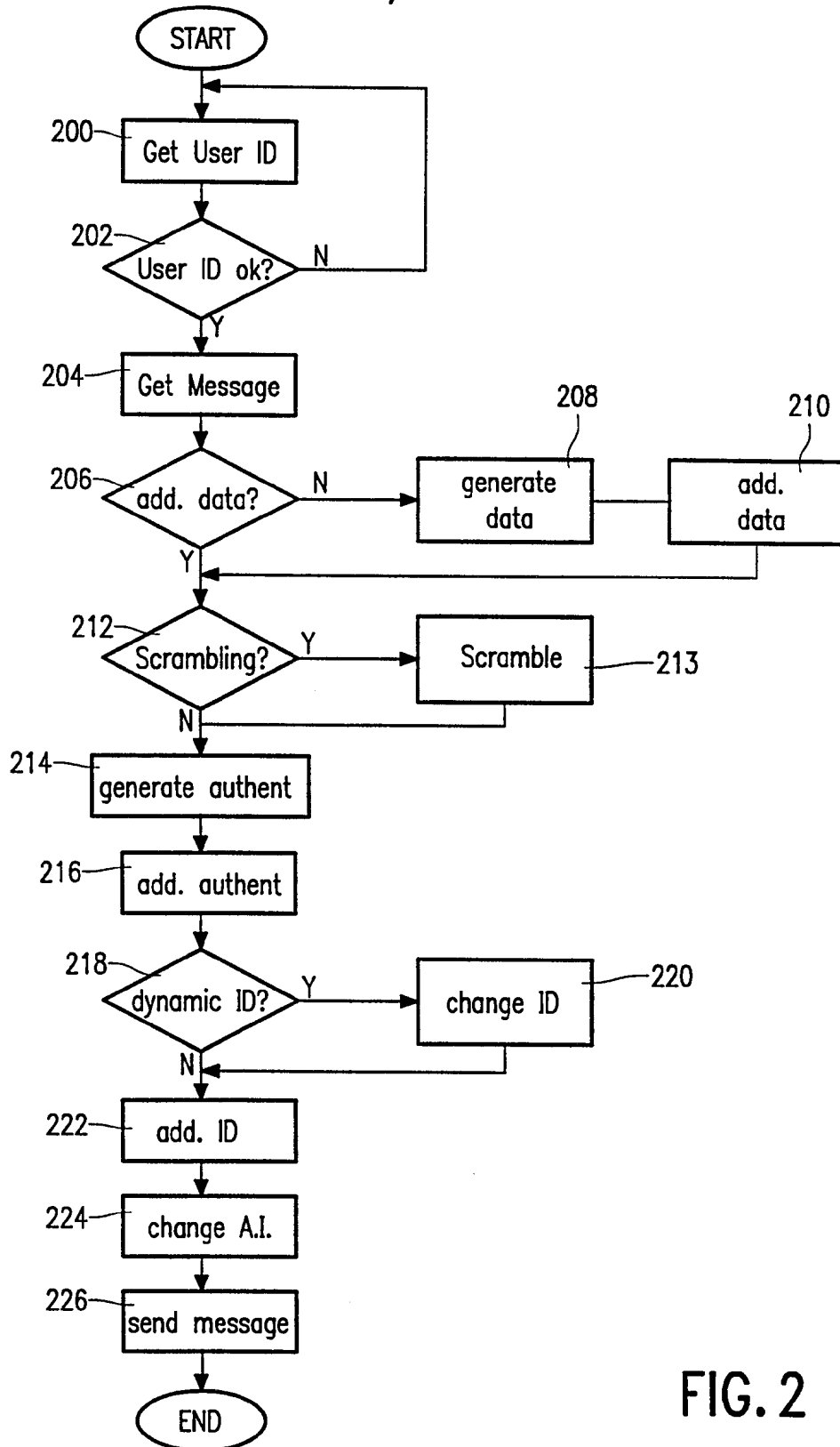


FIG. 2

**INTERNATIONAL SEARCH REPORT**

International application No.

**PCT/IB 98/00578**

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC6: G06F 12/14, G06F 1/00**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

**IPC6: G06F**

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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X	EP 0737907 A2 (SECURE COMPUTING CORPORATION), 16 October 1996 (16.10.96), column 6, line 44 - column 8, line 8  --	1
A	US 5615277 A (HOFFMAN), 25 March 1997 (25.03.97), column 6, line 52 - column 17, line 3  --	1-10
A	US 4677670 A (HENDERSON, JR.), 30 June 1987 (30.06.87), column 1, line 44 - column 12, line 15; column 3, line 25 - line 39  -- -----	1-10

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Date of the actual completion of the international search

**4 November 1998**

Date of mailing of the international search report

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**INTERNATIONAL SEARCH REPORT**

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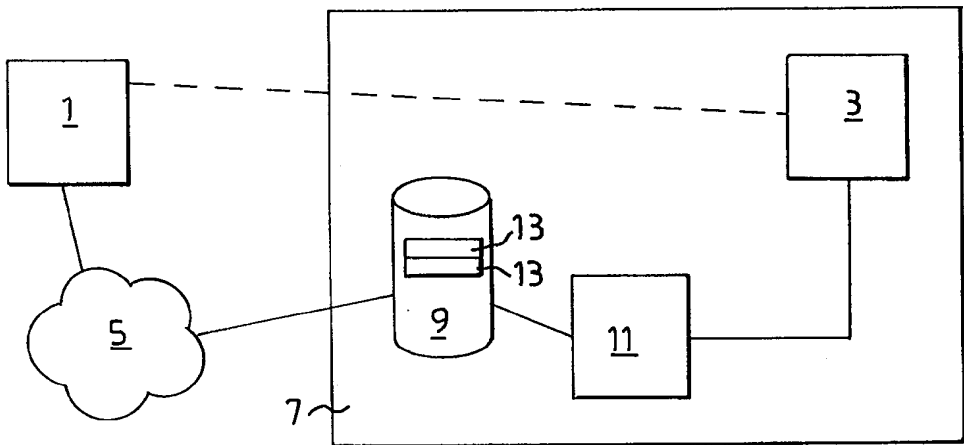
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US 4677670 A	30/06/87	NONE	
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>H04L 12/56, 29/02</b></p>	<p><b>A3</b></p>	<p>(11) International Publication Number: <b>WO 98/59470</b> (43) International Publication Date: 30 December 1998 (30.12.98)</p>
<p>(21) International Application Number: PCT/SE98/01217 (22) International Filing Date: 23 June 1998 (23.06.98) (30) Priority Data: 9702385-7 23 June 1997 (23.06.97) SE (71) Applicants (for all designated States except US): TELEFON-AKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE). TELIA AB [SE/SE]; S-123 86 Farsta (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): KANTER, Theo [NL/SE]; Rönninge skolväg 35E, S-144 62 Rönninge (SE). FOGELHOLM, Rabbe [SE/SE]; Turevägen 54 B, S-191 47 Sollentuna (SE). (74) Agents: HERBJØRNSSEN, Rut et al.; Albihns Patentbyrå Stockholm AB, P.O. Box 3137, S-103 62 Stockholm (SE).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> <p>(88) Date of publication of the international search report: 18 March 1999 (18.03.99)</p>	

(54) Title: METHOD AND APPARATUS TO ENABLE A FIRST SUBSCRIBER IN A LARGER NETWORK TO RETRIEVE THE ADDRESS OF A SECOND SUBSCRIBER IN A VIRTUAL PRIVATE NETWORK



(57) Abstract

The present invention relates to an apparatus and a method for use in a virtual private network, VPN, (7, 7'), or a network domain forming part of a larger network, such as the Internet, to enable a first subscriber (1; 1') in the larger network to retrieve the address of a second subscriber (3; 3') in the VPN. The address may be returned to the first subscriber (1; 1') or a connection means (11) may set up the connection between the subscribers (1, 3; 1', 3') automatically.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/01217

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: H04L 12/56, H04L 29/02 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: H04L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	IETF RFC 883, Volume, November 1983, P. Mockapetris, "DOMAIN NAMES - IMPLEMENTATION and SPECIFICATION" page 23	1-3,7-12
A	IETF RFC 1383, Volume, December 1992, C. Huitema, "An Experiment in DNS Based IP Routing", paragraph 2	1-12
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

01/12/98

International application No.

PCT/SE 98/01217

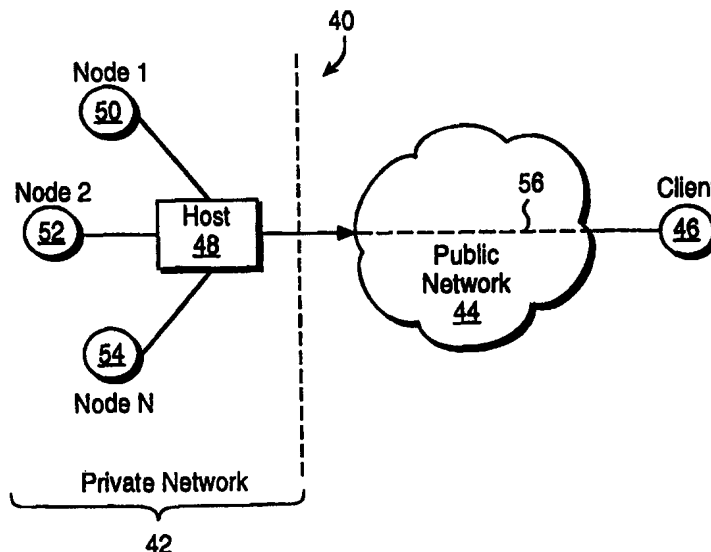
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>G06F 13/00, H04L 9/30</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 99/38081</b> (43) International Publication Date: 29 July 1999 (29.07.99)</p>
<p>(21) International Application Number: PCT/US99/01583 (22) International Filing Date: 26 January 1999 (26.01.99) (30) Priority Data: 09/013,122 26 January 1998 (26.01.98) US (71) Applicant: ASCEND COMMUNICATIONS, INC. [US/US]; One Ascend Plaza, 1701 Harbor Bay Parkway, Alameda, CA 94502 (US). (72) Inventors: PAULSEN, Gaige, B.; 513 Springvale Road, Great Falls, VA 22066 (US). WALKER, Amanda; 2230 Cedar Cove Court, Reston, VA 20191 (US). (74) Agent: LOHSE, Timothy, W.; Gray Cary Ware &amp; Freidenrich, 400 Hamilton Avenue, Palo Alto, CA 94301 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: VIRTUAL PRIVATE NETWORK SYSTEM AND METHOD



(57) Abstract

A system and method for remote users to access a private network (42) having a first communications protocol via a public network (44), such as any TCP/IP network having a second different communications protocol, in a secure manner so that the remote user appears to be connected directly to the private network (42) and appears to be a node on that private network (42). A host (48) connected to the private network (42) may execute a host software application which establishes and provides a communications path for secure access of the remote client computer (46). An encrypted data stream may be communicated between the host (48) and the client (46) representing traffic and commands on the network.

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VIRTUAL PRIVATE NETWORK SYSTEM AND METHODBackground of the Invention

This invention relates generally to apparatus and methods for accessing computer networks and in particular to establishing a secure connection between a remote computer and a private computer network using a public computer network.

In the past, organizations and companies have used private (internal) computer data networks to connect its users to each other. These private networks are not accessible to the public and permit sensitive data to be transferred between users within the company. However, due to the increasing numbers of people who need access to the private computer data network and the disparate locations of these people, there are several disadvantages of these conventional private computer networks.

As the number of people in a company grows, the workforce becomes more dispersed among different locations and there are more employees who are mobile, such as salespeople who travel around a region of the United States. For example, some employees may telecommute which requires dial-up access to the private computer data network. The dispersed workforce and the mobile workforce make a private computer data network unmanageable because this mobility requires at least two network connections for each user. In addition, since cellular telephone access has also become more available, additional connections to the network for this access is needed. In addition, full-time telecommuters dramatically increase the number of permanent "remote offices" a company must interconnect which further complicates

the private computer data network administration and topology. In addition, as companies increase in size, due to acquisitions, mergers and expansion, the private computer data network must support more remote offices and more network nodes. Thus, as a organization expands, the private computer data network of the organization becomes unwieldy and unmanageable.

Recently, it has become necessary and desirable to permit employees of the company to interact "on-line" with customers and suppliers. This function adds a new dimension of complexity to the private computer data network since multiple private computer data networks must be interfaced together in a delicate balance of integration while maintaining some isolation due to security concerns. The individual networks that are being integrated together typically use different data transfer protocols, different software applications, different data carriers and different network management systems. Thus, interfacing these private computer data networks is a major challenge.

There is also a desire to consolidate and simplify the user interface to the computer network as well as to the software applications being executed by the computer network since it is often difficult to keep on top of each new software application. Thus, the costs of implementing and maintaining a private computer data network is high and is expected to increase in the future as the factors set forth above continue to drive up the costs of the private computer data networks. These high costs are compounded by the high costs for long distance telephone charges for leased lines and switched services. The number of support staff necessary to manage the complex

topologies of these private computer data networks also further increases the costs to manage the private computer data networks. In addition, software applications which execute over the private network require separate backup equipment which further complicates the topology and increases the cost of the private computer data network. Thus, the costs and complexity of these private computer data networks are continuing to spiral upwards and there is no foreseeable end in sight.

A typical private computer data network may be used by a organization for some of its communications needs and may carry exclusively data traffic or a mix of voice/video and data traffic. The private computer data network may be constructed with a variety of wide area network (WAN) services that often use the public switched telephone network (PSTN) as a communications medium. A typical network may use high speed leased lines that carry voice, facsimile, video and data traffic between major facilities. These leased lines may include integrated services digital network (ISDN) lines or conventional T1 telephone lines. Because these leased lines are point-to-point connections, a mesh topology is necessary to interconnect multiple facilities. In addition, each leased line must be dedicated to a particular interconnection. A remote office may use switched services over the PSTN, such as ISDN or frame relay. For individual mobile employees, an analog modem may be the best solution for connection to the private computer data network. The private computer data network with all of these different connections, therefore, is very expensive to implement and maintain for the reasons set forth above.

A virtual private network (VPN), on the other hand, may offer the same capabilities as a private computer data network, but at a fraction of the cost. A virtual private network is a private data network that uses a public data network, instead of leased lines, to carry all of the traffic. The most accessible and less expensive public data network currently is the Internet which can be accessed worldwide with a computer and a modem. An Internet-based virtual private network (VPN) is virtual because although the Internet is freely accessible to the public, the Internet appears to the organization to be a dedicated private network. In order to accomplish this, the data traffic for the organization may be encrypted at the sender's end and then decrypted at the receiver's end so that other users of the public network can intercept the data traffic, but cannot read it due to the encryption.

A VPN can replace an existing private data network, supplement a private data network by helping relieve the load on the private data network, handle new software applications without disturbing the existing private data network or permit new locations to be easily added to the network. A typical VPN connects one or more private networks together through the Internet in which the network on each side of the Internet has a gateway and a leased line connecting the network to the Internet. In these typical VPNs, the same protocol for each private network, such as TCP/IP, is used which makes it easier to communicate data between the two networks. To create the VPN, a secure communications path between the two gateways is formed so that the two private networks may communicate with each other. In this configuration, however, each network is aware that the other network is at some other location and is



connected via a router. As an example, if a company has a central private network in California and a remote office in Hong Kong, these two private networks may be connected via the VPN which reduces long distance telephone call charges. However, if a single individual is traveling in Hong Kong and want to connect to the private network in California, the individual must incur long distance telephone charges or, if there is a remote office in Hong Kong, then the entire private network must be connected via the VPN to the California private network to communicate data. In addition, with the conventional VPN described, the individual in Hong Kong is aware that he is connected to the Hong Kong network which is in turn connected, via the gateway and the VPN, to the network in California so that the person in Hong Kong cannot, for example, easily use the network resources of the California network, such as a printer.

Thus, a conventional VPN requires the expense of a leased line and a gateway at each end of the VPN and cannot adequately address the needs of a individual who needs access to the private network. In addition, these conventional VPNs cannot easily connect networks which have different networking protocols. In addition, these conventional VPNs cannot be easily used for connecting an individual who needs remote access to the private network since the entire network with a gateway is needed.

Thus, the invention provides a virtual private network (VPN) which avoids these and other problems with conventional VPNs and it is to this end that the invention is directed.

### Summary of the Invention

In accordance with the invention, a virtual private network system is provided which connects a private data network and a remote client which does not require expensive leased lines or gateways to establish a secure communications path. The system also permits an individual to access the private data network without incurring any long distance telephone charges. In addition, the system permits a private data network and remote client that use one communications protocol to communicate with each other over a public data network that uses a different communications protocol. The system also permits an individual to easily connect to the private data network without a remote private network and the individual appears to be a node on the private network, once connected, so that the individual may access any resources on the private data network.

In accordance with the invention, a system and method for forming a communications path between a public access network and a private access network where the two networks have substantially incompatible transmission protocols is provided. The method comprises establishing a secure communications path over the public access network between a host computer connected to the private network and a remote client computer, encrypting data and commands of the host computer and the client computer, and formatting the encrypted data and commands into a format compatible for transmission over the public access network. The formatted data and commands are then transmitted over the public access network. Once the formatted data and commands has reached its destination, it is decrypted to establish the client

computer as a virtual node on the private network. In accordance with another aspect of the invention, a data structure for communicating data for a private data network having a first communications protocol over a public access network having a second communications protocol is provided.

### Brief Description of the Drawings

Figure 1 is a block diagram illustrating a conventional virtual private network;

Figure 2 is a block diagram illustrating a virtual private network in accordance with the invention;

Figure 3 is a block diagram illustrating more details of the host computer of Figure 1; and

Figure 4 is a flowchart illustrating a method for establishing a virtual private network and communicating secure data over the virtual private network in accordance with the invention.

### Detailed Description of a Preferred Embodiment

The invention is particularly applicable to a system and method for providing a virtual private network which permits remote users to access a private network, such as an AppleTalk network, via a public TCP/IP network, such as the Internet, in a secure manner as if the remote user was one of the nodes on that private network. It is in this

context that the invention will be described. It will be appreciated, however, that the system and method in accordance with the invention has greater utility. Before describing the invention, a brief description of a conventional virtual private network (VPN) will be provided.

Figure 1 is a block diagram illustrating a conventional virtual private network (VPN) 20. The VPN includes a first private network 22 and a second private network 24 connected together through a public computer network 26, such as the Internet. The communications protocols for the first and second private networks as well as the public network may be the standard Transmission Control Protocol/Internet Protocol (TCP/IP). Thus, the communications protocols for the private networks are the same as the public network. Each private network 22, 24 includes a gateway 28, 30 which interfaces between the respective private network and the public network. Each gateway encrypts data traffic from the private network which is going to enter the public network and decrypts encrypted data received from the public network. In normal operation, a secure communications path 32, referred to as a tunnel, is formed over the public network that connects the first and second private networks through the respective gateways. The combination of the two private networks and the tunnel over the public network forms the virtual private network (VPN). The VPN is virtual since it is actually using a public network for the connection, but due to the encryption both private networks believe that they have a private network over which data may be sent. For example, a node 34 of the first private network 22 may send data which is encrypted by the gateway 28 through the tunnel 32, and the data is received by the

second gateway 30 which decrypts the data and routes it to the appropriate node in the second private network. This conventional VPN, however, does not adequately provide an individual remote user with a system for remotely accessing the private network because the conventional VPN connects two networks with a tunnel and would require the individual to be connected to one of the private networks to utilize the VPN. In addition, this conventional VPN does not connect a remote individual directly to the private network so that a remote user with a VPN connection cannot directly access resources, such as a printer, connected to the private network. This conventional system also does not handle computer networks which have different communications protocols. Now, the virtual private network system in accordance with the invention will be described which overcomes these problems with a conventional VPN.

Figure 2 is a block diagram illustrating a virtual private network (VPN) 40 in accordance with the invention. The VPN may include a private network 42 which communicates data using a first communications protocol, a public network 44 which communicates data using a second communications protocol, and a client node 46 that is connected for secure communications to the private network 42 through the public network 44 as described below. The private network 42 may be any type of computer network, such as an AppleTalk network. The public network may be any type of publicly accessible computer network such as the Internet.

The private network 42 may include a host computer 48, and a plurality of network nodes, such as a first node (NODE\_1) 50, a second node (NODE\_2) 52, and

an nth node (NODE\_N) 54 which are all connected to the host computer. In normal operation any node of the private network may share resources with any other node on the network. For example, any node of the private network may share a printer which is attached to the private network. The host computer 48 establishes a secure communications path 56, referred to as a tunnel, through the public network 44 with the remote client 46 by negotiating the communications protocol with the client 46 and authenticating the identity of the client. Once the secure tunnel has been established between the private network 42 through the host computer 48 and the public network 44 with the remote client 46, the remote client is treated as a node of the private network and uses the communications protocol of the private network even though the public network uses a different protocol. Thus, the remote client 46 may access resources connected to the private network, such as a printer, as if the remote client were directly connected to the private network. Therefore, with the VPN in accordance with the invention, the various connections between the remote client and the private network are transparent to the user of the remote client since the user can use the private network in any manner that a user directly connected to the private network can.

With the VPN in accordance with the invention, a gateway at each end of the virtual private network is not required. In addition, data traffic for the private network which has a first data communications protocol may be communicated over a public computer network which has a different communications protocol. In particular, the system encapsulates the data destined for the private data network having a first

protocol in a data packet that may be sent over the public network, as described in more detail below. Thus, once the secure virtual private network connection has been established, the remote client may interact with the private network as if the remote client was directly connected to the private network. The virtual private network in accordance with the invention also permits an individual remote user to easily establish a connection with a distant private network without the need for a remote private network and a leased line or long distance telephone charges. Now, more details about the host computer 48 and the remote client 46 in accordance with the invention will be described.

Figure 3 illustrates more details of the host computer 48 and the remote client 46 in accordance with the invention. The host computer 48 may include a central processing unit (CPU) 60, a memory 62 and a host 64 stored in the memory 62. The host may be a software application which is executed by the CPU 60 of the host computer. When a remote client contacts the private network 42 to establish a secure connection, the host 64 may negotiate and establish the secure virtual connection to the remote client 46, as described below. Once the secure connection has been established, the host 64 accepts unencrypted data from the private network, combines the data with a header containing information about the protocol of the private data network, encrypts the data and the header, and communicates the encrypted data and header, over the secure communications path, to the remote client. The host also receives encrypted data with a header from the remote client, decrypts the data and the

header, and passes the data traffic onto the appropriate node in the private network based on the header information, as described below.

Similarly, at the remote client 46, a client software application 66 stored in a memory 68 in the client computer 46 is executed by a central processing unit (CPU) 70 in the client computer 46. The client 66 negotiates and establishes the secure communications path with the host computer, combines the data with an appropriate header, encrypt the data traffic and the header destined for the client computer, and communicate the encrypted data to the host computer. The client also receives encrypted data traffic from the host computer, decrypts it, and passes the data traffic onto other software application which are being executed by the CPU 70. Thus, the virtual private network in accordance with the invention is software application based so that expensive hardware, such as a gateway and leased lines, are not necessary. The software applications also permit the data between the client and host, which have a first communications protocol, to be communicated over a public computer network which has a second different communications protocol. Now, a method for establishing and communicating data traffic over the virtual private network in accordance with the invention will be described.

Figure 4 is a flowchart illustrating a method 100 for establishing and communicating data over the virtual private network in accordance with the invention.

An example of the phases and data formats for the communications between an AppleTalk network host and an AppleTalk remote client over the Internet will be described below, but the invention is not limited to that example and may be used to



communicate data between any hosts and remote clients having a different communications protocol than the public data network. To begin the method, the remote client may request a connection to the host by any conventional method.

In step 102, once the initial unsecure connection has been established between the host and the client, a protocol negotiation phase occurs in which the host and the client negotiate the parameters that will govern the subsequent communications between the host and the client. The negotiated parameters may include the protocol version, the compression level, and the encryption technique. Each of these parameters has a default setting that must be available for either the host or the remote client to request so that there is a minimum set of functionality which may be implemented. To ensure backwards compatibility of any host or remote client, each host or client will implement at least a first protocol version so that there is backwards compatibility for future versions. These parameters will be described in more detail below. In addition, for the encryption parameter, each host and remote client must be able to support both data encryption standard (DES) type encryption as well as some form of non-DES encryption to permit communications between hosts and clients that are licensed for use within the United States as well as outside of the United States. The invention may use a plurality of different well-known non-DES encryption methods and these encryption methods will not be described here. The protocol negotiation phase is started when the connection is established and is initiated by the remote client sending the host a Protocol Request in which it communicates which protocol version it would like to use and any options, such as the encryption, that it would like to use. The host

then sends the remote client a Protocol Response verifying the protocol version number and any options. An example of the data formats of the Protocol Request and Protocol Response in the context of an AppleTalk network are provided below.

Once the protocol has been negotiated, it is determined, in step 103, if an optional session key negotiation phase 104 is going to occur. In the first protocol version, the session key negotiation phase is optional, but later versions of the protocol will require the session key negotiation phase. The session key negotiation phase is thus entered if a session key bit in the Protocol Request is set during the protocol negotiation phase. During the session key negotiation phase, data is exchanged between the host and remote client for the purpose of setting up an encryption key that is used for the remainder of the communication. In a preferred embodiment, a well known Diffie-Hellman key exchange method is used, but any other conventional key exchange method may be used. If the session key phase and the Diffie-Hellman key exchange method are not being used, the encryption key is chosen during an authentication phase 106, as described below. The data communicated during the session key negotiation phase may include a length word indicating the length of the data and the data. The data flow is bi-directional and is completed when the host and the remote client have agreed on a session key. If the system determines, in step 105, that a session key has been established, an authentication phase 106 is entered. In the event that a session key is not successfully negotiated during the session key negotiation phase, the method proceeds to a teardown phase 110 in which the

communications between the host and the remote client is terminated and the methods ends.

During the authentication phase 106, the remote client and the host negotiate what type of authentication is used for the communications and then provides challenges and responses to authenticate the identity of the remote client. Due to the wide variety of security requirements and methods, the host must, at a minimum, send a request with at least one default authentication type identifier and an associated challenge. However, if the host has the ability to use more than one authentication method, then the host may send the remote client, in a Authentication Request, more than one authentication type identifier and their associated challenges as described below. Thus, to start the authentication phase, the host may communicate an authentication request, as described below, to the remote client. The authentication request may include one or more authentication type/authentication challenge data pairs. In response to the authentication request, the remote client communicates an authentication response back to the host which includes exactly one authentication type/response data pair. If the host sends more than one authentication type/challenge pair, the remote client selects a particular authentication type and responds with the authentication type/response pair for only that particular authentication type. An example of the types of authentication methods is set forth below.

If the session key negotiation phase is not used, then, during a successful authentication phase, an implicit session key may be generated by the remote client. In a preferred embodiment, the session key may be generated by the following steps.

First, a Unicode string containing the password from the client is concatenated with the challenge from the authentication request. Next, a SHA-1 hash value over the resultant concatenated data is calculated and the initial bytes of the hash value may then be used as the session key which may be communicated back to the host.

In response to the authentication response, the host determines if the response was successful or not in step 107. If the response was successful (i.e., an appropriate response to the challenge was received which verifies the identity of the remote client), a success data structure is sent to the remote client and the method goes to an established phase 108, as described below. If the response was not successful (i.e., an appropriate response to the challenge was not received so that the identity of the remote client can not be verified), then an error code is sent to the remote client and the teardown phase 110 is entered.

During a typical successful secure communications session, most of the time is spent in the established phase 108 in which encrypted data including the header is communicated between the remote client and the host. The header, as described below, contains information required by the communications protocol of the private network (i.e., the host and the remote client) to appropriately route data. Thus, the communications protocol information for the private network is embedded in the encrypted data packet so that the data destined for the private data network may be communicated over the public network having a different communications protocol. For each piece of encrypted data sent during the established phase, the data may be preceded by a length and flag word which contains the length of the data in bytes and

six bits of flags. Since the data is typically sent over a TCP/IP based public network, a PUSH bit in the flag bits must be set to accelerate the processing of the transactions once a complete unit of data has been received.

If an unsuccessful session key negotiation, an unsuccessful authentication, or the end of the established phase occurs, then the tear down phase 110 is begun. During the tear down phase, there is no data traffic between the remote client and the host and the communications channel is forcibly closed by either the remote client or the host.

During the teardown phase, when one side shuts down the communications channel, an acknowledgment from the other side may consist of shutting down the connection from that side as well so nothing remains of the communications path. After the teardown phase, the method has been completed. The method, therefore sets up a communication session as needed and then tears down the communications path once the communications have been completed.

Now, an example of the data formats for a system and method in accordance with the invention for communicating AppleTalk data between a remote client and a host over a TCP/IP public network, such as the Internet, will be described. As described above, the virtual private network in accordance with the invention may connect any private network having a first communications protocol to a public network having a second different communications protocol securely to permit remote users to access the private network in a secure manner wherein the remote user appears to be one of the nodes in the private network. In this example, the data formats for each of the communications phases are set forth and explained. For each different

private data network with a different communications protocol, these data formats will vary slightly. The bytes of these data formats are sent across the network connection path over the Internet using a Network Byte Order protocol in which the most significant byte is communicated first.

To better understand the utility of the invention in the context of a connection between an AppleTalk private network and a AppleTalk remote client over the TCP/IP-based Internet, the differences between the protocol for the AppleTalk network and the Internet will be described before describing the data formats for this example. AppleTalk is a proprietary suite of networking protocols which is designed for plug-and-play operation whereas TCP/IP is designed to be administered. In particular, the Internet or any other TCP/IP network has been designed such that each node on the Internet is permanently assigned a unique IP address by a quasi-governmental entity. AppleTalk, on the other hand, assigns a node or device number to a node or device when the nodes or devices are actually placed on the network to provide the plug-and-play functionality. Therefore, the two networking protocols assigns network numbers in different manners.

AppleTalk also has a smaller network number range than the Internet and is not centrally administered so that AppleTalk networks can not be arbitrarily connected to each other without substantial planning to ensure that the connected nodes do not have overlapping network numbers. In AppleTalk, there is also a service location protocol that permits users to locate servers and network devices, such as printers, and AppleTalk has the concept of a "zone" which provide a level of scoping for the service

location protocol. In order to access the network services on a particular network, you must have access to the particular zone. One advantage of the invention is that the remote client can avoid the network number and zone addressing by connecting the user of the remote client directly on the AppleTalk network as a virtual node in the zone of the host computer in a secure manner. Thus, once the user of the remote client is securely connected to the AppleTalk network over the Internet, the user sees all of the devices of the AppleTalk network, such as printers and file servers, in a familiar manner which permits them to access any device on the private network. Now, an example of the data formats for the invention when connecting an AppleTalk private network and a remote client over the Internet will be described.

During the protocol negotiation phase, as described above, there is a protocol request from the host and a protocol response from the remote client. The data formats of the protocol request and protocol response are set forth in Tables 1 - 3 below.

**Table 1- Protocol Request**

Byte Offset	Width	Contents
0	2 bytes	Total Bytes: Total number of bytes in the transaction (excluding this field)
2	2 bytes	Protocol Version: Protocol version requested
4	2 bytes	Options Bytes: Length of the following data bytes
6	specified by the previous field	Options: Any options to be requested

In version 1 of the protocol, the Total Bytes in the protocol request is 6, the Protocol Version is 1, the Options Bytes is 2, and the Options field will contain two bytes which represent 16 individual flag bits. For other versions of the protocol, these fields may contain different values. The meanings of the flag bits in the protocol request data format are set forth below in Table 2.

**Table 2 - Option Flag Bits Format**

Byte Location	Meaning
15-2	Reserved for future options. These must be 0 in the first version of the protocol.
1	Use session key negotiation. If this bit is set, the requester wants to use the Session Key Negotiation phase. If not, it is requested that the phase be omitted.
0	Use DES encryption. If this bit is set, the requester wants to use DES encryption. If it is not set, an alternate encryption method is to be used.

Thus, using the options fields in the first version of the protocol, the session key negotiation phase and the type of encryption may be chosen. With future versions of the protocol, additional options may be selected. The format of the Protocol Response will now be described with reference to Table 3.



**Table 3 - Protocol Response**

Byte Offset	Width	Contents
0	2 bytes	Total Bytes: Total number of bytes in the transaction (excluding this field)
2	2 bytes	Protocol Version: Protocol version to be used
4	2 bytes	Options Bytes: Length of the following data bytes
6	specified in Options Bytes	Options: Any options that are in use

The protocol response data uses a similar data format to the Protocol request, and contains the same data. However, when returned from the Host to the Client in the Protocol Negotiation phase, this data establishes the actual communication protocol and data format to be followed during the Established phase. The data communicated during the protocol negotiation phase is unencrypted since the secure communications path has not yet been established. Now, the data formats for the optional session key negotiation phase will be described.

The session key negotiation phase, as described above, may include the session negotiation request and the session negotiation response. The data format for both of these pieces of data are identical for all responses and requests. In particular, each data packet contains a 2 byte length field followed by the data used for the negotiation of the session key for use in the well-known Diffie-Hellman key exchange method. Once

again, the data is sent unencrypted since no secure communications channel has been established.

The authentication phase, as described above, may include an authentication request and an authentication response, whose data formats are set forth below in Tables 4-6.

**Table 4 - Authentication Request**

Byte Offset	Width	Contents
0	2 bytes	Total Bytes: Total number of bytes in the transaction (excluding this field)
2	2 bytes	Authentication Type: Identifies the authentication type
4	2 bytes	Challenge Bytes: The number of bytes that follow for the challenge (0 or more)
6	specified in Challenge Bytes	Challenge: The data for the challenge in the authentication. The exact contents vary based on the authentication method.

As described above, this data must contain at least one authentication type/challenge pair, but may contain more than one authentication type/challenge pair if the host supports more than one type of authentication. In version 1 of the protocol, the Authentication Type must be one of types set forth in Table 5.

**Table 5 - Authentication Types**

Authentication Type	Description
0	No authentication.  No bytes follow for the challenge (may not be supported by any server). A 0-length response is expected by Hosts which request this method.
1 - Clear Text authentication.	There is no challenge (may not be supported by any server). A 0-length challenge is sent, and the Host expects the user name and password of the client to be sent in clear text.
2	Challenge-Handshake Authentication Protocol (CHAP) - There is an 8-byte encrypted challenge. A 24-byte response is expected by the Host. This method MAY be supported by Hosts and Clients.
3	NT RAS compatible CHAP - There is an 8-byte encrypted challenge. A 16-byte response is expected by the Host. This method MUST be supported by all Hosts and Clients.

As shown, there are several different authentication methods which may be used. The default authentication method is the NT RAS compatible CHAP with an 8 byte challenge and a 16 byte response. Again, since no secure communications path has been established, this data is sent unencrypted. Now, the data format of the authentication response is described with reference to Table 6.

**Table 6 - Authentication Response**

Byte Offset	Width	Contents
0	2 bytes	Total Bytes: Total number of bytes in the transaction (excluding this field)
2	2 bytes	Authentication Type: Identifies the authentication type
4	2 bytes	Response Bytes: Number of bytes in the authentication response
6	specified in Response Bytes	Response: The data which responds to the Challenge. The length and exact contents vary based on the authentication type and the challenge.
Response Bytes +6	up to 32	User Name: The clear text version of the user name. The name is terminated by the end of the data (based on Total Bytes).

This authentication response data must contain exactly one response to one of the Authentication Type/Challenge pairs in the preceding Authentication Request. The Client may choose which of the pairs to respond to if more than one appears in the Authentication Request. The User Name in the response specifies which user is requesting access and is used in conjunction with the Response to authenticate the user.

This data is also sent unencrypted, unless a session key has been negotiated previously in the Session Key Negotiation phase, in which case it is encrypted.

During the initial portion of the established phase, there may be a success data structure or a failure data structure and then during the actual established phase there may be a data structure for data communicated to the remote client and a data structure for data communicated to the host. These data structures are set forth below

in Tables 7 - 11. If a successful secure connection is established, then a connections success data structure, as set forth in Table 7 is sent to the remote client.

**Table 7 - Connection Success**

Byte Offset	Width	Contents
0	2 bytes	Total Bytes: Total number of bytes in the transaction (excluding this field)
2	2 bytes	Success: always contains 0
4	2 bytes	Client Network Number: the assigned network number for the Client
6	1 byte	Client Node Number: the node number of the Client for the nearest AppleTalk Bridge
7	1 byte	Bridge Node Number: the node number of the nearest AppleTalk Bridge
8	2 bytes	Bridge Network Number: the network number of the nearest AppleTalk Bridge
10	2 bytes	Network Range Start: The start of the network range for the AppleTalk network connected to the Host
12	2 bytes	Network Range End: The end of the network range for the AppleTalk network connected to the Host

This successful connection data is sent by the Host when a connection is successfully established between the Client and the Host. It contains the data necessary to configure the AppleTalk connection on the Client side. The connection success data structure thus contains the embedded information about the private data network communications protocol so that private network data may be communicated over the public network which has a different communications protocol. For example, the Bridge Node Number and Bridge Network Number specify AppleTalk specific

network information, such as the AppleTalk default Bridge (or Router) on the network that the Host resides on. This embedded private data network information permits the client and the host to format their data formats, as set forth in Tables 10 and 11, for the particular connection to the particular type of private data network. This embedded information also permits the remote client to be treated as a virtual node of the AppleTalk network so that any devices, such as printers or file servers, on the private network may be accessed by the user of the remote client. The connection success data structure is sent unencrypted, unless a session key has been negotiated in the Session Key Negotiation phase, in which case it is encrypted. The connection failure data format is set forth in Table 8.

**Table 8 - Connection Failure**

Byte Offset	Width	Contents
0	2 bytes	Total Bytes: Total number of bytes in the transaction (excluding this field)
2	2 bytes	Error Code: Contains the error code sent by the Host

This connection failure data is sent by the Host when a connection cannot be successfully established between the Client and the Host. It contains a length field and only one other field, an Error Code field. The error code field contains an optional representation of why the connection failed. As a default, the host may always return an "Undefined Error" message, which gives no information on why it rejected the request. An example of the error codes are set forth below in Table 9.

**Table 9 - Error Codes**

Error Code	Description
1	Unsupported Authentication. This is returned when the Client sent an Authentication Response for an Authentication type which was not in the Authentication Request.
2	Failed Authentication. The specified User Name and Response were not valid for the authentication type and Challenge specified. Note: This could be any kind of error from unknown user to invalid password.
3	No Free Ports. The Host does not have any available ports.
4	Already Logged On. The specified User Name is already in use on this server, and multiple logins of the same user are disallowed.
0xFFFF	Undefined Error. An error prevented the connection from succeeding.

This error data is sent unencrypted, unless a session key has been negotiated in the Session Key Negotiation phase, in which case it is encrypted. If the connection failure data structure is sent, then the communications session ends. If a successful connection is established, then data is communicated between the host and the client using the data format for established data to the remote client as set forth in Table 10.

**Table 10 - Established Data (To Client)**

Byte Offset	Width	Contents
0	2 bytes	Length and Flags: contains the length of the following data in the low 10 bits and a set of reserved flags in the upper 6 bits.
2	2 bytes	Source Network: the network number that sent the packet.
4	1 byte	Source Node: the node number that sent the packet.
5	1 byte	Destination Socket: the socket that the packet is being sent to.
6	1 byte	Source Socket: the socket that sent the packet.
7	1 byte	Type: the AppleTalk type of the packet.
8	Specified by the Length	Payload: the data from the original packet.

This data is sent from the Host to the Client during the established phase. As shown, the data contains the AppleTalk specific information to route the data packet to the client. This data is always encrypted. The basic format (with no flags set) contains data from one packet on the AppleTalk network that is destined for the Client. An example of the data format for data from the remote client to the host is set forth in Table 11.



**Table 11 - Established Data (From Client)**

Byte Offset	Width	Contents
0	2 bytes	Length and Flags: contains the length of the following data in the low 10 bits and a set of reserved flags in the upper 6 bits.
2	2 bytes	Destination Network: the network number the packet is being sent to.
4	1 byte	Destination Node: the node number the packet is being sent to.
5	1 byte	Destination Socket: the socket that the packet is being sent to.
6	1 byte	Source Socket: the socket that sent the packet.
7	1 byte	Type: the AppleTalk type of the packet.
8	Specified by the Length	Payload: the data for the packet.

This data is sent from the remote client to the host during the established phase in order to communicate data packets. The data includes AppleTalk specific information to route the client's data packets to the appropriate node on the private data network. The established data from the remote client to the host is always encrypted to ensure a secure communications channel. The basic format (without any flags set) contains data from one data packet that the remote client is sending to the host which is the AppleTalk network. There are not any special data formats for the teardown phase since no data is communicated between the remote client and the host during the teardown phase.

In summary, the invention provides a virtual private network system between a private data network and a remote client which does not require expensive leased lines

or gateways to establish a secure communications path in which the remote client becomes a virtual node of the private network. The system also permits an individual to access the private data network without incurring any long distance telephone charges. In addition, the system permits a private data network and remote client that use a first communications protocol to communicate with each other over a public data network that uses a different communications protocol. The system also permits an individual to easily connect to the private data network as a virtual node without a remote private network and the individual appears to be a node on the private network, once connected, so that the individual may access any resources on the private data network.

In operation, a user of the remote client establishes a secure connection with the host of the private computer network through the authentication process so that the remote client is a virtual node of the private network. The user may then transmit data and commands in the private network's communication protocol over the public network through the secure communications path and receive data and commands back from the private network. For example, the user of the remote client may issue a print command to a printer attached to the private network, that print command is encapsulated in an encrypted data packet sent over the public access network, the host computer decrypts the print command and passes the print command on to the printer attached to the private network. Thus, the remote client is a virtual node of the private network and the user of the remote client may access any of the resources of the private network as if the remote client was an actual physical node of the private network.

While the foregoing has been with reference to a particular embodiment of the invention, it will be appreciated by those skilled in the art that changes in this embodiment may be made without departing from the principles and spirit of the invention, the scope of which is defined by the appended claims.

Claims:

1. A method for forming a virtual node for a private access network having a private access communications protocol over a public access network having a public access communications protocol, the virtual node being a remote client computer and the method comprising:

establishing a secure communications path over the public access network between a host computer connected to the private network and a remote client computer to establish the remote client computer as a virtual node of the private network;

generating a data packet to be transmitted over the secure communications path, the data packet including data and information about routing the data in the data packet in accordance with the private access communications protocol;

encrypting said data packet;

encapsulating said encrypted data packet into second data packet having a format compatible with the public access communications protocol;

transmitting the second data packet over the public access network;

unpacking the encrypted data packet from said second data packet; and

decrypting the data packet received from the public access network to route the data in the data packet over the private access network using the information about the private access communications protocol.

2. The method of Claim 1, wherein said establishing further comprises negotiating a communications protocol compatible with the private network between the host computer connected to the public access network and the remote client computer, and authenticating the identity of the remote client computer.

3. The method of Claim 2, wherein the authentication comprises generating a challenge at the host computer, communicating said challenge to the remote client computer, and receiving a challenge response from the remote client computer.

4. The method of claim 1 further comprising negotiating a session key for communicating between the host and the client.

5. The method of Claim 1, wherein generating the information in the data packet comprises generating a network node identification number for the remote client node.

6. The method of Claim 5, wherein said private access network comprises an AppleTalk communications network.

7. The method of Claim 6, wherein said public access network comprises the Internet.

8. A virtual node for a private access network having a private access communications protocol over a public access network having a public access communications protocol, the virtual node being a remote client computer and comprising:

means for establishing a secure communications path over the public access network between a host computer connected to the private network and a remote client computer to establish the remote client computer as a virtual node of the private network;

means for generating a data packet to be transmitted over the secure communications path, the data packet including data and information about routing the data in the data packet in accordance with the private access communications protocol;

means for encrypting said data packet;

means for encapsulating said encrypted data packet into second data packet having a format compatible with the public access communications protocol;

means for transmitting the second data packet over the public access network;

means for unpacking the encrypted data packet from said second data packet;

and

means for decrypting the data packet received from the public access network to route the data in the data packet over the private access network using the information about the private access communications protocol.

9. The virtual node of Claim 8, wherein said establishing means further comprises means for negotiating a communications protocol compatible with the private network between the host computer connected to the public access network and the remote client computer, and means for authenticating the identity of the remote client computer.

10. The virtual node of Claim 9, wherein the authentication means comprises means for generating a challenge at the host computer, means for communicating said challenge to the remote client computer, and means for receiving a challenge response from the remote client computer.

11. The virtual node of claim 8 further comprising negotiating a session key for communicating between the host and the client.

12. The virtual node of Claim 8, wherein said means for generating the information in the data packet comprises means for generating a network node identification number for the remote client node.

13. The virtual node of Claim 12, wherein said private access network comprises an AppleTalk communications network.

14. The virtual node of Claim 13, wherein said public access network comprises the Internet.



FIG. 1 (Prior Art)

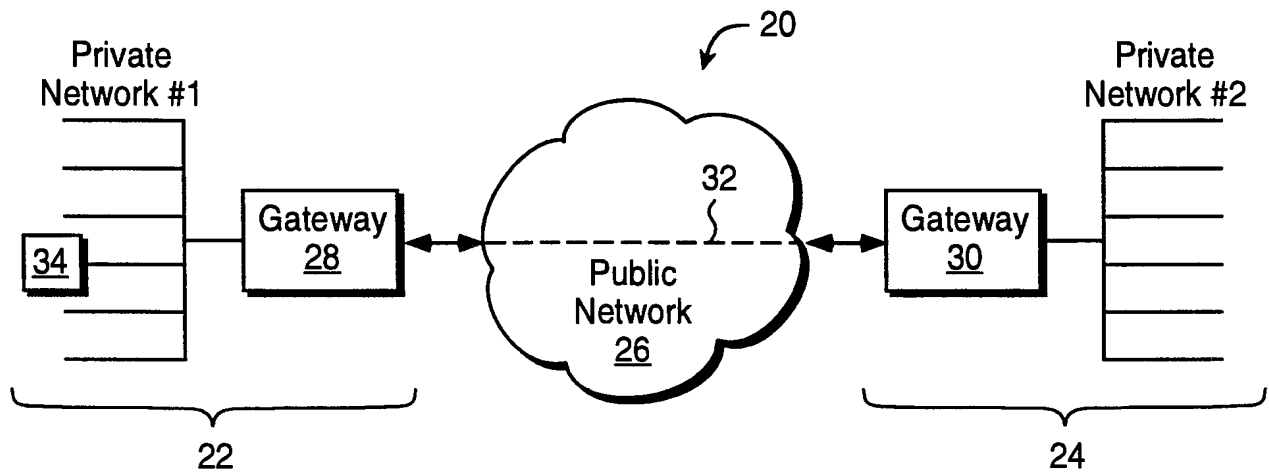


FIG. 2

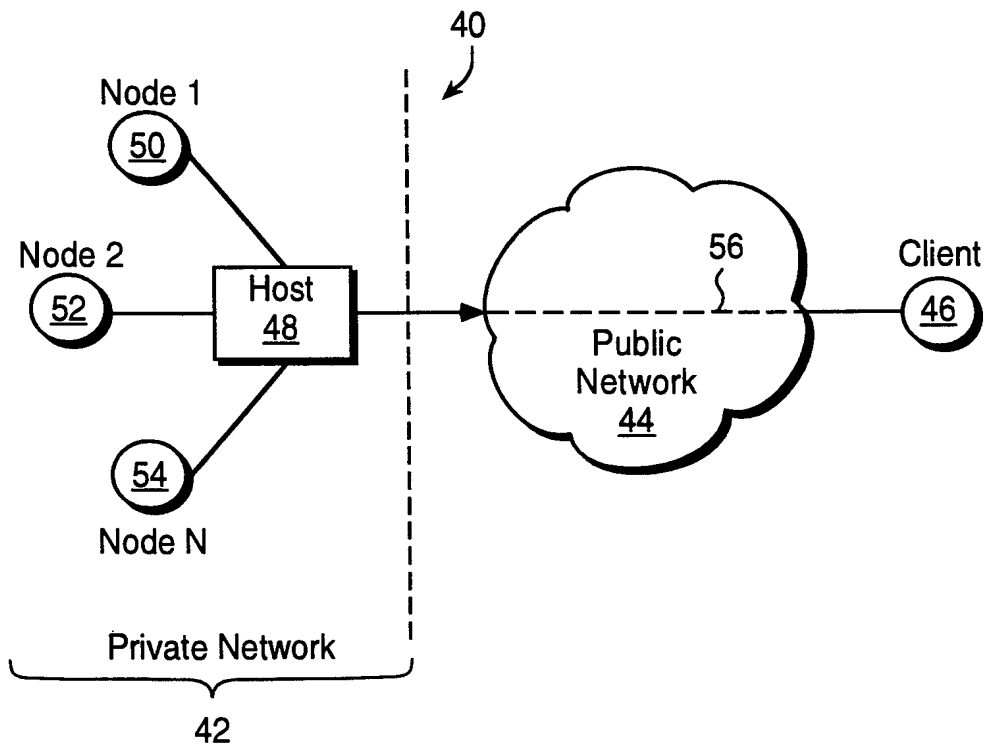


FIG. 3

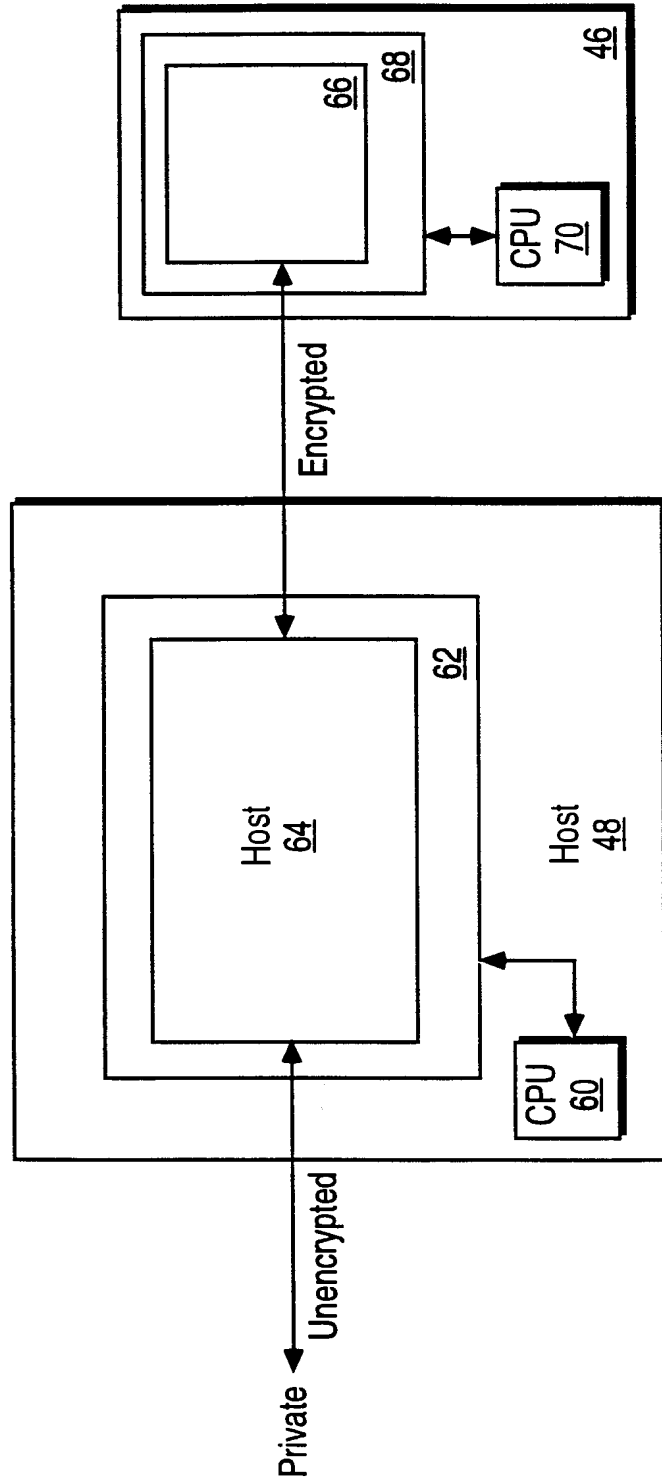
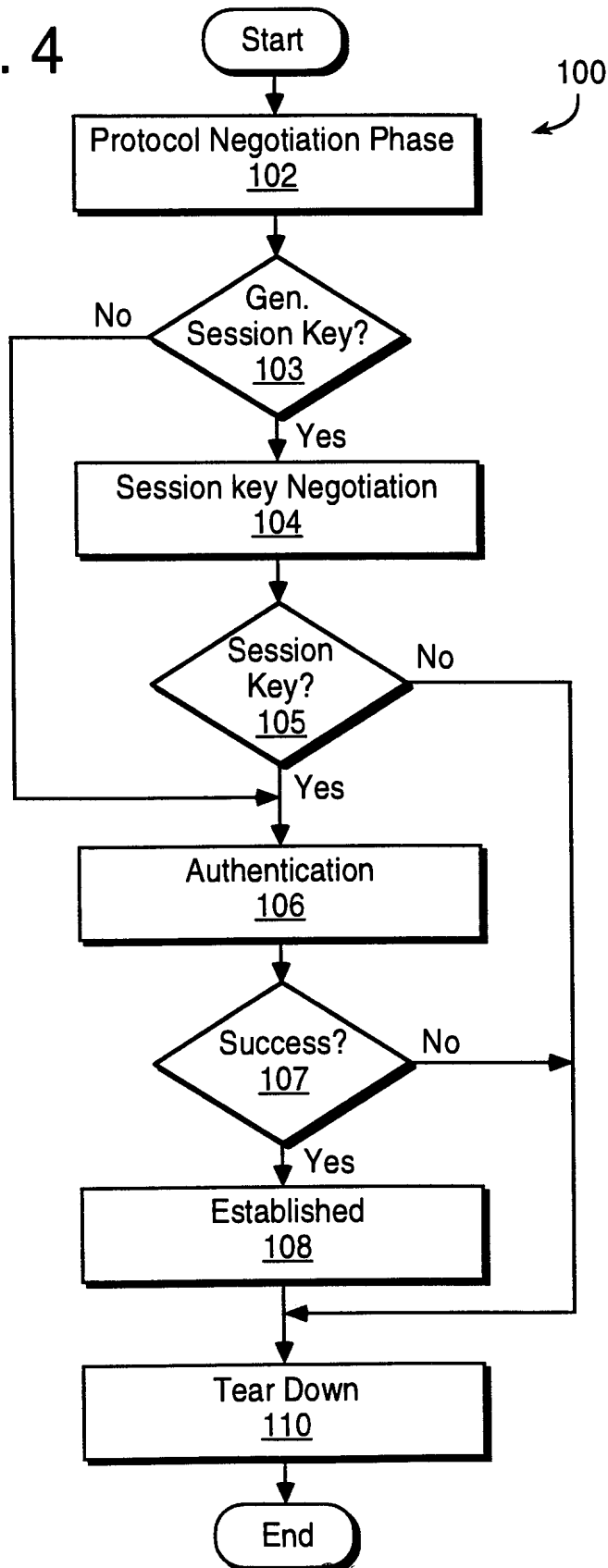


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/01583

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06F 13/00; H04L 9/30  
US CL : 709/245, 229; 380/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/245, 229, 228, 226; 380/30, 23

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, Internet

Search terms : private and public network, protocols, authentication, session key, encrypt, decrypt, encapsulation.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,416,842 A (AZIZ) 16 MAY 1995, Abstract, Figs. 2 and 5 and 6, col. 4 line 65 - col. 5 line 48, col. 6 lines 3-35 and lines 40-51, col. 7 lines 16-35, col. 7 line 63 - col. 8 line 2	1-14
Y	US 5,550,984 A (GELB) 27 AUGUST 1996, Abstract, Fig. 1, col. 5 line 45 - col. 6 line 51, col. 7 line 58 - col. 8 line 19	1-14
Y	US 5,548,646 A (AZIZ ET. AL.) 20 AUGUST 1996, Abstract, Figs. 5 and 6, col. 9 lines 1-50, col. 10 line 32 - col. 11 line 67	1-14
Y,P	US 5,835,726 A (SHWED ET. AL.) 10 November 1998, Abstract, Fig. 21, col. 20 line 41 - col. 21 line 7, col. 22 line 19 - col. 23 line 9.	1-14

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents.	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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21 MAY 1999

Date of mailing of the international search report

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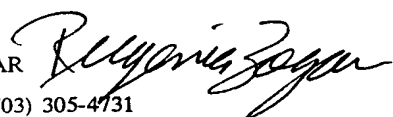
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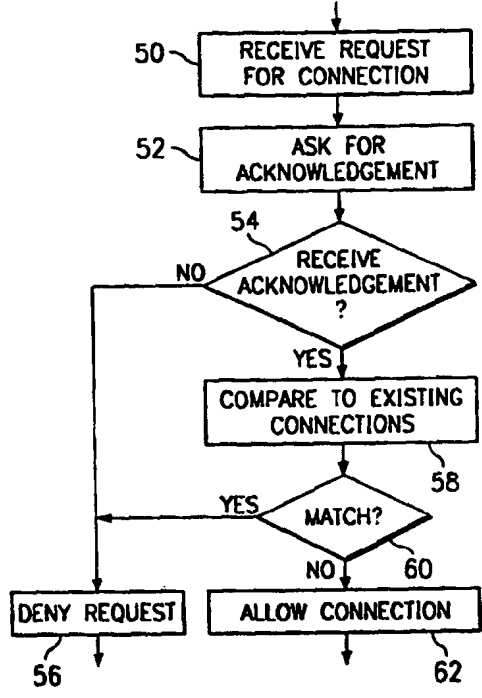
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>H04Q</b></p>	<p><b>A2</b></p>	<p>(11) International Publication Number: <b>WO 99/48303</b> (43) International Publication Date: 23 September 1999 (23.09.99)</p>
<p>(21) International Application Number: PCT/US99/05900 (22) International Filing Date: 18 March 1999 (18.03.99) (30) Priority Data: 09/040,898 18 March 1998 (18.03.98) US (71) Applicant: CISCO TECHNOLOGY, INC. [US/US]; 170 West Tasman Drive, San Jose, CA 95134 (US). (72) Inventors: COX, Dennis; 6800 McNeil Drive #828, Austin, TX 78729 (US). MCCLANAHAN, Kip; 3112 Kerbey Lane, Austin, TX 78703 (US). (74) Agent: SHOWALTER, Barton, E.; Baker &amp; Botts, L.L.P., 2001 Ross Avenue, Dallas, TX 75201-2980 (US).</p>		<p>(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i></p>

(54) Title: METHOD FOR BLOCKING DENIAL OF SERVICE AND ADDRESS SPOOFING ATTACKS ON A PRIVATE NETWORK

(57) Abstract

A method is provided for blocking attacks on a private network (12). The method is implemented by a routing device (10) interconnecting the private network (12) to a public network (14). The method includes analyzing an incoming data packet from the public network (14). The incoming data packet is then matched against known patterns where the known patterns are associated with known forms of attack on the private network (12). A source of the data packet is then identified as malicious or non-malicious based upon the matching. In one embodiment, one of the known forms of attack is a denial of service attack and an associated known pattern is unacknowledged data packets. In another embodiment, one of the known forms of attack is an address spoofing attack and an associated known pattern is a data packet having a source address matching an internal address of the private network (12).



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METHOD FOR BLOCKING DENIAL OF SERVICE AND  
ADDRESS SPOOFING ATTACKS ON A PRIVATE NETWORK

TECHNICAL FIELD OF THE INVENTION

This invention relates in general to communication systems, and more particularly to a method for blocking denial of service and address spoofing attacks on a private network.

5

BACKGROUND OF THE INVENTION

Corporate and other private networks often provide external access outward and inward through Internet gateways, firewalls or other routing devices. It is important for these routing devices to defend the private network against attackers from the outside as well as to allow access to the private network by authorized users. However there are numerous forms of attack on conventional routing device that can incapacitate the devices and interfere with an associated private network. The problem of keeping unauthorized persons from accessing data is a large problem for corporate and other information service management. Routing devices, such as gateways, firewalls and network routers lack important safeguards to block or prevent attacks. In particular, the number of denial service attacks have risen dramatically in recent years. Further, IP spoofing incidents occur with increasing frequency.

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A denial of service attack consists of repeatedly sending requests for connections to different hosts through and/or behind the routing device. Typically, the host will wait for acknowledgment from the requester.

Because a host can only handle a finite number of requests (for example, 1 to n, where n depends on the resources available to the host), the attacker can crash or "flood" a host with requests to the point of  
5 disrupting network service (host/server/port) to users.

Another form of attack is address spoofing which can be used by unauthorized third parties to gain access to a private network. This attack involves the attacker identifying a valid internal network address within the  
10 private network. The attacker then requests access to the private network through the routing device by spoofing that internal network address. Conventional routing devices typically are not sophisticated enough to determine that such a request should be denied (i.e.,  
15 because an external request can not originate from an internal address) and will allow access to the attacker. Address spoofing attacks can be carried out against various types of networks and network protocols such as IPX/SPX, MAC layer, Netbios, and IP.

20 It is therefore advantageous to provide facilities within a routing device that block denial of service, address spoofing and other attacks on an associated private network.

#### 25 SUMMARY OF THE INVENTION

In accordance with the present invention, a method for blocking denial of service and address spoofing attacks on a private network is disclosed that provides significant advantages over conventional network routing  
30 devices.

According to one aspect of the present invention, the method is implemented by a routing device interconnecting the private network to a public network. The method includes analyzing an incoming data packet  
35 from the public network. The incoming data packet is



then matched against known patterns where the known patterns are associated with known forms of attack on the private network. A source of the data packet is then identified as malicious or non-malicious based upon the matching. In one embodiment, one of the known forms of attack is a denial of service attack and an associated known pattern is unacknowledged data packets. In another embodiment, one of the known forms of attack is an address spoofing attack and an associated known pattern is a data packet having a source address matching an internal address of the private network.

A technical advantage of the present invention is the enabling of a routing device to the identify a denial of service attack and to block such an attack from tying up the routing device.

Another technical advantage of the present invention is enabling a routing device to identify an address spoofing attack and to block such an attack.

A further technical advantage of the present invention is an ability for the routing device to track information about the attacker to allow preventive measures to be taken.

Other technical advantages should be readily apparent to one skilled in the art from the following figures, description, and claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present invention and advantages thereof may be acquired by referring to the following description taken in conjunction with the accompanying drawings, in which like reference numbers indicate like features, and wherein:

FIGURE 1 is a block diagram of an communication system including a routing device and an associated private network;

FIGURE 2 is a flow chart of one embodiment of a method for blocking attacks on a private network according to the present invention;

5 FIGURE 3 is a flow chart of one embodiment of a method for blocking an address spoofing attack according to the present invention; and

FIGURE 4 is a flow chart of one embodiment of a method for blocking a denial of service attack according to the present invention.

10

#### DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 is a block diagram of an communication system including a routing device 10 and an associated private network 12. Routing device 10 provides a  
15 connection between corporate private network 12 and an Internet cloud 14. Routing device 10 can include a gateway, firewall or other device interconnecting private network 12 and Internet cloud 14. In operation, routing device 10 allows internal users within private network 12  
20 to gain access to Internet cloud 14. Routing device 10 also allows external users connected to Internet cloud 14 to gain access to private network 12. A significant and growing problem is that an attacker 16 may try to gain access to or disrupt private network 12 through Internet  
25 cloud 14.

Denial of service and address spoofing are two common forms of attack that might be used by attacker 16. In general, a denial service attack is one in which attacker 16 attempts to prevent others from using private  
30 network 12. A denial service attack works if routing device 10 spends all of its time processing requests and cannot respond quickly enough to satisfy additional requests. An Address spoofing attack is one in which attacker 16 fakes an internal address to get around or  
35 into standard address filtering schemes. According to

the present invention, routing device 10 is enabled with a method for blocking these and other types of attacks by analyzing incoming data packets.

Thus, one possible occurrence is that attacker 16 will try to get into private network 12 by spoofing an address that exists inside private network 12. This is intended to allow attacker 16 to gain access and impersonate an internal user. When a packet from attacker 16 reaches routing device 12, an attack blocking component, according to the present invention, will notice that the address matches one that exists within private network 12. Because incoming packets should not be the same as outgoing packets, the attack blocking component can deny access to private network 12 and record the information about the attack for use by the system administrator. Attacker 16 can also try to deny access to all external users by conducting a denial of service attack. This involves attacker 16 flooding private network 12 or routing device 10 by sending an extremely large number of packets. For example, attacker 16 may send 30,000 or more packets. According to the present invention, the attack blocking component of routing device 10 can notice that the first packet is spoofed or that it cannot be acknowledged and ignore all other packets. Further, routing device 10 can use diagnostic detection tools (e.g., trace root, ping, NS lookup) to pinpoint attacker 16 and notify the system administrator. In general, according to the present invention, routing device 10 can be enabled to intelligently analyze incoming packets, match the packets against known patterns for attack strategies and respond accordingly to malicious packets.

FIGURE 2 is a flow chart of one embodiment of a method for blocking attacks on a private network according to the present invention. As shown, an

incoming packet is analyzed by the routing device in step 20. In step 22, the routing device analyzes the incoming packet against known patterns. Based upon this pattern matching, in step 24, the routing device can identify the data packet and its source as malicious or non-malicious. The known patterns used in step 22 can be built using knowledge about various types of attacks. This knowledge can be recorded in the form of patterns that are then stored in a database or other storage device accessible by the routing device. The routing device can then match the analyzed packets against the patterns to determine whether or not some type of attack is being made. If an attack is identified, the routing device can identify the source of that packet as malicious and treat the source accordingly.

In particular, the routing device can implement methods for blocking denial of service attacks and address spoofing attacks as shown, for example, in FIGURES 3 and 4. FIGURE 3 is a flow chart of one embodiment of a method for blocking an address spoofing attack according to the present invention. This method is applicable to address spoofing attacks on various types of networks, but is described specifically with respect to an IP network.

As shown in step 30 of FIGURE 3, the routing device receives a packet. In step 32, the routing device compares the IP address of the packet against known internal IP addresses of the associated private network. In step 34, the routing device determines if the source IP address matches an internal address. If not, in step 36, the routing device routes the packet as appropriate for the packet. However, if the source IP address matches an internal address, then the routing device identifies that there is an attempt to spoof an internal address. The addressed is known to be spoofed because an

internal IP address of the private network cannot be accessing the private network from an external point. Consequently, in step 38, the routing device drops the packet and does not route it to the network. In step 40,  
5 the routing device analyzes the packet header for the history of the packet in order to obtain some information about the source of the packet. Then, in step 42, the routing device takes an appropriate defensive action against that packet. For example, the routing device can  
10 refuse to accept any more packets from the real source of the packet. In this case, the defensive action can include adding the offending IP address to a cache of IP addresses and then not allowing access to the router device for any IP address in the cached list. Further,  
15 the routing device can store information about the attack for later use and for analysis for administrators of the private network. For example, information concerning the packet origination, destination or content can be stored internally to the router device or sent to a syslog  
20 server for later analysis.

FIGURE 4 is a flow chart of one embodiment of a method for blocking a denial of service attack according to the present invention. As shown, in step 50, the routing device receives a request for a connection.  
25 Then, in step 52, the routing device asks for an acknowledgment from the requestor. In step 54, the routing device checks whether or not an acknowledgment has been received. If one is not received within a specified period of time, the routing device moves to  
30 step 56 and denies the request. This denial ensures that the routing device does not churn on pending requests even though acknowledgments have not been received within reasonable amounts of time.

If an acknowledgment is received in step 54, the  
35 routing device moves to step 58 and compares the

requested connection to existing connections. Then, in step 60, the routing device determines if there is a match between the requested connection and one of the existing connections. If so, the routing device moves to  
5 step 46 and denies the request. The request is denied because one source should not have more than one connection through the routing device to the private network. If, in step 60, there is no match, then the routing device can allow the connection in step 62. The  
10 method of FIGURE 4 prevents the routing device from being tied up by multiple requests from one source and thereby blocks the denial of service attack.

In general, the method of the present invention can be integrated as a component of a gateway, firewall or  
15 other routing device. In one implementation, the present invention can work off of a variable size cache file that holds network addresses. For blocking spoofing, each incoming address can be held in the cache file and checked to see if the incoming address matches an network  
20 address that is on the private network. If the incoming address matches, then the request can be denied. Also, a message can be sent to a system log which, rather than being written to a file, can be written to a console to prevent the log from getting overloaded and crashing the  
25 routing device. Further, an optional E-mail message or page can be sent to a specified address or number in the case of an attack. If an attack happens more than once on the same address in the span of a certain period of time (for example, five minutes), then the number of  
30 messages can be limited to prevent overloading of the E-mail or paging service. An optional shutdown mechanism can also be in place that will enable the routing device to automatically shut down certain services if attacks continued.

Denial of service attacks are generally easier to trace. However, when such an attack is also spoofed, the problem becomes very difficult to stop. According to the present invention, an incoming address can be checked  
5 against the cache file and a quick search can be performed to see if the address is already in a list of pending addresses. If so, the request packet can be discarded. An address is removed from the list if a successful acknowledge packet is sent back or a variable  
10 time limit is reached. The number of matching addresses that are allowed in the list can be a variable set by the system administrator.

Although the present invention has been described in detail, it should be understood that various changes,  
15 substitutions and alterations can be made thereto without departing from the sphere and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A method for blocking attacks on a private network implemented by a routing device interconnecting the private network to a public network, comprising:
  - 5 analyzing an incoming data packet from the public network;
  - matching the incoming data packet against known patterns, the known patterns associated with known forms of attack on the private network; and
  - 10 identifying a source of the data packet as malicious or non-malicious based upon the matching.
2. The method of Claim 1, wherein one of the known forms of attack is a denial of service attack and an associated known pattern is unacknowledged data packets.
- 15 3. The method of Claim 1, wherein one of the known forms of attack is an address spoofing attack and an associated known pattern is a data packet having a source address matching an internal address of the private network.
- 20 4. The method of Claim 1, wherein the public network is the Internet.
- 25 5. The method of Claim 4, wherein the routing device is a firewall providing access to the Internet.



6. A method for blocking an address spoofing attack on a private network implemented by a routing device interconnecting the private network to a public network, comprising:

5 receiving an incoming data packet from the public network;

comparing a source address of the data packet against known internal addresses of the private network;

10 determining if the source address matches a known internal address;

if there is no match, routing the data packet to the private network;

if there is a match, dropping the data packet.

15 7. The method of Claim 6, further comprising, if there is a match, analyzing a header of the data packet for a history of the data packet and taking defensive action against the data packet based upon the history.

20 8. The method of Claim 7, wherein the defensive action comprises refusing to accept any more data packets from a real source of the data packet.

25 9. The method of Claim 7, wherein the defensive action comprises storing information about the data packet for use and analysis by a system administrator.

10. The method of Claim 6, wherein the public network is the Internet.

30

11. The method of Claim 10, wherein the routing device is a firewall providing access to the Internet.

12. A method for blocking a denial of service attack on a private network implemented by a routing device interconnecting the private network to a public network, comprising:

5 receiving a request for a connection from the public network;

requesting an acknowledgment from an initiator of the request;

10 determining whether an acknowledgment has been received;

if an acknowledgment is not received, denying the request;

if an acknowledgment is received, comparing the request to existing connections;

15 if there is a match between the request and an existing connection, denying the request;

if there is not match between the request and an existing connection, allowing the connection and routing packets to the private network.

20

13. The method of Claim 12, wherein the public network is the Internet.

25 14. The method of Claim 13, wherein the routing device is a firewall providing access to the Internet.

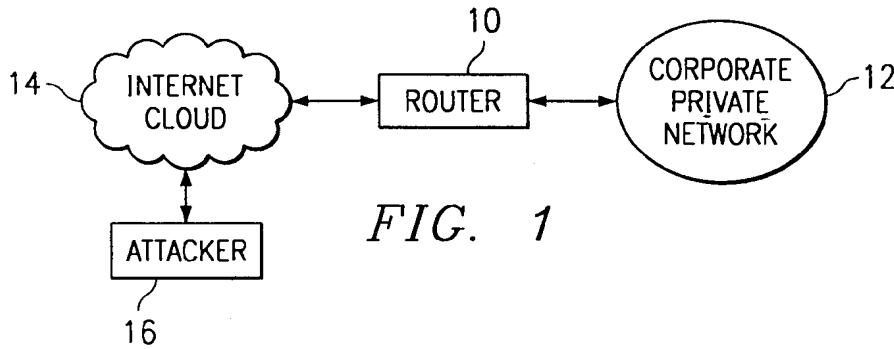


FIG. 1

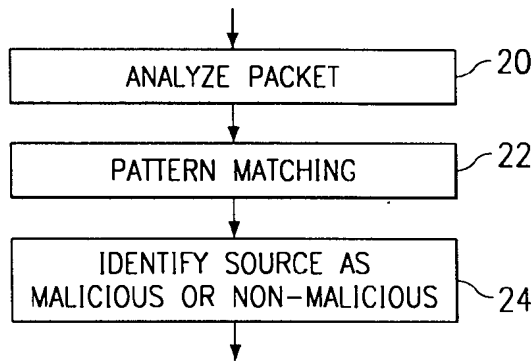


FIG. 2

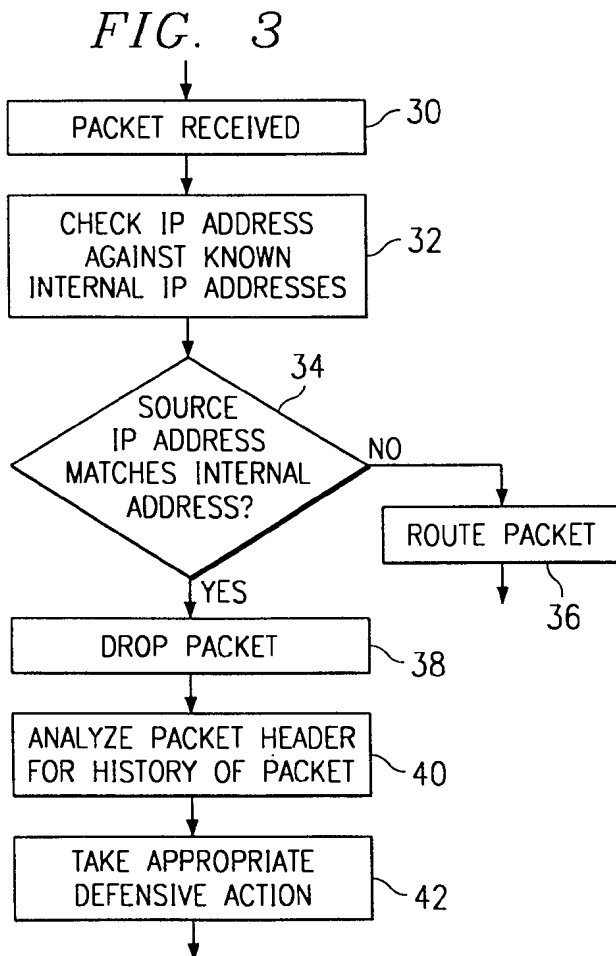


FIG. 3

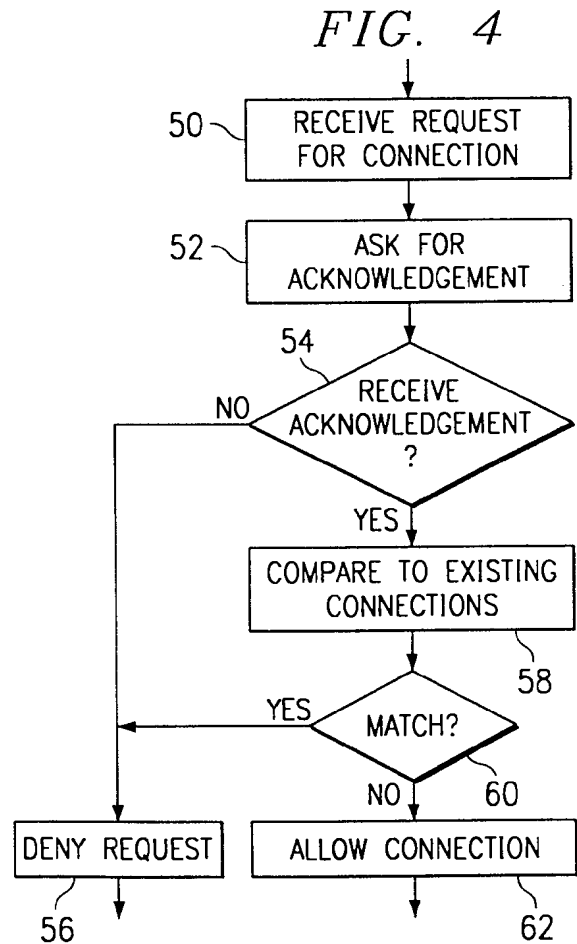


FIG. 4

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	9448908
<b>Application Number:</b>	11839987
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	9470
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
<b>Filer:</b>	Toby H. Kusmer./Kerrie Jones
<b>Filer Authorized By:</b>	Toby H. Kusmer.
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				Filing Date	<b>08-16-2007</b>
				First Named Inventor	<b>Victor Larson</b>
				Art Unit	<b>2453</b>
				Examiner Name	<b>Lim, Krisna</b>
				Docket Number	<b>077580-0066</b>

**U.S. PATENTS**

EXAMINER'S INITIALS	CITE NO.	Patent Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1044	5,590,285	12/31/19996	Krause et al.	

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	C9	WO9843396	10/01/1998	Northern Telecom Limited			

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	D81	European Search Report dated January 24, 2011 from corresponding European Application Number 10011949.4
	D82	European Search Report dated March 17, 2011 from corresponding European Application Number 10184502.2
	D83	Hollenbeck et al., "Registry Registrar Protocol (RRP) Version 1.1.0; Internet Engineering Task Force, 34 pages (1999)
	D84	Notice of Allowance dated March 14, 2011 from corresponding US Application Number 11/840,508 (Our Ref. No.077580-0057)
	D85	Tannenbaum, "Computer Networks," pages 202-219 (1996)

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				Examiner Name	<b>Lim, Krisna</b>
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\_\_\_\_\_  
 /Hasan M. Rashid/  
 Hasan M. Rashid; Reg. No.: 62,390  
 McDermott Will & Emery LLP  
 28 State Street  
 Boston, MA 02109  
 Tel. (617) 535-4000  
 Fax (617) 535-3800

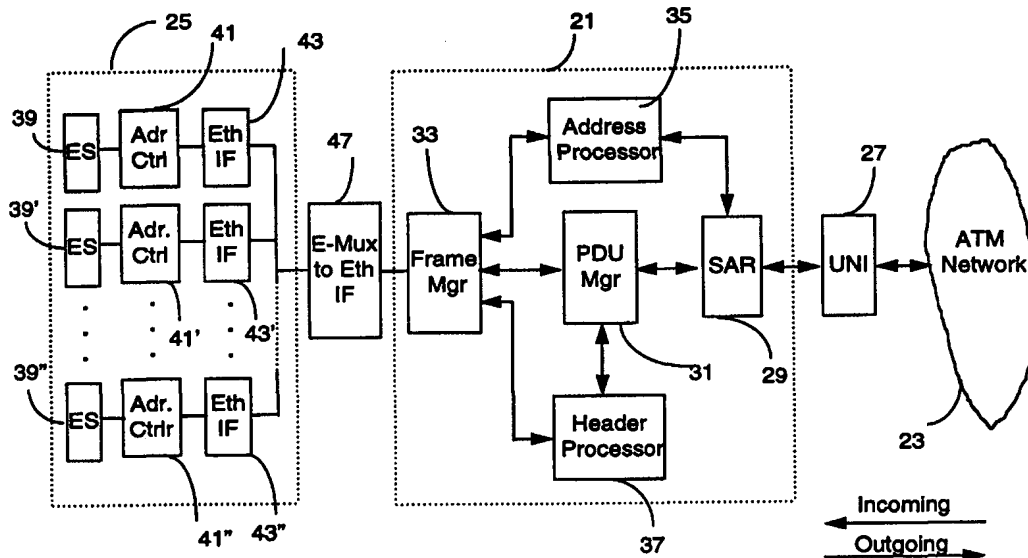
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(54) Title: A MECHANISM FOR MULTIPLEXING ATM AALS VIRTUAL CIRCUITS OVER ETHERNET



(57) Abstract

The invention provides for an E-Mux and a method for encapsulating/segmenting ATM cells into/from an Ethernet frame at the boundary between an ATM and an Ethernet network. An Ethernet end-station on the E-Mux is addressed using multiple MAC level identifiers, which are dynamically assigned according to the ATM virtual circuits which terminate on that end station, and have only transitory significance on the Ethernet. A unique ATM OUI identifies the frames carrying ATM-traffic.

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A MECHANISM FOR MULTIPLEXING ATM AAL5 VIRTUAL CIRCUITS OVER  
ETHERNET

Field of the Invention

5           The invention is directed to a system and method for carrying ATM network information over a local area network (LAN), and more particularly to a mechanism for multiplexing ATM AAL5 virtual circuits over Ethernet.

10   Background of The Invention

          The asynchronous transfer mode (ATM) forms the basis for switching in broadband networks. ATM is a connection oriented data transport which is media independent. The key feature of ATM is the segmentation of data into fixed length units of data referred to as cells.

15   Each cell is separately steered at each ATM switch via an identifier of local significance to the local transport leg provided in the header of each cell. The identifiers are reassigned during the transit of a cell from an input port to an output port on a switch. The identifier carried between a switch and an end system is 24 bits in length. For an ATM

20   user network interface (UNI), this is a concatenation of a 16 bit virtual circuit identifier (VCI) and an 8 bit virtual path identifier (VPI).

          This routing mechanism differs significantly from other networks, in that there is only one identifier specifying a local path vs. source and destination information. This path information in itself is

25   insufficient to uniquely identify the real source and destination for the payload and therefore the connection is set up via signalling. As such, connection to a remote end-station is requested and upon connection set-up, the network informs the end station what the local identifier of the connection is.

30           Ethernet is a connectionless LAN technology designed for data applications in which all stations on the network share the communication medium. This medium, which could be twisted pairs,

fiber, or coaxial cables, is shared in a peer to peer fashion. All devices on the Ethernet can be reached by a single transmission of data. Ethernet operates typically at 10Mbps and the data are sent in the form of Ethernet "frames".

5           There is no central arbitrator of bandwidth to administer media access on an Ethernet. Every time an Ethernet end station sends message, it listens to the media to ensure that it is not in use by another station. If this is true, the end station commences sending its own message. During the message send phase, the end station monitors the  
10 media to detect if another station has also commenced sending at the same time. The minute delays imposed by the speed of light permit a relatively large window wherein multiple stations can believe that the media is idle, and therefore can commence sending an Ethernet frame. If the end station detects a collision, i.e. what it hears does not match  
15 what it sends, it switches to sending a short "jabber" sequence to ensure that all colliding end stations detect that contention has occurred. All end-stations detecting a collision will wait a random interval and will then retry sending their frame, once again applying the same rules to determine success, and to free up the channel as quickly as possible  
20 when a collision occurs. Additional error detection is built into each frame to ensure that errored frames are not propagated.

Ethernet end stations are addressed globally and uniquely by a 48 bit media access control (MAC) address. The MAC address is comprised of a 24 bit Organization Unique Identifier (OUI) and a 24 bit end station  
25 identifier (ID). OUI is a globally administered numbering plan which comprises a portion of a number identifying the organization administering the remainder of the number, which is IEEE for Ethernet. The ID is a unique identifier that a manufacturing organization can provide to all equipment that it manufactures.  
30 Further, this identifier is unique and statically assigned and well known to the station. Certain Ethernet addresses are reserved for broadcast and

multicast to all end-stations on the segment and for diagnostic purposes.

5 An Ethernet connected end station receives all data broadcast onto the media. By convention, the end station discards all traffic not directed to itself, all, or a subset of end stations, as identified in the destination MAC address.

10 All major emerging communication technologies rest on the layers of the OSI model. The OSI model defines a physical layer which specifies the standards for the transmission medium, a data link layer (layers 2 and 3) and a network layer (layers 4 to 7). Thus, in many cases, Ethernet operates on FDDI (fiber distributed data interface) physical layer, and the MAC layer, placed on top of FDDI, comprises the data layer. ATM operates on SONET, copper, twisted pairs, FDDI as physical layer, and the data layer is subdivided into an ATM layer and an ATM  
15 adaptation layer (AAL) providing the convergence function (called also convergence sublayer CS). Whatever the implementation of the AAL at the UNI, the ATM network is not concerned with the AAL operations, the ATM bearer service is masked from the convergence function.

20 It has become evident that LAN shared bus architecture is insufficient to meet the demands of applications that require more bandwidth, and that LANs are beginning to become a bottleneck in computing environments. For this reason, more economic local interfaces such as a Frame-Relay version (FUNI) and an Ethernet  
25 version, Cells-in-Frames (CIF), are used in the access network. In both cases, the separation of data into cells is deferred until within the network, but the higher level information is carried to the end station. In addition, according to the CIF version the AAL5, PDUs are pre-packaged at the end station and this implies changes in HW and SW at  
30 each Ethernet connected end station.

Switched Ethernet technology, developed to provide more capacity to an end-user, does not relay on shared medium, it rather



provides point-to-point bandwidth between the user station and the switch, so that instead of sharing a 10 Mbit/s medium, the user gets a dedicated 10 Mbits/s medium. As Ethernet hubs and switches are growing in use, they become an inexpensive means to provide more bandwidth to workstations. A switched Ethernet network is more flexible, in that it may include stations that are using a port at a given full rate, stations that share a port, or stations that have access to more than one port.

However, switched Ethernet provides only limited bandwidth and supports data traffic only. A more efficient solution for bursty traffic is needed. There is also a need to simplify and standardize the access link while also obtaining protection of the access traffic.

Although ATM provides a very rich environment with numerous traffic classes and the ability to multiplex many data streams with different handling requirements together, this functionality is mainly required in the network backbone. It is sought that ATM networks will be used by more general class end stations for delivering multi-media services. However, in the short term, the extra bandwidth and cost of ATM interfaces is probably not justified for general class end stations, such as desktop computers. It is possible to built ATM switches with lower speed ATM interfaces, but this solution presents a serious deployment problem in that it requires replacement of the substantial installed base of shared media LAN wiring and adapter cards.

An ATM-Ethernet concentrator is disclosed in United States Patent No. 5,457,681 (Gaddis et al., issued on October 10, 1995 and assigned to Washington University), which provides an interface between an ATM network and a plurality of Ethernet segments. Each Ethernet frame transmitted by any of the Ethernet segments is fragmented into a sequence of ATM cells, which are transmitted by an Ethernet controller associated with the respective segment over the ATM network and delivered to the interconnected Ethernet

controllers. When the cells are received, the controller re-assembles them into frames and transmits the frames over the respective Ethernet segment to the end stations. While this patent partially addresses the problems of bandwidth and cost, it does not provide a method and system for transmitting ATM cells in Ethernet frames, for  
5 taking advantage of the ATM capabilities.

There is a need to provide an improved network communication system with minimal displacement of existing network components, capable of providing large bandwidth to the end  
10 stations for data, video and voice traffic, and providing LAN access to switched point-to-point WAN links.

International application No. PCT/CA95/00029 (WO 95/20282) (by Burwell et al. published on July 27, 1995 and assigned to Newbridge Networks Corporation) discloses a communication network  
15 comprising ATM switches interfaced with LANs, the ATM cells being encapsulated in LAN frames and being delivered in encapsulated form over the Ethernet LAN direct to the end station. In another embodiment, the LAN interface adapter of the end station provide bridging, network layer functions and LAN emulation functions to  
20 permit transparent communication between the end stations over the ATM network. The interface adapter, also defined as a "ridge (bridge/router) creates frames from ATM cells and vice-versa.

However, the method disclosed in the above patent layers ATM carriage on top of the Ethernet layer. This is to say, ATM information  
25 only appears within the Ethernet payload, imposing an extra layer of indirection and frame processing on ATM handing at the LAN/WAN boundary.

#### Summary of the Invention

30 It is an object of this invention to provide a mechanism for transmitting ATM cells in Ethernet frames for interworking of ATM

backbone networks with the large base of legacy equipment, and for re-establishing access to an ATM network for a LAN.

It is another object of the invention to provide an addressing convention for carriage of ATM over Ethernet to a specified end  
5 station.

This invention is based on the fact that although an Ethernet MAC address is normally globally unique for universal interoperability, it does not absolutely have to be for a closed Ethernet to work. Uniqueness of the address within the Ethernet broadcast  
10 domain itself is necessary. According to this invention, an Ethernet end station is allowed to assume multiple MAC level identifiers on a single Ethernet interface. These identifiers which are dynamically assigned, have only transitory significance on the Ethernet.

Accordingly, the invention provides a multiplexer (E-Mux) for  
15 encapsulating ATM cells into a LAN frame, comprising a segmentation and reassembly unit for receiving a plurality of incoming ATM cells with a LAN destination address and generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU); a PDU manager for receiving the AAL5 PDU and extracting an AAL5 payload; a header processor for  
20 extracting a traffic type indicator from the header of the PDU; an address processor for extracting the LAN destination address from the header of an incoming ATM cell; and a frame manager for receiving the traffic type indicator, the AAL5 payload and the LAN destination address and generating an incoming LAN frame.

25 The invention also provides a multiplexer (E-Mux) for segmenting a LAN frame into a plurality of ATM cells, comprising: a frame manager for receiving an outgoing LAN frame with an ATM destination address and de-assembling it into a traffic type indicator, an AAL5 payload and an ATM destination address; a header processor for  
30 receiving the traffic type indicator from the frame manager; a PDU manager for receiving the AAL5 payload and the traffic type indicator and generating an ATM adaptation layer 5 (AAL5) protocol data unit

(PDU); an address processor for receiving the ATM destination address from the frame manager; and a segmentation and reassembly unit for receiving the PDU and the ATM destination address generating a plurality of ATM cells with the ATM destination address.

5           According to another aspect of the invention, there is provided a telecommunication network comprising a LAN with a plurality of end-stations connected over a transmission medium and an ATM network, comprising: a multiplexer (E-Mux) for encapsulating a plurality of  
10           ATM cells received from the ATM network into an incoming LAN frame and for segmenting a LAN frame received from the LAN network into a plurality of outgoing ATM cells; an E-Mux-to-LAN interface for adapting the transmission format of the LAN frame for transmission over the connection medium of an LAN network; an  
15           ATM-to-E-Mux interface for adapting the transmission format of the ATM cells received from an ATM network for processing by the E-Mux; an address controller at each end station for forwarding the incoming LAN frame to the end station when a destination address comprised in the destination MAC field of the LAN frame is recognized by the address controller, and for inserting an ATM destination address into  
20           the source MAC field of the outgoing frame.

          A method for transmitting information from an ATM network to an Ethernet network using an E-Mux is also disclosed, the method performing the steps of: establishing connection between an ATM switch of the ATM network and an end station of the Ethernet network  
25           based on a VPI/VCI destination address in the header of an incoming ATM cell; receiving a plurality of incoming ATM cells with the destination address, and generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU) with a segmentation and reassembly unit; extracting an AAL5 payload from the PDU with a PDU manager;  
30           extracting a traffic type indicator from the header of the PDU with a header processor; generating with a frame manager an incoming Ethernet frame using the traffic type indicator, the AAL5 payload and

the destination address; and transmitting the Ethernet frame over the Ethernet network to the end station according to the destination address.

According to still another aspect of the invention, there is provided a method for transmitting information from an Ethernet network to an ATM network using an E-Mux performing the steps of: establishing connection between an end station of the Ethernet network and an ATM switch of the ATM network based on a VPI/VCI destination address provided by the end station; generating an outgoing Ethernet frame at the end station and transmitting same to the E-Mux; extracting from the Ethernet outgoing frame a traffic type indicator, a frame payload and a source address, with a frame manager; generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU) with a segmentation and reassembly unit from the frame payload and a traffic type indicator extracted from the type field of the outgoing frame with a header processor; segmenting the PDU into a plurality of outgoing ATM cells and inserting a VPI/VCI destination address in the header of the cells from an address processor.

Advantageously, the system and method of the invention provides a highly efficient carriage of ATM information to an end station using actual MAC address space in the Ethernet frame.

Because the frames are not pre-packaged into AAL5 PDUs at the end station, but at the E-Mux, the system of the invention is efficient, as custom hardware to perform this function does not need to be deployed at each Ethernet connected end station, and the end station software is not burdened with this task. Custom hardware to perform SAR (segmentation and reassembly) function is built into the E-Mux.

Still another advantage of the invention is that legacy Ethernet can coexist with ATM LAN to UNI traffic. ATM intelligence can be distributed in such a LAN segment. For meshed PVC/UBR type connections, standard packet formats and driver interfaces may be used between layer 3 and the Ethernet interface, making the invention

applicable to various LAN technologies. No additional information needs to be propagated outside the system of the invention. Therefore, this permits the system to be tailored as an application specific ATM to Ethernet interface.

5           Still another advantage of the invention is that the Ethernet frame is efficiently used since the ATM routing information is embedded in the Ethernet MAC addressing field. No additional ATM header within the Ethernet payload is necessary, since the entire ATM semantics is not carried to the end station. This does not preclude,  
10 however, additional semantics being packaged in a separate header in the Ethernet frame.

          ATM virtual circuit (VC) address mapping is carried forward into the Ethernet domain. Intermediate steps are not required to map Ethernet MAC to VC, as VC information flows end-to-end. For  
15 uncommitted bit rate (UBR) data services, only the ATM path identifier need to be carried forward across an Ethernet LAN.

          As a result, Ethernet traffic can coexist-exist with ATM LAN to UNI traffic. As indicated above, each Ethernet connected station may assume multiple IDs on the LAN at the MAC level. Thus, for  
20 traditional, non-ATM traffic, it retains the manufacturers MAC address built into the Ethernet interface at the factory. For ATM traffic, it assumes one or more IDs depending on the ATM virtual circuits which ultimately terminate at that particular end station interface.

#### 25 Brief Description of the Drawings

          The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of the preferred embodiments, as illustrated in the appended drawings, where:

30           **Figure 1A** shows the convergence and segmentation and reassembly functions of ATM (prior art);

**Figure 1B** shows an ATM network for defining the terms virtual channel and virtual path (prior art);

**Figure 1C** shows an Ethernet frame (prior art);

**Figure 2** shows the block diagram of the E-Mux;

5 **Figure 3A** shows the processing of the ATM cells to produce an incoming Ethernet frame;

**Figure 3B** shows the processing of an outgoing Ethernet frame to produce ATM cells;

10 **Figure 4A** is a the flow-chart illustrating the assembly of the ATM cells to produce an Ethernet frame;

**Figure 4B** is a the flow-chart illustrating the segmentation of the Ethernet frame to produce ATM cells;

**Figure 5** shows the block diagram of a variant of the E-Mux;

15 **Figure 6A** shows the processing of the ATM cells to produce an incoming Ethernet frame according to the variant of Figure 5; and

**Figure 6B** shows the processing of an outgoing Ethernet frame to produce ATM cells according to the variant of Figure 5.

#### Description of the Preferred Embodiment

20 Figures 1A, 1B, and 1C are provided for defining and illustrating some of the terms necessary for describing the present invention and its mode of operation.

Figure 1A shows the convergence function, and the segmentation and reassembly (SAR) function of ATM. The convergence function is responsible for accepting the user traffic which could range from one to maximum 65,000 bytes, and placing a header 10 and a trailer 12 around it to obtain a protocol data unit (PDU) 2. For this invention, the payload field of the PDU is limited to 1,500 bytes, which is the size of the Ethernet payload field. To push PDU beyond 25 Ethernet limit of 1,500 bytes will require an additional header in the Ethernet frame. The length of the header and trailer is between 6 and 30 40 bytes. Once the header and the trailer have been added to the user

payload, the traffic is segmented into 44-48 bytes data units 14. Next, the adaptation layer adds a header 16, and possibly a trailer 18 to the data unit 14, depending on the type of payload being supported. In any event, the final data unit from this operation is always a 48 octet block  
5 20. Finally, the last operation is performed by the data link layer which adds a five-octet header 22 to the 48-octet payload 20 resulting in a 53 bytes cell 24. Each cell is transported over the physical layer between two ATM switches designated by the address information in header 22.

Figure 1B shows a basic linear point-to-point ATM network  
10 configuration where the connections are identified through virtual channel identifiers (VCI) and virtual path identifiers (VPI) in the ATM cell header. Switching in the ATM network is illustrated at 5, 7, and 9. A virtual channel connection (VCC) 11 has end-to-end significance between end users A and B. A virtual path connection (VPC) has  
15 significance between adjacent ATM devices, 5, 7, and 9, and switching is performed very quickly through the use of a routing table.

Figure 1C illustrates an Ethernet frame. Ethernet end stations are addressed globally and uniquely by the MAC address. Field 28 comprises the destination MAC and field 30 comprises the source  
20 MAC. The MAC address is has a 24 bit organizationally unique identifier (OUI) 38, 42 and a 24 bit end station identifier 40, 44.

A type field 32 is provided for specifying the traffic type.

The payload field 34 may comprise up to 1500 bytes. The frame begins with a training sequence 26 for allowing receiver  
25 synchronization and ends with a frame check sequence 36, for determining the integrity of the data in the frame.

Figure 2 shows the block diagram of the system according to the invention. An E-Mux 21 exchanges ATM cells with an ATM UNI 27, which is connected in turn to an ATM network 23. E-Mux 21 is also  
30 connected to an Ethernet LAN 25 for exchanging frames. By convention, the traffic travelling from ATM network 23 to LAN 25 is



defined by the term "incoming", and the traffic travelling from LAN 25 to ATM network 23 is defined by the term "outgoing".

According to the invention, a unique MAC OUI is established for extending ATM path addressing into the Ethernet MAC address domain. This unique MAC OUI identifies the traffic as ATM UNI. The ATM OUI is inserted in both the destination and the source MAC fields 38 and 42. The OUI field informs LAN 25 that the traffic is coming from a source not registered to it, so as to treat it accordingly. As indicated earlier, this permits the ATM traffic to coexist with traditionally addressed Ethernet traffic.

E-Mux 21 associated to LAN 25 also requires a unique ID in the destination MAC, such that incoming traffic can be uniquely addressed to it. The ID could be for example VPI=0, VCI=0, which is never used in the ATM network 23. This unique address, ATM OUI, VPI=0, VCI=0, is mapped into the source MAC field 30 of an incoming frame and in the destination MAC of an outgoing frame. This is described next in connection with Figures 3A, which shows the processing of the ATM cells to produce an incoming Ethernet frame and Figure 3B, which shows the processing of an outgoing Ethernet frame to produce ATM cells.

Each end station has an VPI/VCI address for the ATM traffic used to establish connection between a switch in the ATM network and an end station through signalling in a known manner. For the incoming traffic, a flow of cells 24, addressed to an end station 39, 39', 39" in Ethernet network 25 is received at UNI 27 from network 23. The cells are assembled into a PDU 2 by SAR unit 29 of E-Mux 21.

PDU 2 comprises a AAL5 payload field 14 for receiving the payload from the incoming cells 24, the size of the payload field being limited to the maximum size of field 34 (up to 1500 bytes) of an Ethernet frame 3. Although the normal ATM AAL5 protocol data unit (PDU) is quite large, as discussed in connection to Figure 1, it can be constrained to fit within the 1500 bytes of an Ethernet frame.

Since the size of the PDU is restricted to the payload field length of a frame, the cell segmentation function is performed by SAR 29 at boundary to the ATM network, such that the need for additional PDU information to be carried in the payload portion of the Ethernet frame is obviated. This differs from the cell-in-frame (CIF) approach in which the SAR function is performed at the end station, and then the cells are reassembled into Ethernet frames for transmission.

A PDU manager 31 strips the LLC/SNAP (Logical link control, sub-network attachment point) header of the PDU 2 and provides it to a header processor 37, which determines the type of the payload. The payload and the payload type are forwarded to a frame manager 33.

Frame manager 33 generates the Ethernet frame 3 by mapping the payload into field 34 and the payload type into field 32. Frame manager 33 also receives the address of the destination end station from an address processor 35, and maps this information into field 40 of destination MAC. This address is a concatenation of the VPI/VCI address extracted from the cell header 22. As well, address processor 35 maps the address of the E-Mux in the source MAC field 30, namely ATM OUI and VPI=0, VCI=0 in fields 40 and 42, respectively. As such, for the incoming traffic, the source MAC field of frame 3 comprises the address of the E-Mux, and the destination MAC comprises the address of the end station in the Ethernet.

Frame manager 33 sends frame 3 assembled as indicated above, over the Ethernet network 25. An interface 47 is provided for adapting the format of the frame to the connection medium of Ethernet 25.

In general, each "ATM aware" end station 39, 39', 39" is provisioned with an address controller, as shown at 41, 41', 41", which allows the end station to signal the network to request/accept connections. As well, address controller 41, 41', 41" provides the range of VPI/VCI values that could be assigned for such connections to the associated end station 39, 39', 39 to a defined subset of the whole VPI/VCI's allocated for UNI 27. An address controller 41, 41', 41"

recognizes a destination ID as being its own, using a look-up table, and directs frame 3 to the associated end station 39, 39', 39".

For the outgoing direction, an end station 39, 39', 39" generates an outgoing frame 3, with the destination MAC indicating the ATM OUI address of E-Mux 21, rather than the address of another end station in the Ethernet network 25. As such, the corresponding Ethernet interface transmits the outgoing frame to E-Mux 21. The source MAC ID field 44 comprises the VCI/VCI address, of the destination ATM device in ATM network 23.

Now, frame manager 33 receives the frame from interface 47, segments the frame and provides the payload to PDU manager 31, the VPI/VCI address to address processor 35 and the type information from field 32 to header processor 37. PDU manager 31 generates a PDU 2 by inserting the payload received from frame manager 33 into field 14, and the type information from header processor 37 into LLC/SNAP header field 16. PDU is then forwarded to SAR 29 which segments the PDU 2 into cells 24, for UNI 27. Address processor 35 inserts the VPI/VCI address from the source MAC ID field 44 into each cell header, so that ATM network 23 switches the cell accordingly.

A simple example of this technique would be that end station 39 has established an ATM connection on VCI=5, VPI=7. For all traffic that is to be directed beyond the Ethernet onto the ATM network 23, end station 39 would set the destination MAC address in the Ethernet frame to that of the E-Mux 21, which is ATM-OUI, VPI=0, VCI=0, and would identify the virtual circuit via the source MAC, which will show ATM-OUI, VPI=7, VCI=5, identifying the source as the owner of that VCC. Traffic flowing in the direction from E-Mux 21 to end station 39, would see the source and destination addresses reversed.

As a simple extension of this concept, an Ethernet station, when originating signalling, may use the source MAC field for the normal Ethernet MAC and the destination MAC field for the ATM-OUI and '0'. The source MAC field permits an E-164 encoded NSAP to give the

Ethernet connected end station a unique identification in the ATM network. In this way, the E-Mux can arbitrate and aggregate signalling onto a standard UNI from multiple Ethernet connected devices.

Additional overhead is eliminated by performing the ATM  
5 AAL5 protocol encapsulation at the E-Mux (e.g. normal protocol encapsulation for AAL5 as defined by RFC1483). Thus, an encapsulation of the cells into a PDU frame is effected by PDU manager 31, and an encapsulation of the PDU into an Ethernet frame is effected by the frame manager 33, such that the Ethernet end station does not  
10 have to be ATM protocol aware, or perform CRC (cyclic redundancy check) and SAR (segmentation and reassembly) functions.

Figure 4A is a the flow-chart illustrating the processing of the ATM cells to produce an Ethernet frame. In step 100, a connection between the station in the ATM network and the E-Mux 21 is  
15 established based on the ATM address of the E-Mux. An address controller, lets say 41, recognizes its associate end station as the owner of the VPI/VCI, and station 39 establishes communication with ATM network 2, shown in step 110.

When E-Mux 21 receives a flow of ATM cells over a specific VC,  
20 as shown in step 120, it assembles the cells into a PDU, step 130, verifies that the AAL5 CRC is correct, in step 140, and maps the payload into the payload portion of the Ethernet frame in step 150. The destination MAC is set in field 28 to ATM OUI, VCI/VPI in step 160 to uniquely identify the owner of that particular path on the LAN, and the source  
25 MAC is set to that of the E-Mux, namely ATM OUI 0x00, in step 170.

The E-Mux broadcasts the Ethernet frame onto the Ethernet network in step 180. Station 39 with ID VPI/VCI in the destination MAC receives the frame, while other stations 39', 39'' on the Ethernet, receive the frame and discard it as they are not addressed to them, as  
30 shown in step 190.

Figure 4B shows a the flow-chart illustrating the processing of an Ethernet frame to produce ATM cells.

First, in step 200, an end station, for example station 39 originates a message to be sent, for example, over VCI=5, VPI=7. It prepares an Ethernet frame as shown in Figure 3B directed to the E-Mux by inserting the ATM OUI in fields 38 and 42, the VPI=0, VCI=0 address in the destination MAC field 40 and inserts the ATM virtual circuit address information in the source MAC address field 44.

In step 210, station 39 broadcasts the frame on the Ethernet. Other stations on the Ethernet receive the frame, check the destination MAC in step 220, and discard it in step 230, as they are not the addressed recipients of this frame.

E-Mux 21 receives the frame in step 240, and as the recipient, keeps the frame. It performs ATM AAL5 PDU and SAR processing on the payload steps 250 and 260, extracts the ATM virtual circuit address information from the frame source MAC and inserts it into the cell headers in step 270. The resulting cells are transmitted in step 280 over the address specified by the VPI/VCI address information.

Additional processing could be performed during processing of the cells from the Ethernet frames. For example, an Ethernet II/DIX format frame could be converted to RFC1483 encapsulation prior to AAL5 and SAR handling as an additional interworking step.

The invention may be used for providing ATM WAN (wide area network) access from a LAN. This permits a LAN connected computer to establish unique and private WAN connections, while maintaining access to all legacy services deployed on the non-ATM aware portions of the local LAN.

Use of Ethernet networks as a distributed multiplexer backbone over several shelves of equipment, permits an Ethernet to be used as the media to demultiplex an ATM UNI over a collection of devices distributed over a large area (e.g. up to 6000 feet for 10BaseT). The typical application would see shelf and line card encoded in the ATM VPI/VCI addressing scheme to permit static de-multiplexing of the UNI.

A variation of the E-Mux of the invention can function as an ATM to Ethernet multiplexer, as shown in Figure 5.

This variant provides for a highly scaleable and optionally redundant UNI termination for IP (Internet Protocol). The automated association of IP to VCI/VPI can be utilized to produce ATM interfaces for IP protocol based devices which can support significantly more virtual circuits than are currently available. This eliminates the requirement for the address controllers 41, 41', 41" residing in the attached end station 39, 39', 39". This also moves the IP->ATM association from the custom hardware in the Ethernet interface 43, 43', 43", to the traditional Ethernet ARP cache resident on the end station. Current ATM interfaces are limited to between 500 and 2000 VCs. This invention permits interfaces for relatively low bandwidth connections (as for an ATM based element management channel) to scale up to more than 50,000 virtual circuits.

In this case the E-Mux 50 assumes the OUI/VPI/VCI identifiers and the attached end station retains its normal MAC address. Figure 6A shows the processing of the ATM cells to produce an incoming Ethernet frame and Figure 6B illustrates the processing of an outgoing Ethernet frame to produce ATM cells, for E-Mux 50.

For the incoming traffic source OUI field 42 contains the ATM OUI to indicate to the end station that traffic comes from the ATM network 23. The VPI/VCI address from the cell header 22 is mapped by E-Mux 50 into the source ID field 44. The destination MAC field 28 comprises the Ethernet MAC of the station recipient of the respective frame.

For the outgoing traffic, Figure 6B shows that the end station inserts the ATM OUI identification in field 38 of the destination MAC field 28 and the VPI/VCI address of the destination station in the ATM network 23 in field 40 of the destination MAC. The E-Mux 50 inserts the VPI/VCI address into the cell headers, so that the cells are switched accordingly in network 23. The source MAC field 30 comprises the

Ethernet address of the end station in the Ethernet network that generated the respective frame.

There are numerous ways by which the embodiment of Figure 5 can learn the Ethernet MAC address of the attached end stations.

5 Alternatively, the Ethernet all-stations broadcast address can be used.

The generalized operation is that an attached end station learns the IP->MAC association for devices remotely connected to the ATM network as it would for a normal Ethernet. However, the MAC addresses presented actually contain VPI/VCI information by which  
10 those devices can be reached. The attached host is "spoofed" into having an Ethernet layer 2 address mapping for ATM connected devices such that Ethernet address resolution and forwarding mechanisms make ATM attached devices reachable.

This invention can also be used to provide hot standby backup  
15 platforms. Normally an ATM connection is unique and cannot automatically be locally switched to another platform. The availability of Ethernet as a broadcast medium permits the ATM traffic to be fanned out to multiple devices simultaneously and only acted upon by the current "active" platform.

20 While the invention has been described with reference to particular example embodiments, further modifications and improvements which will occur to those skilled in the art, may be made within the purview of the appended claims, without departing from the scope of the invention in its broader aspect.

**WE CLAIM:**

1. A multiplexer (E-Mux) for encapsulating ATM cells into a LAN frame, comprising:
  - 5 a segmentation and reassembly unit for receiving a plurality of incoming ATM cells with a LAN destination address, and generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU);
    - a PDU manager for receiving said AAL5 PDU and extracting an AAL5 payload;
    - 10 a header processor for extracting a traffic type indicator from the header of said PDU;
      - an address processor for extracting said LAN destination address from the header of an incoming ATM cell; and
      - a frame manager for receiving said traffic type indicator, said AAL5 payload and said LAN destination address and generating an incoming LAN frame.
- 20 2. A multiplexer as claimed in claim 1, wherein said LAN is an Ethernet network and said incoming LAN frame is an Ethernet frame.
3. A multiplexer (E-Mux) for segmenting a LAN frame into a plurality of ATM cells, comprising:
  - 25 a frame manager for receiving an outgoing LAN frame with an ATM destination address and de-assembling it into a traffic type indicator, an AAL5 payload and an ATM destination address;
    - a header processor for receiving said traffic type indicator from said frame manager;
    - a PDU manager for receiving said AAL5 payload and said traffic type indicator and generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU);
    - 30 an address processor for receiving said ATM destination address from said frame manager; and



a segmentation and reassembly unit for receiving said PDU and said ATM destination address generating a plurality of ATM cells with said ATM destination address.

5           4. A multiplexer as claimed in claim 3, wherein said LAN is an Ethernet network and said outgoing LAN frame is an Ethernet frame.

          5. A multiplexer as claimed in claim 2, further comprising:  
          an E-Mux-to-Ethernet interface for formatting said Ethernet  
10       frame for transmission over the connection medium of an Ethernet network; and

          an ATM-to-E-Mux interface for formatting said ATM cells received from an ATM network for processing by said E-Mux.

15           6. A multiplexer as claimed in claim 4, further comprising:  
          an E-Mux-to-ATM interface for formatting said ATM cells for transmission over the medium of an ATM network; and  
          an Ethernet-to-E-Mux interface for formatting said Ethernet  
          frame received over a transmission medium of an Ethernet network  
20       for processing by said E-Mux.

          7. An Ethernet network comprising a plurality of end stations and an Ethernet/ATM interface connected over a transmission medium, each end station comprising an address controller for  
25       forwarding an incoming LAN frame received from said Ethernet/ATM interface ATM network to said end station when a destination address comprised in the destination MAC field of said frame is recognized by said address controller, and for inserting an ATM destination address into the source MAC field of an outgoing frame destined to said  
30       Ethernet/ATM interface.

8. A telecommunication network comprising a LAN with a plurality of end-stations connected over a transmission medium and an ATM network, comprising:

5 a multiplexer (E-Mux) for encapsulating a plurality of incoming ATM cells received from said ATM network into an incoming LAN frame and for segmenting an outgoing LAN frame received from said LAN network into a plurality of outgoing ATM cells;

10 an E-Mux-to-LAN interface for formatting said incoming LAN frame for transmission over the connection medium of said LAN network, and for formatting said outgoing Ethernet frame received over the connection medium of said LAN network for processing by said E-Mux;

15 an ATM-to-E-Mux interface for formatting of said incoming ATM cells received from said ATM network for processing by said E-Mux, and for formatting said outgoing cells for transmission over the medium of said Ethernet network; and

20 an address controller at each end station for forwarding said incoming LAN frame to said end station when a destination address comprised in the destination MAC field of said incoming LAN frame is recognized by said address controller, and for inserting an ATM destination address into the source MAC field of said outgoing LAN frame, when said outgoing LAN frame is destined to said ATM network.

25 9. A method for transmitting information from an ATM network to an Ethernet network using an E-Mux performing the steps of:

30 establishing connection between an ATM switch of said ATM network and an end station of said Ethernet network based on a VPI/VCI destination address in the header of an incoming ATM cell;

receiving a plurality of incoming ATM cells with said destination address, and generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU);

extracting an AAL5 payload from said PDU;

5 extracting a traffic type indicator from the header of said PDU;

generating an incoming Ethernet frame using said traffic type indicator, said AAL5 payload and said destination address; and

transmitting said Ethernet frame over said Ethernet network to said end station according to said destination address.

10

10. A method as claimed in claim 9, wherein said incoming Ethernet frame comprises:

a destination MAC field including:

a unique ATM OUI identifier indicating that said

15 incoming Ethernet frame comprises ATM traffic; and

said VPI/VCI destination address specifying the address of said end station;

a source MAC field including:

said ATM OUI identifier indicating that said incoming

20 Ethernet frame comprises ATM traffic; and

a unique address of said E-Mux.

11. A method for transmitting information from an Ethernet network to an ATM network using an E-Mux performing the steps of:

25 establishing connection between an end station of said Ethernet network and an ATM switch of said ATM network based on a VPI/VCI destination address provided by said end station;

generating an outgoing Ethernet frame at said end station and transmitting same to said E-Mux;

30 extracting from said Ethernet outgoing frame a traffic type indicator, a frame payload and a source address;

generating an ATM adaptation layer 5 (AAL5) protocol data unit (PDU) from said frame payload and a traffic type indicator extracted from the type field of said outgoing frame; and

5 segmenting said PDU into a plurality of outgoing ATM cells and inserting a VPI/VCI destination address in the header of said cells from an address processor.

12. A method as claimed in claim 11, wherein said outgoing Ethernet frame comprises:

10 a destination MAC field including:

a unique ATM OUI identifier indicating that said outgoing Ethernet frame comprises ATM traffic; and

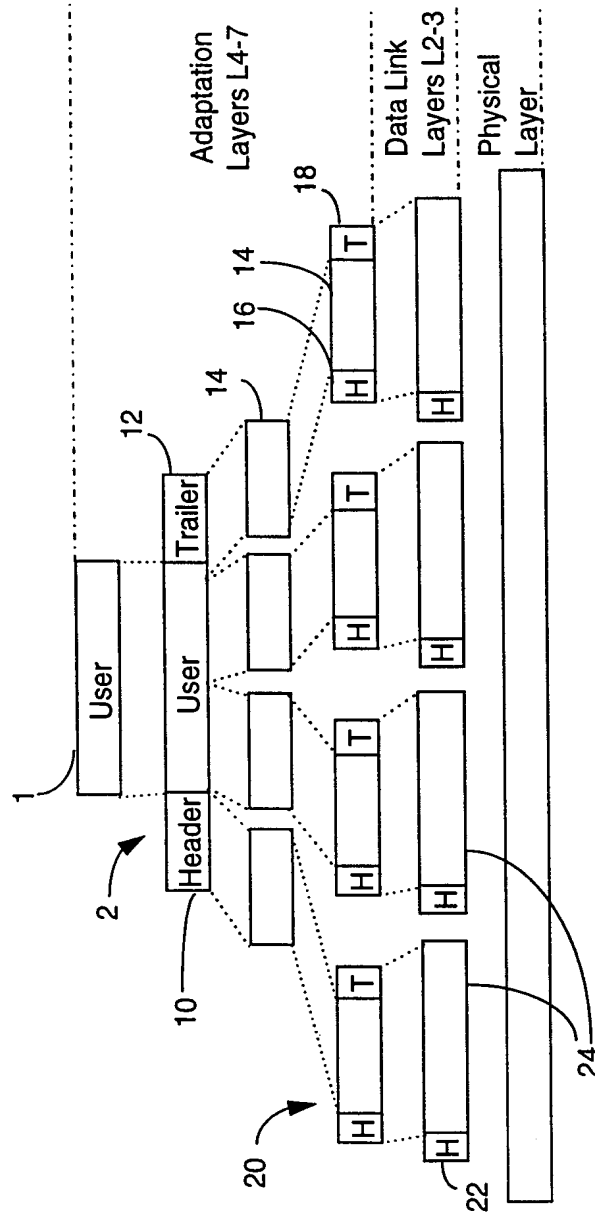
a unique address of said E-Mux;

a source MAC field including:

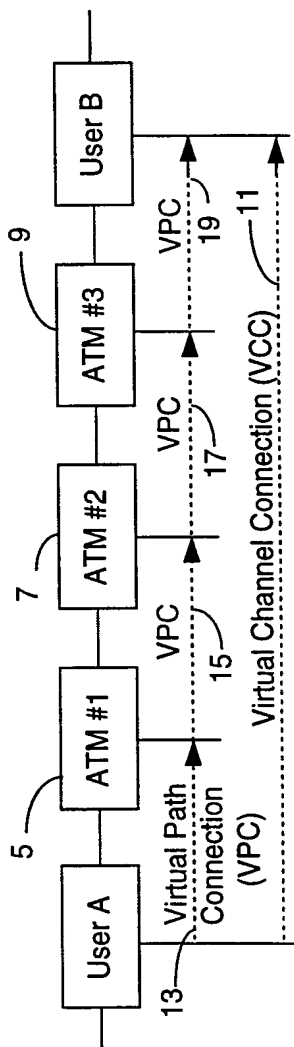
15 said ATM OUI identifier indicating that said outgoing Ethernet frame comprises ATM traffic; and

said VPI/VCI destination address specifying the address of said ATM cell.

**FIGURE 1A**  
(Prior Art)



**FIGURE 1B (Prior Art)**



**FIGURE 1C (Prior Art)**

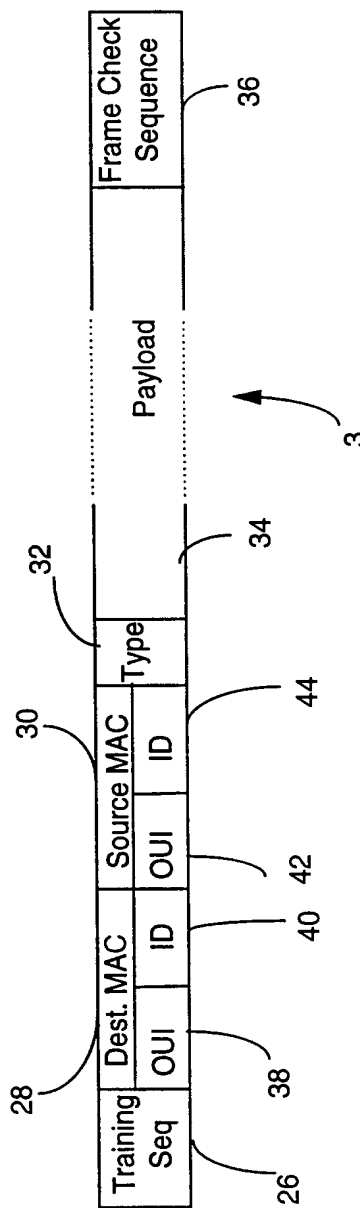


FIGURE 2

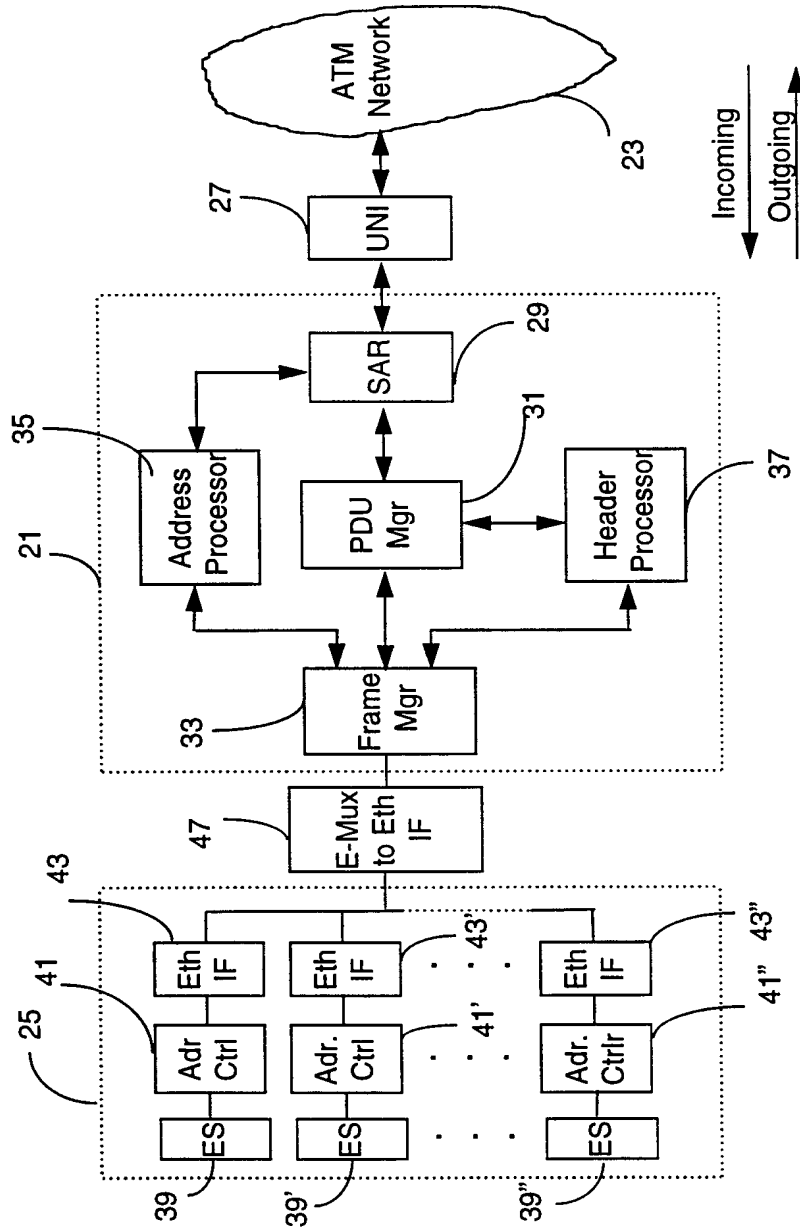
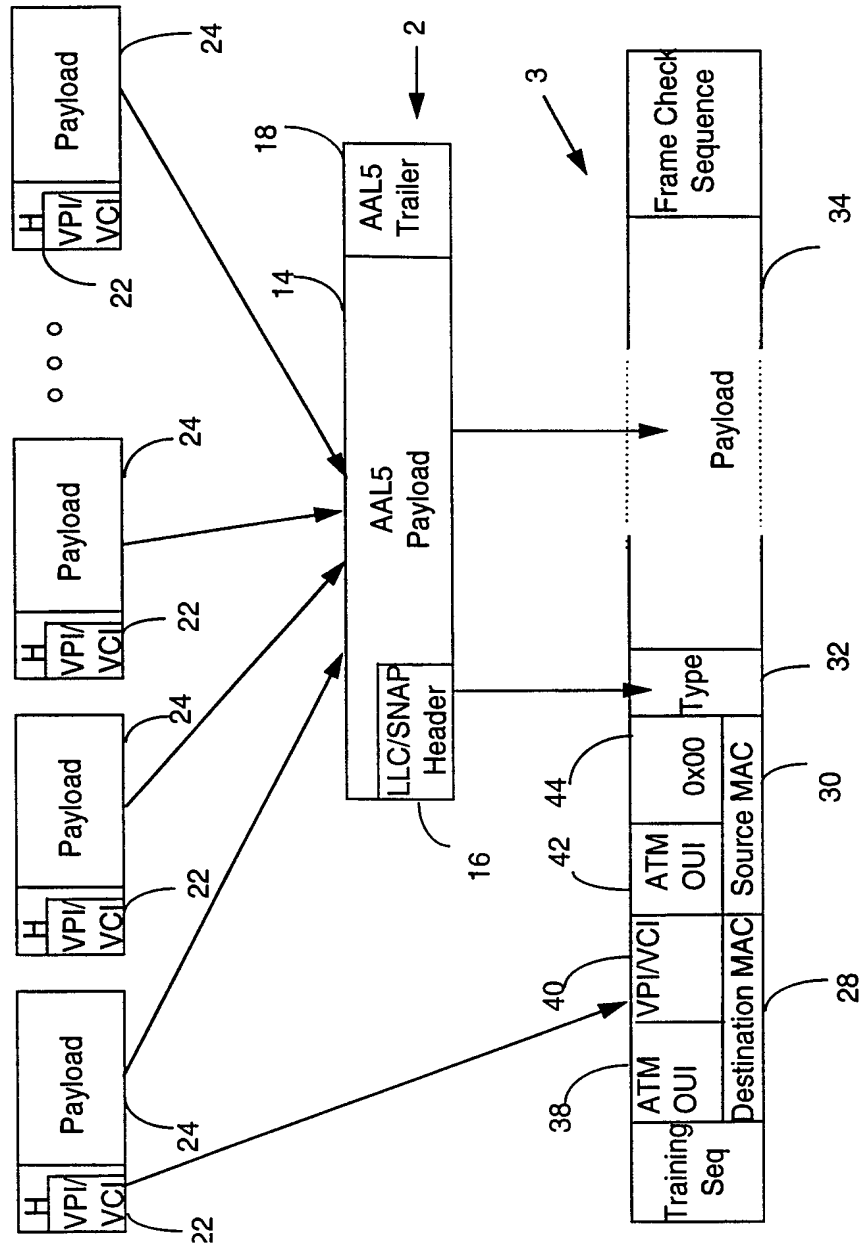
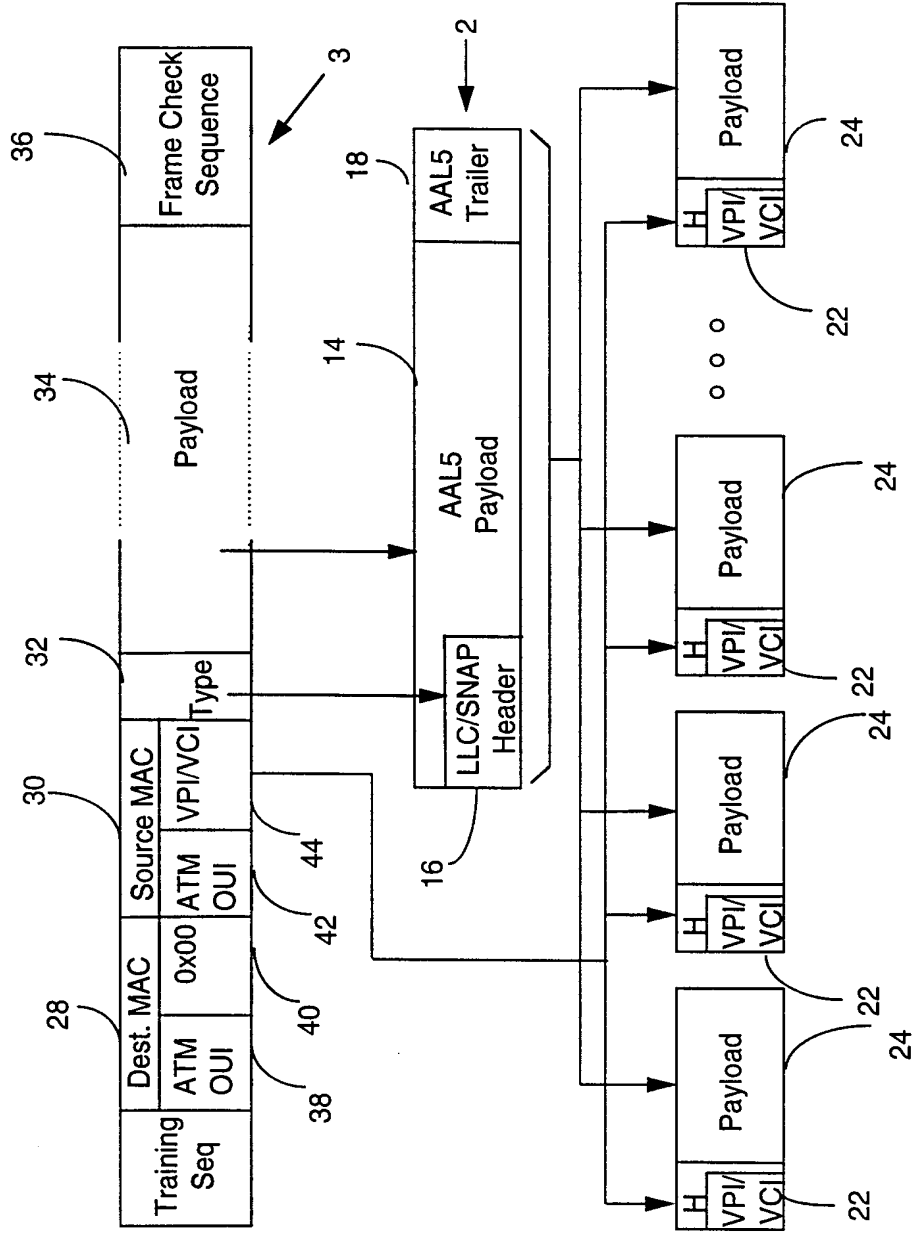


FIGURE 3A

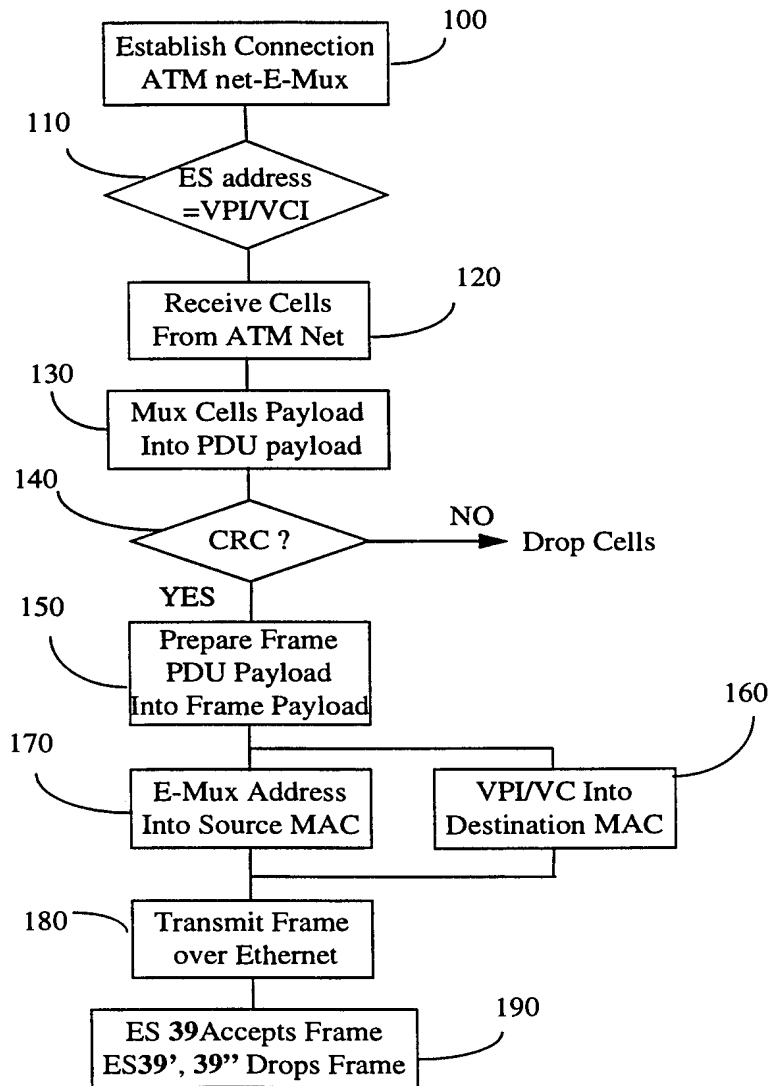




**FIGURE 3B**



**FIGURE 4A**



**FIGURE 4B**

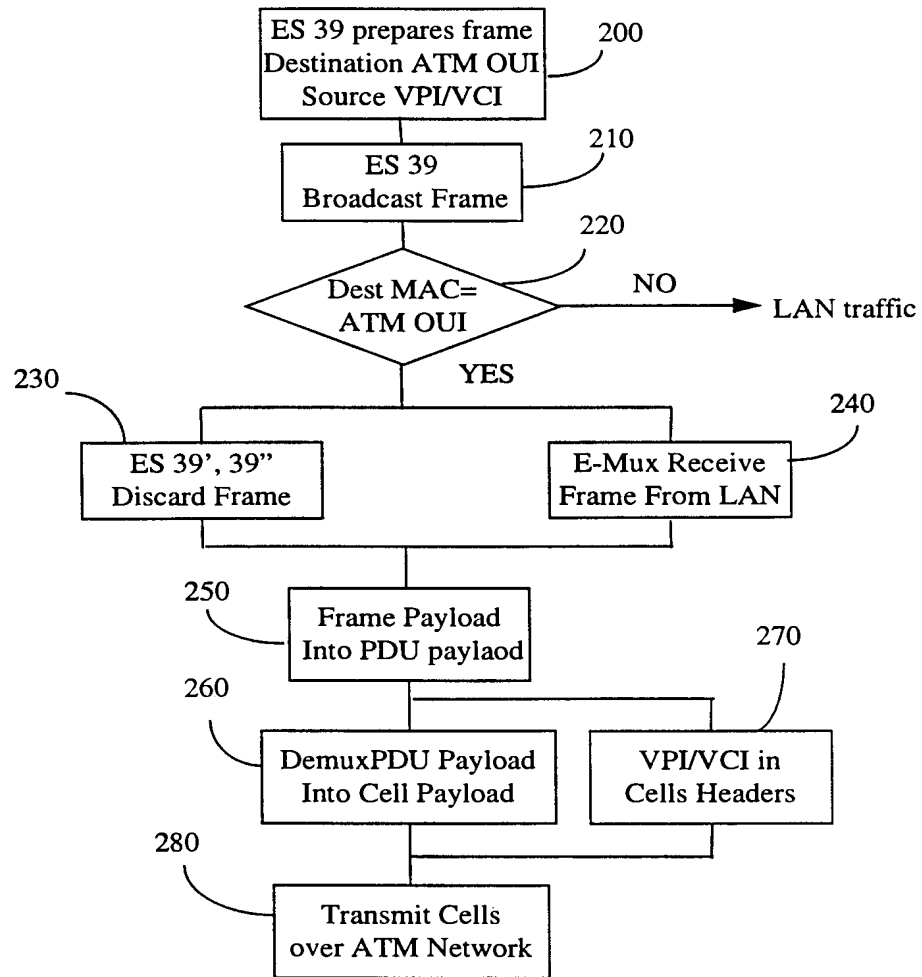


FIGURE 5

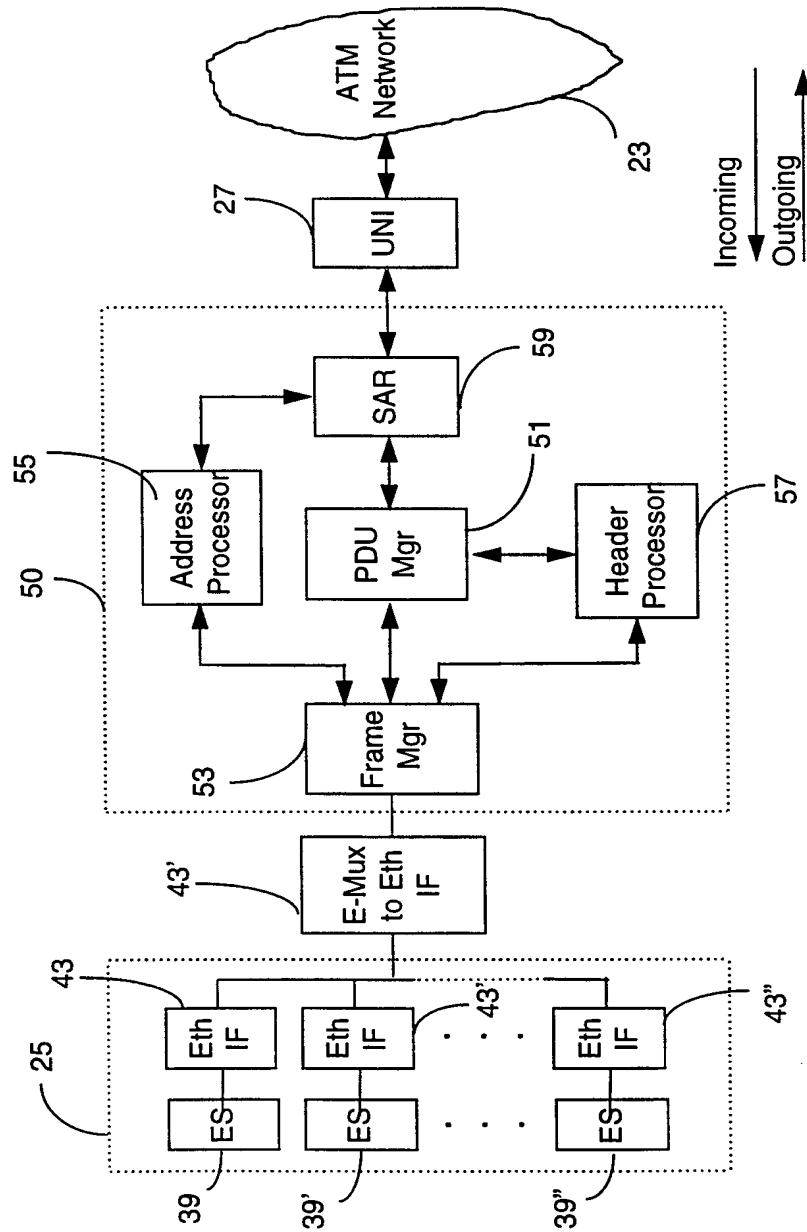
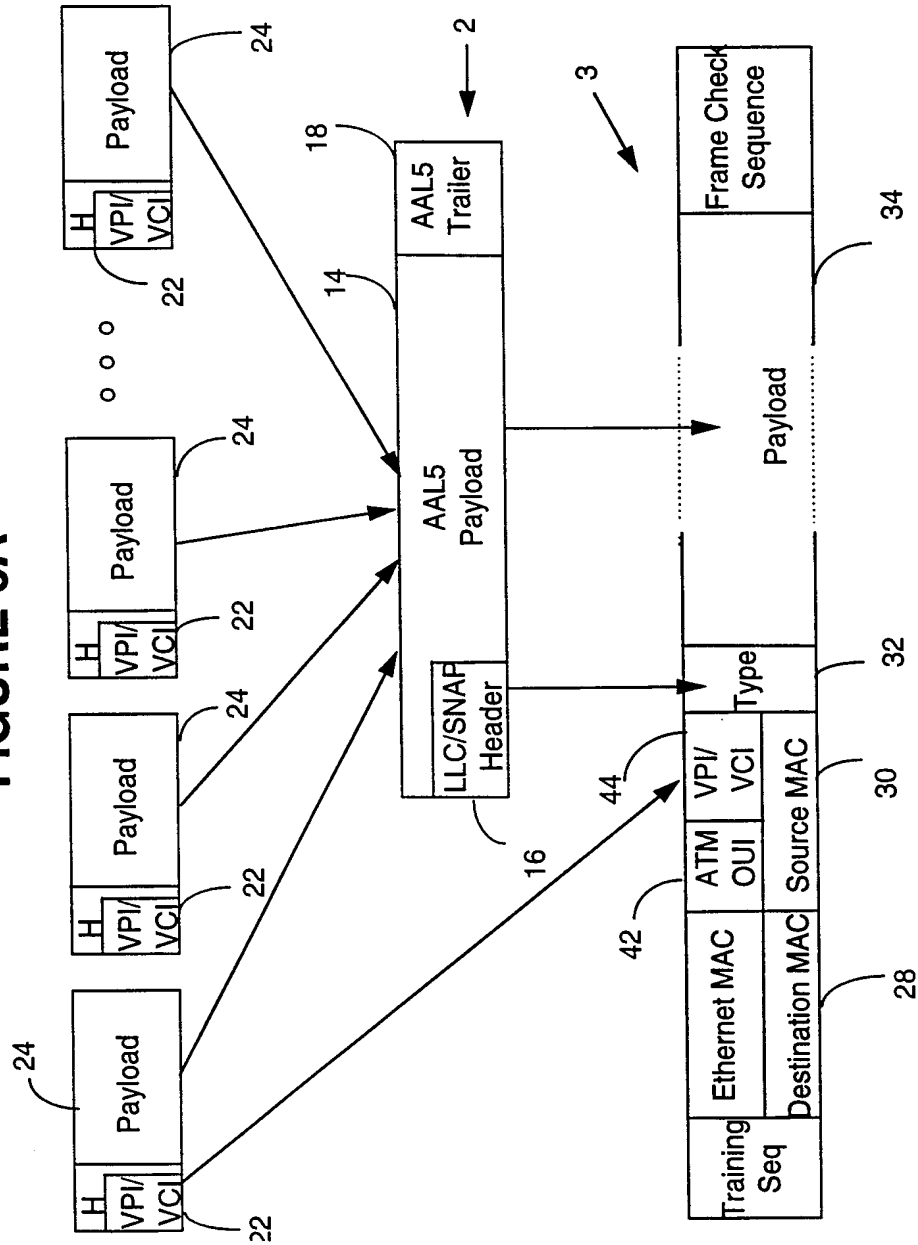
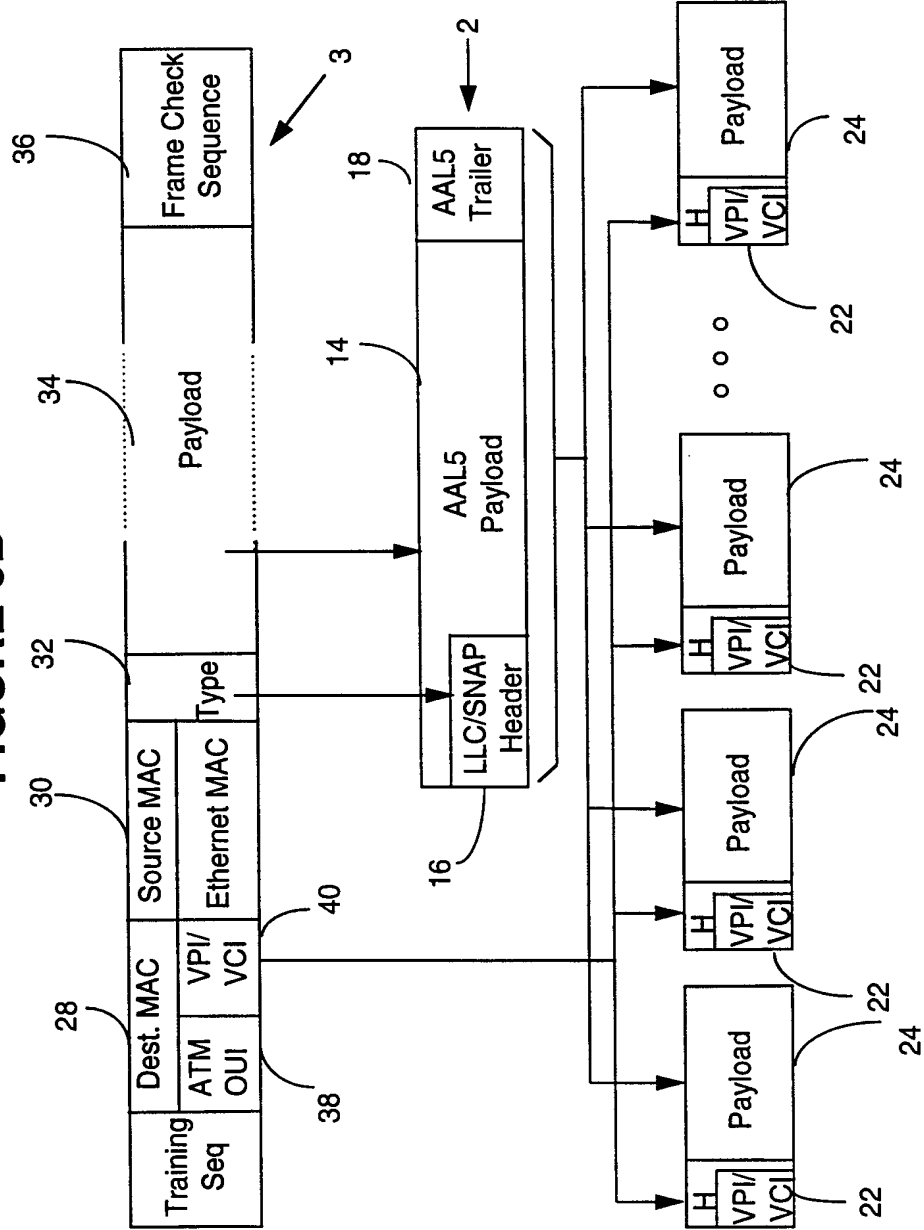


FIGURE 6A



**FIGURE 6B**



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 98/00197

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 H04L12/66 H04Q11/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 H04L H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CASTRO R ET AL: "SUPPORT OF DATA COMMUNICATIONS IN AN ATM LAN" INFORMATION NETWORKS AND DATA COMMUNICATION, PROCEEDINGS OF THE IFIP TC6 INTERNATIONAL CONFERENCE ON INFORMATION NETWORKS AND DATA COMMUNICATION, FUNCHAL, MADEIRA ISLAND, PORTUGAL, APR. 18 - 21, 1994, no. CONF. 5, 18 April 1994, VEIGA P;DIPAK KHAKHAR (EDS ), pages 277-295, XP000593298 see paragraph 2.3.4 --- -/--	1-9, 11

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

17 June 1998

Date of mailing of the international search report

26/06/1998

Name and mailing address of the ISA  
 European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer  
  
 Staessen, B

**INTERNATIONAL SEARCH REPORT**

International Application No PCT/CA 98/00197
---

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>SMITH J C: "10MBPS TO 155MBPS ATM USING THE IDT SARAMTM AS A CONCENTRATOR BROUWER CORE"                      WESCON '94. WESTERN ELECTRONIC SHOW AND CONVENTION, ANAHEIM, SEPT. 27 - 29, 1994, 27 September 1994, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, pages 495-502, XP000532615                      paragraph "ATM Packet structuring"</p> <p align="center">---</p>	1-12
A	<p>MIRCHANDANI V ET AL: "AN INTERNETWORKING ARCHITECTURE FOR INTEGRATED VOICE AND DATA COMMUNICATIONS"                      PROCEEDINGS OF THE REGION 10 ANNUAL INTERNATIONAL CONFERENCE (TENCO, SINGAPORE, 22 - 26 AUG., 1994, vol. VOL. 2, no. CONF. 9, 22 August 1994, CHAN T K Y (ED ), pages 749-753, XP000528218                      see paragraph 3</p> <p align="center">---</p>	1-12
A	<p>CAMARDA P ET AL: "A ROUTER FOR THE INTERCONNCETION OF ETHERNET LOCAL AREA NETWORKS VIA AN ATM NETWORK"                      PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INTEGRATED BROADBAND SERVICES AND NETWORKS, LONDON, 15 - 18 OCT., 1990, no. -, 15 October 1990, INSTITUTION OF ELECTRICAL ENGINEERS, pages 283-288, XP000410619                      paragraph "Router Description";</p> <p align="center">---</p>	1-12
A	<p>PAONE R ET AL: "FEASIBILITY MODEL OF A FLEXIBLE BUSINESS CUSTOMER PREMISES NETWORK"                      ELECTRONICS AND COMMUNICATION ENGINEERING JOURNAL, vol. 4, no. 4, 1 August 1992, pages 215-224, XP000307899                      see page 222                      see page 223</p> <p align="center">-----</p>	1-12



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	9762021
<b>Application Number:</b>	11839987
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	9470
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
<b>Filer:</b>	Hasan M. Rashid/Melissa Molchan
<b>Filer Authorized By:</b>	Hasan M. Rashid
<b>Attorney Docket Number:</b>	77580-0066 (VRNK-1CP2DVCN)
<b>Receipt Date:</b>	29-MAR-2011
<b>Filing Date:</b>	16-AUG-2007
<b>Time Stamp:</b>	13:49:08
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	0066IDS.pdf	125965 <small>1e49f81f0da67d59ba4a028047e60183012a066c</small>	no	2

### Warnings:

### Information:

This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	WO9843396.pdf	1348054 02fb89aa88c9d669c72e526b2d6b8ded86400824	no	37
<b>Warnings:</b>					
<b>Information:</b>					
3	NPL Documents	101EPSearchReport.pdf	316610 3c556bd662e25af934512ea23fc10a393885c6e0	no	7
<b>Warnings:</b>					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
<b>Information:</b>					
4	NPL Documents	105EPSearchReport.pdf	216885 f5ee81ea84e25bf6755cf8572244c2c2a61312	no	6
<b>Warnings:</b>					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
<b>Information:</b>					
5	NPL Documents	2NOA0057.pdf	2721824 f8e309ce9dee16e42daecb0b92faae39880f762a	no	34
<b>Warnings:</b>					
<b>Information:</b>					
6	NPL Documents	Hollenbeck.pdf	2638150 c8d6d8db4c54893bb4e2b3e2e62315f1adb77b5	no	34
<b>Warnings:</b>					
<b>Information:</b>					
7	NPL Documents	Tannenbaum.pdf	853980 aef4faaf476d56146d79ce1cc0a775fb29459767	no	18
<b>Warnings:</b>					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>				8221468	

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**



UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

23630 7590 04/04/2011
McDermott Will & Emery
600 13th Street, NW
Washington, DC 20005-3096

EXAMINER
LIM, KRISNA
ART UNIT PAPER NUMBER

2453
DATE MAILED: 04/04/2011

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

11/839,987 08/16/2007 Victor Larson 77580-0066 9470
TITLE OF INVENTION: METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

23630 7590 04/04/2011  
 McDermott Will & Emery  
 600 13th Street, NW  
 Washington, DC 20005-3096

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

11/839,987 08/16/2007 Victor Larson 77580-0066 9470

TITLE OF INVENTION: METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK  
 (VRNK-1CP2DVCN)

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1510 \$300 \$0 \$1810 07/05/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
----------	----------	----------------

LIM, KRISNA 2453 709-227000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). <input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. <input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b>	2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____ (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____ 3 _____
--	--

**3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)**

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) :  Individual  Corporation or other private group entity  Government

4a. The following fee(s) are submitted: <input type="checkbox"/> Issue Fee <input type="checkbox"/> Publication Fee (No small entity discount permitted) <input type="checkbox"/> Advance Order - # of Copies _____	4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above) <input type="checkbox"/> A check is enclosed. <input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached. <input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).
--	---

**5. Change in Entity Status (from status indicated above)**

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.  b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_  
 Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 11/839,987, 08/16/2007, Victor Larson, 77580-0066 (VRNK-1CP2DVCN), 9470
Row 2: 23630, 7590, 04/04/2011, EXAMINER LIM, KRISNA
Row 3: ART UNIT 2453, PAPER NUMBER

McDermott Will & Emery
600 13th Street, NW
Washington, DC 20005-3096

DATE MAILED: 04/04/2011

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 15 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 15 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**Notice of Allowability**

**Application No.**

11/839,987

**Examiner**

Krisna Lim

**Applicant(s)**

LARSON ET AL.

**Art Unit**

2453

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1.  This communication is responsive to the communication filed 01/10/2011.
- 2.  The allowed claim(s) is/are 1-18.
- 3.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All   b)  Some\*   c)  None   of the:
    - 1.  Certified copies of the priority documents have been received.
    - 2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**


- 4.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  - 5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a)  including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.
    - (b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
- 6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- 1.  Notice of References Cited (PTO-892)
- 2.  Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3.  Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
- 4.  Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5.  Notice of Informal Patent Application
- 6.  Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_.
- 7.  Examiner's Amendment/Comment
- 8.  Examiner's Statement of Reasons for Allowance
- 9.  Other \_\_\_\_\_.

/Krisna Lim/  
Primary Examiner, Art Unit 2453



<b>Search Notes</b>  	<b>Application/Control No.</b>  11839987	<b>Applicant(s)/Patent Under Reexamination</b>  LARSON ET AL.
	<b>Examiner</b>  Krisna Lim	<b>Art Unit</b>  2453

SEARCHED			
Class	Subclass	Date	Examiner
709	225-229, 245	2/13/2010	kl
726	15	2/13/2010	kl
709	225-229, 245	3/25/2011	kl
726	15	3/25/2011	kl

SEARCH NOTES		
Search Notes	Date	Examiner
EAST, Inventors	2/13/2010	kl

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
709	227, 228	2/13/2010	kl
709	227, 228	3/25/2011	kl

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Subst. for form 1449/PTO				Complete if Known			
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Use as many sheets as necessary)				Application Number	11/839,987		
				Filing Date	08/16/2007		
				First Named Inventor	Victor Larson		
				Art Unit	2453		
				Examiner Name	Krisna Lim		
				Docket Number	077580-0066		
<b>U.S. PATENTS</b>							
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<b>OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
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				Art Unit	<b>2453</b>
				Examiner Name	<b>Krisna Lim</b>
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				First Named Inventor	Victor Larson
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				Examiner Name	Lim, Krisna
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				Art Unit	2453
				Examiner Name	Lim, Krisna
				Docket Number	077580-0066

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				Art Unit	<b>2453</b>
				Examiner Name	<b>Lim, Krisna</b>
				Docket Number	<b>077580-0066</b>

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Subst. for form 1449/PTO		<b>Complete if Known</b>	
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		Examiner Name	<b>Lim, Krisna</b>
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Subst. for form 1449/PTO				<b>Complete if Known</b>	
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				Examiner Name	<b>Lim, Krisna</b>
				Docket Number	<b>077580-0066</b>

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				Docket Number	<b>077580-0066</b>

	D1305	Notice of Allowance dated December 5, 2005 from corresponding US Application Number 09/429,643 (Our Ref. No.077580-0016)	
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	D1313	Notice of Allowance dated May 27, 2009 from corresponding US Application Number 11/839,969 (Our Ref. No.077580-0065)	
	D1314	Notice of Allowance dated May 9, 2006 from corresponding US Application Number 10/401,551 (Our Ref. No.077580-0037)	
	D1315	Notice of Allowance dated November 19, 2009 from corresponding US Application Number 11/839,969 (Our Ref. No.077580-0065)	
	D1316	Notice of Allowance dated November 21, 2006 from corresponding US Application Number 10/702,486 (Our Ref. No.077580-0039)	
	D1317	Notice of Allowance dated October 29, 2007 from corresponding US Application Number 10/714,849 (Our Ref. No. 077580-0042)	
	D1318	Notice of Allowance dated September 16, 2009 from corresponding US Application Number 11/839,969 (Our Ref. No.077580-0065)	
	D1319	P. Srisuresh et al., "DNS extensions to Network address Translators (DNS_ALG)", Internet Draft, Jul. 1998, pp. 1-27.	
	D1320	PCT International Search Report for related PCT Application No.: PCT/US01/13261, 8 pages (Our Ref. No. 077580-0032).	

Subst. for form 1449/PTO		<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Use as many sheets as necessary)		Application Number	<b>11/839,987</b>
		Filing Date	<b>08-16-2007</b>
		First Named Inventor	<b>Victor Larson</b>
		Art Unit	<b>2453</b>
		Examiner Name	<b>Lim, Krisna</b>
		Docket Number	<b>077580-0066</b>

	D1321	PCT International Search Report for related PCT Application No.: PCT/US99/25323, 3 pages (Our Ref. No. 077580-0062).	
	D1322	PCT International Search Report for related PCT Application No.: PCT/US99/25325, 3 pages (Our Ref. No. 077580-0061).	
	D1323	Reiter, Michael K. and Rubin, Aviel D. (AT&T Labs-Research), "Crowds: Anonymity for Web Transactions", pp. 1-23.	
	D1324	RFC 2401 (dated Nov. 1998) Security Architecture for the Internet Protocol (RTP).	
	D1325	RFC 2543-SIP (dated March 1999): Session Initiation Protocol (SIP or SIPS).	
	D1326	Rich Winkel, "CAQ: Networking With Spooks: The NET & The Control Of Information", Internet Newsgroup, Jun. 21, 1997, 4 pages. (Due to difficulty finding a hard copy of this reference, a copy of this reference is not included herewith. This reference, however was first submitted to the Patent Office in an IDS in application No. 11/679,416 on 11/13/2007 as ref. No. C20. The office is requested to see this reference at that location).	
	D1327	Rubin, Aviel D., Geer, Daniel, and Ranum, Marcus J. (Wiley Computer Publishing), "Web Security Sourcebook", pp. 82-94.	
	D1328	Search Report (dated Aug. 20, 2002), International Application No. PCT/US01/04340.	
	D1329	Search Report (dated Aug. 23, 2002), International Application No. PCT/US01/13260.	
	D1330	Search Report (dated Oct. 7, 2002), International Application No. PCT/US01/13261.	
	D1331	Search Report, IPER (dated Jan. 14, 2003), International Application No. PCT/US01/13260.	
	D1332	Search Report, IPER (dated Nov. 13, 2002), International Application No. PCT/US01/04340.	
	D1333	Shankar, A.U. "A verified sliding window protocol with variable flow control". Proceedings of ACM SIGCOMM conferece on Communications architectures & protocols. pp. 84-91, ACM Press, NY,NY 1986.	
	D1334	Shree Murthy et al., "Congestion-Oriented Shortest Multi-path Routing", Proceedings of IEEE INFOCOM, 1996, pp. 1028-1036.	
	D1335	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 10, 2010, 9:00 AM.	
	D1336	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 10, 2010, 1:00 PM.	
	D1337	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 11, 2010, 9:00 AM.	
	D1338	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 11, 2010, 1:30 PM.	
	D1339	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 12, 2010, 9:00 AM.	
	D1340	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 12, 2010, 1:15 PM.	

Subst. for form 1449/PTO		<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>		Application Number	<b>11/839,987</b>
		Filing Date	<b>08-16-2007</b>
		First Named Inventor	<b>Victor Larson</b>
		Art Unit	<b>2453</b>
		Examiner Name	<b>Lim, Krisna</b>
		Docket Number	<b>077580-0066</b>

	D1341	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 15, 2010, 9:00 AM.	
	D1342	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 15, 2010, 12:35 PM.	
	D1343	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 8, 2010, 8:45 AM.	
	D1344	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 8, 2010, 1:30 PM.	
	D1345	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 9, 2010, 9:00 AM.	
	D1346	Trial Transcript, VirnetX vs. Microsoft Corporation dated March 9, 2010, 1:30 PM.	
	D1347	W. Stallings, "Cryptography And Network Security", 2nd, Edition, Chapter 13, IP Security, Jun. 8, 1998, pp. 399-440.	
/Krisna Lim/		EXAMINER	DATE CONSIDERED <b>03/25/2011</b>

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO				<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>				Application Number	11/839,987
				Filing Date	08-16-2007
				First Named Inventor	Victor Larson
				Art Unit	2453
				Examiner Name	Lim, Krisna
				Docket Number	077580-0066


**CERTIFICATION STATEMENT**

Please See 37 CFR 1.97 and 1.98 to make the appropriate selection(s)

- Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
- The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$180.00, or further fees which may be due, to Deposit Account 50-1133.
- Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.
- None


**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

  
 Toby H. Kusner; Reg. No.:26,418  
 McDermott Will & Emery LLP  
 28 State Street  
 Boston, MA 02109  
 Tel. (617) 535-4000  
 Fax (617) 535-3800

Date: 2/9/11

DM\_US 27365439-1.077580.0066

<b><i>Index of Claims</i></b>  	<b>Application/Control No.</b>  11839987	<b>Applicant(s)/Patent Under Reexamination</b>  LARSON ET AL.
	<b>Examiner</b>  Krisna Lim	<b>Art Unit</b>  2453

✓	<b>Rejected</b>
=	<b>Allowed</b>

-	<b>Cancelled</b>
÷	<b>Restricted</b>

<b>N</b>	<b>Non-Elected</b>
<b>I</b>	<b>Interference</b>

<b>A</b>	<b>Appeal</b>
<b>O</b>	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	06/05/2009	12/29/2009	02/13/2010	07/04/2010	03/25/2011			
	1	✓	✓	=	✓	=			
	2		○	=	✓	=			
	3		○	=	✓	=			
	4		○	=	✓	=			
	5		○	=	✓	=			
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	9		○	=	✓	=			
	10		○	=	✓	=			
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	14		○	=	✓	=			
	15		○	=	✓	=			
	16		○	=	✓	=			
	17		○	=	✓	=			
	18		○	=	✓	=			



Subst. for form 1449/PTO				<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>				Application Number	11/839,987
				Filing Date	08-16-2007
				First Named Inventor	Victor Larson
				Art Unit	2453
				Examiner Name	Lim, Krisna
				Docket Number	077580-0066

U.S. PATENTS					
EXAMINER'S INITIALS	CITE NO.	Patent Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
<i>KL</i>	A1044	5,590,285	12/31/1996	Krause et al.	

U.S. PATENT APPLICATION PUBLICATIONS					
EXAMINER'S INITIALS	CITE NO.	Patent Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS							
EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes -Number -Kind Codes (if known)	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
<i>KL</i>	C9	WO9843396	10/01/1998	Northern Telecom Limited			

OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)			
EXAMINER'S INITIALS	CITE NO.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	
<i>KL</i>	D81	European Search Report dated January 24, 2011 from corresponding European Application Number 10011949.4	
<i>KL</i>	D82	European Search Report dated March 17, 2011 from corresponding European Application Number 10184502.2	
<i>KL</i>	D83	Hollenbeck et al., "Registry Registrar Protocol (RRP) Version 1.1.0; Internet Engineering Task Force, 34 pages (1999)	
<i>KL</i>	D84	Notice of Allowance dated March 14, 2011 from corresponding US Application Number 11/840,508 (Our Ref. No.077580-0057)	
<i>KL</i>	D85	Tannenbaum, "Computer Networks," pages 202-219 (1996)	

  
**KRISNA LIM**  
**PRIMARY EXAMINER**

*4/14/2011*





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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes application details for Victor Larson and examiner information.

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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U.S. Patent and Trademark Office

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P.O. Box 1450  
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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
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11839987 1CP2DVCN	8/16/07	LARSON ET AL.	77580-0066 (VRNK-
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McDermott Will & Emery  
600 13th Street, NW  
Washington, DC 20005-3096

EXAMINER

Krisna Lim

ART UNIT	PAPER
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2453	20110414
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DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

Attached herewith is a copy of IDS filed 03/29/2011 with Examiner's initial and dated.

/Krisna Lim/  
Primary Examiner, Art Unit 2453

.Subst. for form 1449/PTO				<b>Complete if Known</b>	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Use as many sheets as necessary)				Application Number	<b>11/839,987</b>
				Filing Date	<b>08-16-2007</b>
				First Named Inventor	<b>Victor Larson</b>
				Art Unit	<b>2453</b>
				Examiner Name	<b>Lim, Krisna</b>
				Docket Number	<b>077580-0066</b>

**U.S. PATENTS**

EXAMINER'S INITIALS	CITE NO.	Patent Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1044	5,590,285	12/31/19996	Krause et al.	

**U.S. PATENT APPLICATION PUBLICATIONS**

EXAMINER'S INITIALS	CITE NO.	Patent Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

**FOREIGN PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes - Number 4 - Kind Codes (if known)	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
	C9	WO9843396	10/01/1998	Northern Telecom Limited			

**OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

EXAMINER'S INITIALS	CITE NO.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	D81	European Search Report dated January 24, 2011 from corresponding European Application Number 10011949.4
	D82	European Search Report dated March 17, 2011 from corresponding European Application Number 10184502.2
	D83	Hollenbeck et al., "Registry Registrar Protocol (RRP) Version 1.1.0; Internet Engineering Task Force, 34 pages (1999)
	D84	Notice of Allowance dated March 14, 2011 from corresponding US Application Number 11/840,508 (Our Ref. No.077580-0057)
	D85	Tannenbaum, "Computer Networks," pages 202-219 (1996)

/Krisna Lim/

04/14/2011

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE  
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE, if required. Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address, and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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 600 13th Street, NW  
 Washington, DC 20005-3096

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 I hereby certify that the Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

	(Date of Mailing)
	(Time)
	(Day)

APPLICATION NO.	FILING DATE	BEST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11839387	08/16/2007	Victor Larson	77580-0066	9470

TITLE OF INVENTION: METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK

APPL. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEES DUE	DATE DUE
nonprovisional	NO	\$1710	\$300	\$0	\$1810	07/05/2011

EXAMINER	ART UNIT	CLASSIFICATION
LIM, KRISHNA	2453	709-227003

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.303):

Change of correspondence address (for Change of Correspondence Address form PTO/SB/122) attached.

"Fee Address" indication (for "Fee Address" Indication form PTO/SB/147; Fee (B3-02 or those recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list:

(1) the names of up to 3 registered patent attorneys or agents OK, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

McDermott Will & Emery LLP

3. ASSIGNOR: NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: VIRNETX, INCORPORATED

(B) RESIDENCE (CITY and STATE OR COUNTRY): SCOTTS VALLEY, CA

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. The following fee(s) are submitted:

Issue Fee

Publication Fee (No small entity discount permitted)

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5. Change in Entity Status (from status indicated above):

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature: /Toby H. Kusmer/ Date: June 17, 2011

Typed or printed name: Toby H. Kusmer Registration No. 26,418

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is in its (and by the USPTO in process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.19. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	11839987
<b>Filing Date:</b>	16-Aug-2007
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Filer:</b>	Toby H. Kusmer./Mary Fontinha
<b>Attorney Docket Number:</b>	77580-0066 (VRNK-1 CP2DVCN)

Filed as Large Entity

### Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
Utility Appl issue fee	1501	1	1510	1510
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1810</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	10334007
<b>Application Number:</b>	11839987
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	9470
<b>Title of Invention:</b>	METHOD FOR ESTABLISHING SECURE COMMUNICATION LINK BETWEEN COMPUTERS OF VIRTUAL PRIVATE NETWORK
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
<b>Filer:</b>	Toby H. Kusmer./Mary Fontinha
<b>Filer Authorized By:</b>	Toby H. Kusmer.
<b>Attorney Docket Number:</b>	77580-0066 (VRNK-1CP2DVCN)
<b>Receipt Date:</b>	17-JUN-2011
<b>Filing Date:</b>	16-AUG-2007
<b>Time Stamp:</b>	17:15:48
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1810
RAM confirmation Number	4199
Deposit Account	501133
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	PTOL85.pdf	299977 f8bc9a8e357ac136ed10c4a595c4eb79495222d5	no	1

### Warnings:

### Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32364 1174f5991b61c0bfa9a358ab9b9601128a4c23a7	no	2
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### Warnings:

### Information:

**Total Files Size (in bytes):** 332341

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#### **New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

#### **National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

#### **New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**





APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/839,987

07/26/2011

7987274

77580-0066

9470

23630

7590

07/06/2011

(VRNK-1CP2DVCN

McDermott Will & Emery  
600 13th Street, NW  
Washington, DC 20005-3096

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 15 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Victor Larson, Fairfax, VA;  
Robert Dunham Short III, Leesburg, VA;  
Edmund Colby Munger, Crownsville, MD;  
Michael Williamson, South Riding, VA;



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/839,987	07/26/2011	7987274	77580-0066	9470
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23630	7590	07/06/2011	(VRNK-1CP2DVCN)	
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McDermott Will & Emery  
600 13th Street, NW  
Washington, DC 20005-3096

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 15 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

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Edmund Colby Munger, Crownsville, MD;  
Michael Williamson, South Riding, VA;

AO 120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> P.O. Box 1450 Alexandria, VA 22313-1450	<b>REPORT ON THE                  FILING OR DETERMINATION OF AN                  ACTION REGARDING A PATENT OR                  TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas Tyler Division on the following

Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.);

DOCKET NO. 6:13-cv-00351	DATE FILED 4/22/2013	U.S. DISTRICT COURT Eastern District of Texas Tyler Division
PLAINTIFF VirnetX Inc. and Science Applications International Corporation		DEFENDANT Microsoft Corporation
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,502,135	12/31/2002	VirnetX Inc.
2 7,188,180	3/6/2007	VirnetX Inc.
3 7,418,504	8/26/2008	VirnetX Inc.
4 7,490,151	2/10/2009	VirnetX Inc.
5 7,921,211	4/5/2011	VirnetX Inc.

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY	
	<input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,187,274		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
 Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy