

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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NEW BAY CAPITAL, LLC  
Petitioner

v.

VIRNETX, INC.  
Patent Owner

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Case IPR2013-00377 (Patent 7,418,504 B2)

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Before SALLY C. MEDLEY, MICHAEL P. TIERNEY, KARL D. EASTHOM,  
and STEPHEN C. SIU, *Administrative Patent Judges*.

MEDLEY, *Administrative Patent Judge*.

JUDGMENT  
Termination of the Proceeding  
*37 C.F.R. § 42.73*

On November 6, 2013, Petitioner New Bay Capital, LLC (“New Bay”) filed an unopposed motion to terminate this proceeding, representing that New Bay is abandoning the contest. Paper 13 at 1. New Bay’s abandonment of the contest is construed as a request for entry of adverse judgment. 37 C.F.R. § 42.73(b)(4);

*see also* 35 U.S.C. § 325(d) (describing effects of “the same or substantially the same prior art or arguments previously . . . presented to the Office”).

This case is in the preliminary proceeding stage; no institution of a trial has been made.<sup>1</sup> Based on the facts of this case, it is appropriate to enter judgment.<sup>2</sup> Therefore, the motion to terminate the proceeding is *granted*.

Accordingly, it is

ORDERED that New Bay’s unopposed motion to terminate is *granted*;

FURTHER ORDERED that the proceeding is *terminated*.

For PETITIONER:

Robert M. Asher  
[rasher@sunsteinlaw.com](mailto:rasher@sunsteinlaw.com)

Jeffrey T. Klayman  
[jklayman@sunsteinlaw.com](mailto:jklayman@sunsteinlaw.com)

For PATENT OWNER:

Joseph E. Palys  
[joseph.palys@finnegan.com](mailto:joseph.palys@finnegan.com)

Naveen Modi  
[naveen.modi@finnegan.com](mailto:naveen.modi@finnegan.com)

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<sup>1</sup> A preliminary proceeding begins with the filing of a petition for instituting a trial and ends with a written decision as to whether a trial will be instituted. 37 C.F.R. § 42.2.

<sup>2</sup> A judgment means a final written decision by the Board, or a termination of a proceeding. 37 C.F.R. § 42.2.

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>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 7,997,274		
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

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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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
-------	-------------------	------

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



UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/840,560	08/17/2007	Victor Larson	077580-0063 (VRNK-1CP3CN2)

**CONFIRMATION NO. 1537**

**POWER OF ATTORNEY NOTICE**

23630  
McDermott Will & Emery  
The McDermott Building  
500 North Capitol Street, N.W.  
Washington, DC 20001



Date Mailed: 12/04/2012

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 12/03/2012.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervned as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/rbell/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/840,560	08/17/2007	Victor Larson	077580-0063 (VRNK-1CP3CN2)

**CONFIRMATION NO. 1537**

**POA ACCEPTANCE LETTER**

22852  
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER  
LLP  
901 NEW YORK AVENUE, NW  
WASHINGTON, DC 20001-4413



Date Mailed: 12/04/2012

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 12/03/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/rbell/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re *Inter Partes* Reexamination of: )  
)  
Victor LARSON et al. ) Control Nos.: 95/001,856; 95/001,789  
)  
U. S. Patent No. 7,921,211 ) Group Art Unit: 3992  
)  
Issued: April 5, 2011 ) Examiner: Roland G. Foster  
)  
For: AGILE NETWORK PROTOCOL FOR ) Confirmation Nos. 4051; 6053  
SECURE COMMUNICATIONS )  
USING SECURE DOMAIN NAMES )

Mail Stop *Inter Partes* Reexam  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Commissioner:

**REVOCATION OF POWER OF ATTORNEY,  
STATEMENT UNDER 37 C.F.R. § 3.73(b),  
AND GRANT OF NEW POWER OF ATTORNEY**

The undersigned, a representative authorized to sign on behalf of the assignee owning all of the interest in U.S. Patent No. 7,921,211 (“the ’211 patent”), hereby revokes all previous powers of attorney or authorization of agent granted in the ’211 patent before the date of execution hereof.

In compliance with 37 C.F.R. § 3.73(b), the undersigned verifies that VirnetX Inc. is the assignee of the entire right, title, and interest in the ’211 patent by virtue of an assignment recorded in the U.S. Patent and Trademark Office at Reel 019722, Frame 0525 on August 21, 2007.

The undersigned representative of the assignee hereby grants its power of attorney to the patent practitioners associated with **Finnegan, Henderson, Farabow, Garrett & Dunner,**

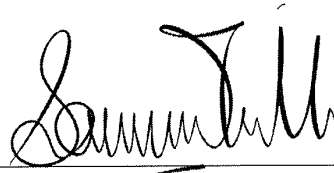
Attorney Docket Nos. 11798.0008; 11798.0012  
Control Nos. 95/001,856; 95/001,789

**L.L.P., Customer Number 22,852**, to transact all business in the Patent and Trademark Office connected with the '211 patent, including the reexamination proceedings assigned control nos. 95/001,856 and 95/001,789, and in any other proceedings involving the '211 patent.

Please also send all future correspondence concerning the '211 patent to the address associated with **Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P., Customer Number 22,852**.

Dated: 11/30/12

By: \_\_\_\_\_



Sameer Mathur  
Vice President, Corporate Development and Product  
Marketing  
VirnetX Inc.



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	14368873
<b>Application Number:</b>	11840560
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1537
<b>Title of Invention:</b>	AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
<b>Filer:</b>	Joseph Edwin Palys./connie sisk
<b>Filer Authorized By:</b>	Joseph Edwin Palys.
<b>Attorney Docket Number:</b>	077580-0063 (VRNK-1CP3CN2
<b>Receipt Date:</b>	03-DEC-2012
<b>Filing Date:</b>	17-AUG-2007
<b>Time Stamp:</b>	16:08:20
<b>Application Type:</b>	Utility under 35 USC 111(a)

### 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	Power of Attorney	Patent_POA_211.pdf	56074 <small>eea311f94334fc4b7882e0ed995b6db51e3c0389</small>	no	2

### Warnings:

### Information:

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.



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 Alexandria, Virginia 22313-1450  
 www.uspto.gov



Bib Data Sheet

CONFIRMATION NO. 1537

<b>SERIAL NUMBER</b> 11/840,560	<b>FILING OR 371(c) DATE</b> 08/17/2007 <b>RULE</b>	<b>CLASS</b> 709	<b>GROUP ART UNIT</b> 2453	<b>ATTORNEY DOCKET NO.</b> 077580-0063 (VRNK-1CP3CN2)
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**APPLICANTS**

Victor Larson, Fairfax, VA;  
 Robert Dunham Short III, Leesburg, VA;  
 Edmund Colby Munger, Crownsville, MD;  
 Michael Williamson, South Riding, VA;

**\*\* CONTINUING DATA \*\*\*\*\***

This application is a CON of 10/714,849 11/18/2003 PAT 7418504  
 which is a CON of 09/558,210 04/26/2000 ABN  
 which is a CIP of 09/504,783 02/15/2000 PAT 6502135  
 which is a CIP of 09/429,643 10/29/1999 PAT 7010604  
 which claims benefit of 60/106,261 10/30/1998  
 and claims benefit of 60/137,704 06/07/1999

**\*\* FOREIGN APPLICATIONS \*\*\*\*\***

**IF REQUIRED, FOREIGN FILING LICENSE GRANTED**

\*\* 08/29/2007

Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no	<b>STATE OR COUNTRY</b> VA	<b>SHEETS DRAWING</b> 40	<b>TOTAL CLAIMS</b> 3	<b>INDEPENDENT CLAIMS</b> 3	
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance					
Verified and Acknowledged	Examiner's Signature	Initials			

**ADDRESS**

22852

**TITLE**

AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

<b>FILING FEE RECEIVED</b> 3666	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees
		<input type="checkbox"/> 1.16 Fees ( Filing )
		<input type="checkbox"/> 1.17 Fees ( Processing Ext. of time )
		<input type="checkbox"/> 1.18 Fees ( Issue )
		<input type="checkbox"/> Other _____
		<input type="checkbox"/> Credit



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/840,560	08/17/2007	Victor Larson	077580-0063 (VRNK-1CP3CN2)

**CONFIRMATION NO. 1537**

**POA ACCEPTANCE LETTER**

22852  
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER  
LLP  
901 NEW YORK AVENUE, NW  
WASHINGTON, DC 20001-4413



Date Mailed: 02/08/2012

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 02/06/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/sdstevenson/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/840,560	08/17/2007	Victor Larson	077580-0063 (VRNK-1CP3CN2)

23630  
McDermott Will & Emery  
600 13th Street, NW  
Washington, DC 20005-3096

**CONFIRMATION NO. 1537**  
**POWER OF ATTORNEY NOTICE**



Date Mailed: 02/08/2012

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 02/06/2012.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/sdstevenson/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Document code: WFEE

United States Patent and Trademark Office  
Sales Receipt for Accounting Date: 04/15/2011

AMULLINS SALE #00000028 Mailroom Dt: 04/15/2011 090527 11840560  
01 FC : 8012 15.00 DA



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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., ISSUE DATE, PATENT NO., ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 11/840,560, 04/05/2011, 7921211, 077580-0063 (VRNK-1CP3CN2), 1537

23630 7590 03/16/2011
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 701 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;



COPY

5-20-09

11840560 - 2453

Subst. for form 1449/PTO <b>SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>				<b>Complete if Known</b>	
				Application Number	11/840,560
				Filing Date	August 17, 2007
				First Named Inventor	Victor Larson
				Art Unit	2157
Examiner Name	VU, Kim Y.				
Sheet	1	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)

**U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1000	5,311,593	05/10/1994	Carmi	
	A1001	5,511,122	04/23/1996	Atkinson	
	A1003	5,805,803	09/08/1998	Birrell et al.	
	A1004	5,822,434	10/13/1998	Caronni et al.	
	A1005	5,898,830	04/27/1999	Wesinger, Jr. et al.	
	A1006	60/134,547	05/17/1999	Victor Sheymov	
	A1007	60/151,563	08/31/1999	Bryan Whittles	
	A1008	5,950,195	09/07/1999	Stockwell et al.	
	A1009	6,119,171	09/12/2000	Alkhatib	
	A1010	6,937,597	08/30/2005	Rosenberg et al.	
	A1011	7,072,964	07/04/2006	Whittle et al.	
	A1012	09/399,753	09/22/1998	Graig Miller et al.	
	A1013	6,079,020	06/20/2000	Liu	
	A1014	6,173,399	01/09/2001	Gilbrech	
	A1015	6,226,748	05/01/2001	Bots et al.	
	A1016	6,226,751	05/01/2001	Arrow et al.	
	A1017	6,701,437	03/02/2004	Hoke et al.	
	A1018	6,055,574	04/25/2000	Smorodinsky et al.	
	A1019	6,246,670	06/12/2001	Karlsson, et al.	

OP  
2/23

**FOREIGN PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes - Number - Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
	B1000	WO 001/17775 <del>WO 01/12295</del>	03-30-2000	Science Applications International Corporation			
	B1001	WO 00/70458	11-23-2000	Comsec Corporation			
	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

EXAMINER	/Krisna Lim/	DATE CONSIDERED	03/14/2010
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\*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.

(1)  
 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./





11840560 - GAU: 2453

Subst. for form 1449/PTO <b>SUPPLEMENTAL          INFORMATION DISCLOSURE STATEMENT BY          APPLICANT</b> <i>(Use as many sheets as necessary)</i>			<b>Complete if Known</b>			
			Application Number		11/840,560	
			Filing Date		August 17, 2007	
			First Named Inventor		Victor Larson	
			Art Unit		2157	
Examiner Name		VU, Kim Y.				
Sheet	1	of	1	Docket Number		077580-0063 (VRNK-1CP3CN2)

**U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1020	US 7,461,334	12/02/08	Lu, et al.	
	A1021	US 7,353,841	04/08/08	Kono, et al.	
	A1022	US 7,188,175	03/06/07	McKeeth, James A.	
	A1023	US 7,167,904	01/23/07	Devarajan, et al.	
	A1024	US 7,039,713	05/02/06	Van Gunter, et al.	
	A1025	US 6,757,740	06/29/04	Parekh, et al.	
	A1026	US 6,752,166	06/22/04	Lull, et al.	
	A1027	US 6,687,746	02/03/04	Shuster, et al.	
	A1028	US 6,338,082	01/08/02	Schneider, Eric	
	A1029	US 6,333,272	12/25/01	McMillin, et al.	
	A1030	US 6,314,463	11/06/01	Abbott, et al.	
	A1031	US 6,298,341	10/02/01	Mann, et al.	
	A1032	US 6,262,987	07/17/01	Mogul, Jeffrey C.	
	A1033	US 6,199,112	<del>03/06/04</del>	Wilson, Stephen K.	3/2001
	A1034	US 6,052,788	04/18/00	Wesinger, et al	
	A1035	US 2,895,502	07/21/59	Garland Roper Charles, et al.	
	A1036	US 2001/0049741	12/06/01	Skene, et al.	

CD  
2/23

**FOREIGN PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes -Number -Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No

**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.
	C1240	David Kosiur, "Building and Managing Virtual Private Networks" (1998)
	C1241	P. Mockapetris, "Domain Names - Implementation and Specification," Network Working Group, RFC 1035 (November 1987)
	C1242	Request for Inter Partes Reexamination of Patent No. 6,502,135, dated Nov. 25, 2009.
	C1243	Request for Inter Partes Reexamination of Patent No. 7,188,180, dated Nov. 25, 2009.

EXAMINER /Krisna Lim/	DATE CONSIDERED 03/14/2010
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\*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.  
 BST99 1638591-1.077580.0063

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./

**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)

23630 7590 01/19/2011

McDermott Will & Emery  
 600 13th Street, NW  
 Washington, DC 20005-3096

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.

**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.
11/840,560	08/17/2007	Victor Larson	077580-0063 (VRNK, LGR3CN2)	1537

TITLE OF INVENTION: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

APPL. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	04/19/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
LIM, KRISNA	2453	709-223000

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, (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.
--	---

1 \_\_\_\_\_  
 McDermott Will & Emery LLP  
 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: VirnetX, Inc.  
 (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)  
 Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)  
 A check is enclosed.  
 Payment by credit card. Form PTO-2038 is attached.  
 The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 501133 (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: /Toby H. Kusmer/ Date: February 9, 2011  
 Typed or printed name: Toby H. Kusmer Registration No. 26418

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.

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.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	11840560			
<b>Filing Date:</b>	17-Aug-2007			
<b>Title of Invention:</b>	AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES			
<b>First Named Inventor/Applicant Name:</b>	Victor Larson			
<b>Filer:</b>	Toby H. Kusmer./Kelly Ciarmataro			
<b>Attorney Docket Number:</b>	077580-0063 (VRNK-1CP3CN2)			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<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>	9405577
<b>Application Number:</b>	11840560
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1537
<b>Title of Invention:</b>	AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<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>	077580-0063 (VRNK-1CP3CN2)
<b>Receipt Date:</b>	09-FEB-2011
<b>Filing Date:</b>	17-AUG-2007
<b>Time Stamp:</b>	11:33:22
<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	9049
Deposit Account	501133
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)  
 Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)  
 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)	PartB.pdf	113503 <small>5fd038c90d96c57d6f112f24c1e339dd413d5a89</small>	no	1

**Warnings:**

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

**Information:**

2	Fee Worksheet (PTO-875)	fee-info.pdf	32043 <small>7c9c7e1faa235598f10ff3d335e5dfec563151ea</small>	no	2
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**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	145546
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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.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

23630 7590 01/19/2011
McDermott Will & Emery
600 13th Street, NW
Washington, DC 20005-3096

EXAMINER: LIM, KRISNA
ART UNIT: 2453
PAPER NUMBER:
DATE MAILED: 01/19/2011

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 11/840,560, 08/17/2007, Victor Larson, 077580-0063, 1537
Row 2: TITLE OF INVENTION: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
Row 1: nonprovisional, NO, \$1510, \$300, \$0, \$1810, 04/19/2011

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)

23630                      7590                      01/19/2011

McDermott Will & Emery  
 600 13th Street, NW  
 Washington, DC 20005-3096

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.

**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.
11/840,560	08/17/2007	Victor Larson	077580-0063 (VRNK LCP3CN2)	1537

TITLE OF INVENTION: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	04/19/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
LIM, KRISNA	2453	709-223000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><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></p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(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 _____</p> <p>3 _____</p>
---	---

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

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><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).</p>
---	--

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.

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.





UNITED STATES PATENT AND TRADEMARK OFFICE

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

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 11/840,560, 08/17/2007, Victor Larson, 077580-0063 (VRNK-1CP3CN2), 1537
Row 2: 23630, 7590, 01/19/2011, EXAMINER LIM, KRISNA
Row 3: McDermott Will & Emery, 600 13th Street, NW, Washington, DC 20005-3096, ART UNIT, PAPER NUMBER 2453
DATE MAILED: 01/19/2011

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 470 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 470 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.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	11/840,560	LARSON ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Krisna Lim	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 amendment filed 1/10/2011.
2.  The allowed claim(s) is/are 4-63.
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)**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date _____</li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application</li> <li>6. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date _____ .</li> <li>7. <input type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other _____.</li> </ol> |
|---|---|

/Krisna Lim/  
 Primary Examiner, Art Unit 2453

Pursuant to 37 C.F.R 1.109 and M.P.E.P 1302.14, the following is an Examiner's Statement of Reasons for Allowance:

The prior arts of record do not teach or suggest a domain name service system configured and arranged to be connected to a communication network, to store a plurality of domain names and corresponding network addresses, to receive a query for a network address, and to indicate in response to the query whether the domain name service system supports establishing a secure communication link.

The examiner considers the applicants' claims 4-63 to be allowable based on the claim interpretation and the aforesaid prior arts of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krisna Lim whose telephone number is 571-272-3956. The examiner can normally be reached on Tuesday to Friday from 7:10 AM to 5:40 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Krista Zele, can be reached on 571-272-7288. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

Application/Control Number: 11/840,560

Page 3

Art Unit: 2453


Business Center (EBC) at 866-217-9197 (toll-free).

KI

January 11, 2011

/Krisna Lim/

Primary Examiner, Art Unit 2453

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 11840560	<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>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	03/14/2010	10/19/2010	01/11/2011					
	1	✓	-	-					
	2	✓	-	-					
	3	✓	-	-					
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30	33		✓	=					
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32	35		✓	=					
33	36		✓	=					

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 11840560	<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>

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N	<b>Non-Elected</b>
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O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
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34	37		✓	=					
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56	59		✓	=					
57	60		✓	=					
58	61		✓	=					
59	62		✓	=					
60	63		✓	=					



<b>Search Notes</b>  	<b>Application/Control No.</b>  11840560	<b>Applicant(s)/Patent Under Reexamination</b>  LARSON ET AL.
	<b>Examiner</b>  Krisna Lim	<b>Art Unit</b>  2453

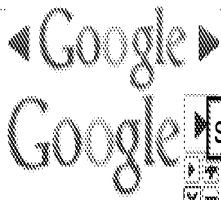
<b>SEARCHED</b>			
<b>Class</b>	<b>Subclass</b>	<b>Date</b>	<b>Examiner</b>
709	226, 221	3/14/2010	kl
726	15	3/14/2010	kl
709	226, 221	1/11/2011	kl
726	15	1/11/2011	kl

<b>SEARCH NOTES</b>		
<b>Search Notes</b>	<b>Date</b>	<b>Examiner</b>
EAST, Inventors	3/14/2010	kl
EAST, Inventors, google	1/11/2011	kl

<b>INTERFERENCE SEARCH</b>			
<b>Class</b>	<b>Subclass</b>	<b>Date</b>	<b>Examiner</b>
709	226	1/11/2011	kl

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secure domain name s

Search

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1. \$5.99 Domain Name Sale

Why Pay More? Limited Time! Free Hosting w/Site Builder & more. GoDaddy.com

2. UltraDNS Services

Most Secure DNS Service. Quality Reliability and Scalability 24/7. www.UltraDNS.com

Establishment of a secure communication link based on a domain ...

Proceedings of ACM SIGCOMM conference on Communications architectures ... A computer readable medium storing a domain name server (DNS) proxy module ... www.patentgenius.com/patent/7490151.html - Cached

2. DNS Security Links

Second, take Secure DNS seriously, even though there are intractable .... The goal was to clog the servers, and communication links on the way to the ... www.softpanorama.org/DNS/security.shtml - Cached - Similar

3.

Establishment of a secure communication link based on a domain ...

by EC Mungar - 2009 - Cited by 1 - Related articles Feb 10, 2009 ... Establishment of a secure communication link based on a domain name service (DNS) request. United States Patent 7490151 ... www.freepatentsonline.com/7490151.html - Cached

4.

ANS | Authoritative Name Server | DNS Uptime | DNSSEC support ...

We started with an initial premise that caching and authoritative DNS ... with DNSSEC standards and optional DNSAUTH to secure DNS communication link ... www.nominum.com/what-we-do/software.../ans-premier-and-ans - Cached

5.

Dynamic DNS - Wikipedia, the free encyclopedia

Dynamic DNS is a method / protocol / network service that provides the ... It connects to the service provider's systems and causes those systems to link the ... Increasing efforts to secure Internet communications today involve ... en.wikipedia.org/wiki/Dynamic\_DNS - Cached - Similar

6.

Method for establishing secure communication link between ...

A technique is disclosed for establishing a secure communication link between a first ... Donald E. Eastlake, "Domain Name System Security Extensions", DNS ... www.patentstorm.us/patents/6639759.html - Cached

7.

VirnetX - Research and Product Development

Ads

1. 1&1 - Domain Name \$0.99 Domain Name \$0.99: Why Pay more? Domain Name Offer Ends Soon! www.1and1.com

Establishment of a secure communication link based on a domain name service request. United States Patent 7490151. A plurality of computer codes. www.patentgenius.com/domain-names/

See your ad here

**Secure domain name registrar service:** Customers, including **service ...** query request **services,** enforcement of policies and support for **communication** with ...  
[www.virnetx.com/products.php](http://www.virnetx.com/products.php) - Cached

8.

Building **Secure** ASP.NET Applications: Authentication ...  
For message-level security, use the **Web Services** Development Kit to build ... Demand, Role=@"**DomainName**\WindowsGroup")] // Demand that the caller is a specific user .... Use a combination of SSL and IPsec to **secure communication links** ...  
[msdn.microsoft.com/en-us/library/ff649362.aspx](http://msdn.microsoft.com/en-us/library/ff649362.aspx) - Cached

9.

Vantio™ Base System - Nominum  
These features combine to allow network owners to leverage DNS for more than ... Full DNSSEC support with optional DNSAUTH to **secure DNS communication links** ...  
[64.50.170.202/~nominum/what-we-do/.../vantio-base-server](http://64.50.170.202/~nominum/what-we-do/.../vantio-base-server) - Cached

10.

Sunbelt Software **Secure DNS** Enters Beta | News & Opinion | PCMag.com  
Sep 17, 2010 ... The **Domain Name System (DNS)** translates a human-readable **link** like **\_am\_dangerous.com** into a numeric IP address for network **communication** ...  
[www.pcmag.com/article2/0,2817,2369279,00.asp](http://www.pcmag.com/article2/0,2817,2369279,00.asp) - Cached



1 2 3 4 5 6 7 8 9 10 Next

secure domain name s

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**EAST Search History**

**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	49	((VICTOR) near2 (LARSON)). INV.	US-PGPUB; USPAT; USOCR	OR	ON	2011/01/11 10:25
L2	172	((ROBERT) near2 (SHORT)). INV.	US-PGPUB; USPAT; USOCR	OR	ON	2011/01/11 10:25
L3	27	((EDMUND) near2 (MUNGER)). INV.	US-PGPUB; USPAT; USOCR	OR	ON	2011/01/11 10:26
L4	80	((MICHAEL) near2 (WILLIAMSON)). INV.	US-PGPUB; USPAT; USOCR	OR	ON	2011/01/11 10:26
L5	199	I1 or I2 or I3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:26
L6	258	I5 or I4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:26
L7	90	I6 and (DNS domain name service)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:27
L8	76	I7 and (secure communication network)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:27
L9	12631	709/226, "221".ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:28
L10	664	726/15.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:29

L11	13261	l10 or l9	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:29
L12	9	l11 and l8	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:30
L13	8006063	(secure domain name service)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:52
L14	2777986	l13 and (secure communication)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:58
L15	3577	l14 and DNS.ti,ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:58
L16	283	l15 and @ad<="19990607"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:58
L17	28	l16 and (l9 or l10)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 10:59
L18	0	l17 and secure.ti,ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 11:06
L19	0	l17 and secure\$4.ti,ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 11:07

L20	912	l13 and (secure same domain same name same service)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 11:07
L21	192	l20 and (secure same communication same link)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 11:08
L22	2	l21 and @ad<="19990607"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/01/11 11:08
S1	59654	(network adj4 interface).ti, ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/03/09 14:44
S2	1046	S1 and (network same utilization same information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/03/09 14:45
S4	59985	(network adj4 interface).ti, ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/03/21 23:35
S5	1054	S4 and (network same utilization same information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/03/21 23:35
S6	8683	(interface same definitions).ti,ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/04/25 16:26
S7	6	(("6973298") or ("7359894") or ("20070244633")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/09/15 11:26

S8	3	((BRADLY) near2 (BILLMAN)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2010/09/15 14:26
S9	2	("6973298").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/09/15 15:07
S10	0	S9 and ( accept\$4 or reject \$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/09/15 15:07
S11	36	(("5796393") or ("6256648") or ("6389372") or ("6421678") or ("6442567") or ("6594673") or ("20020116466") or ("20020124053") or ("20030020977") or ("20030050977") or ("20040042599") or ("20040088325") or ("20040122803") or ("20050198031") or ("20050209999") or ("20050210409") or ("20050267766") or ("20060004789")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/09/15 15:23
S12	12	(("5479482") or ("5797093") or ("6233445") or ("6240285") or ("6295454") or ("6819929")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/09/15 15:31
S13	2288911	(social network roadside assistance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/09/15 15:59
S14	804240	S13 and (assistance request \$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/09/15 15:59
S15	703679	S14 and (members network)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/09/15 16:00

S16	276219	S15 and (accept\$4 reject\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/09/15 16:03
S17	2306651	(social network roadside assistance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/10/13 14:08
S18	19	((RODGER) near2 (ERICKSON)).INV.	US-PGPUB; USPAT; USOCR	OR	ON	2010/12/10 13:51
S19	12452	(proxy same servers).ti,ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:25
S20	3056	S19 and ((state or status) same information)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:26
S21	0	S20 and (each same cache)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:26
S22	1117	S20 and cache	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:26
S23	1108	S22 and (session or communication or establish \$4 or connect\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:27
S24	1108	S23 and servers.ti,ab,clm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:28

S25	1108	S24 and (establish\$4 new session proxy server)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:28
S26	38	S24 and (establish\$4 same new same session same proxy same server)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 14:29
S27	950724	(proxy servers (load adj4 balance))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 15:41
S28	1108	S27 and S25	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 15:41
S29	111	"5566297"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 15:53
S30	2	("5566297").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/12/10 15:53
S31	2	S30 and ( servers or (( first adj5 server) and (second adj5 server)) and (state same information and cache))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/12/10 15:55
S32	108	("5566297").URPN.	USPAT	OR	ON	2010/12/10 15:56
S33	110	S32 or S29	USPAT	OR	ON	2010/12/10 15:56
S34	104	S33 and ( servers or (( first adj5 server) and (second adj5 server)) and (state same information and cache))	USPAT	OR	ON	2010/12/10 15:57



EAST Search History

S35	58	S34 and ( servers or ((first adj5 server) and (second adj server)) and (state same information and cache)).ti, ab,clm.	USPAT	OR	ON	2010/12/10 15:58
S36	2	S35 and (proxy adj3 server)	USPAT	OR	ON	2010/12/10 15:59
S37	7	S35 and (proxy same servers)	USPAT	OR	ON	2010/12/10 15:59

**EAST Search History (Interference)**

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CONFIRMATION NO. 1537

<b>SERIAL NUMBER</b> 11/840,560	<b>FILING or 371(c) DATE</b> 08/17/2007 <b>RULE</b>	<b>CLASS</b> 709	<b>GROUP ART UNIT</b> 2453	<b>ATTORNEY DOCKET NO.</b> 077580-0063 (VRNK-1CP3CN2)		
<b>APPLICANTS</b> Victor Larson, Fairfax, VA; Robert Dunham Short III, Leesburg, VA; Edmund Colby Munger, Crownsville, MD; Michael Williamson, South Riding, VA;						
<b>** CONTINUING DATA *****</b> This application is a CON of 10/714,849 11/18/2003 PAT 7,418,504 which is a CON of 09/558,210 04/26/2000 ABN which is a CIP of 09/504,783 02/15/2000 PAT 6,502,135 which is a CIP of 09/429,643 10/29/1999 PAT 7,010,604 which claims benefit of 60/106,261 10/30/1998 and claims benefit of 60/137,704 06/07/1999						
<b>** FOREIGN APPLICATIONS *****</b>						
<b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 08/29/2007						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Met after Allowance		<b>STATE OR COUNTRY</b>	<b>SHEETS DRAWINGS</b>	<b>TOTAL CLAIMS</b>
35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Initials		VA	40	3
Verified and Acknowledged		/KRISNA LIM/ Examiner's Signature				
<b>ADDRESS</b> McDermott Will & Emery 600 13th Street, NW Washington, DC 20005-3096 UNITED STATES						
<b>TITLE</b> AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES						
<b>FILING FEE RECEIVED</b> 3366	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

<b>Application Number</b> 	<b>Application/Control No.</b> 11/840,560	<b>Applicant(s)/Patent under Reexamination</b> LARSON ET AL.	

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<b>TERMINAL DISCLAIMER</b>	<input checked="" type="checkbox"/> <b>APPROVED</b>	<input type="checkbox"/> <b>DISAPPROVED</b>
Date Filed : 12/22/10	<b>This patent is subject to a Terminal Disclaimer</b>	

<b>Approved/Disapproved by:</b>
Janice Ford

<b>TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT</b>	Docket Number (Optional)
<p>In re Application of: Victor Larson et al.</p> <p>Application No.: 11/840,560</p> <p>Filed: August 17, 2007</p> <p>For: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES</p> <p>The owner*, <u>VirnetX, Inc.</u>, of <u>100</u> percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term <b>prior patent</b> No. <u>7,418,504</u> as the term of said prior patent is defined in 35 U.S.C. 154 and 173, and as the term of said <b>prior patent</b> is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the <b>prior patent</b> are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.</p> <p>In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of the <b>prior patent</b>, "as the term of said <b>prior patent</b> is presently shortened by any terminal disclaimer," in the event that said <b>prior patent</b> later:</p> <ul style="list-style-type: none"> <li>expires for failure to pay a maintenance fee;</li> <li>is held unenforceable;</li> <li>is found invalid by a court of competent jurisdiction;</li> <li>is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;</li> <li>has all claims canceled by a reexamination certificate;</li> <li>is reissued; or</li> <li>is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.</li> </ul> <p>Check either box 1 or 2 below, if appropriate.</p> <p>1. <input type="checkbox"/> For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.</p> <p>I hereby 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 such willful false statements may jeopardize the validity of the application or any patent issued thereon.</p> <p>2. <input checked="" type="checkbox"/> The undersigned is an attorney or agent of record. Reg. No. <u>26418</u></p> <p style="text-align: center;">_____/Toby H. Kusmer/_____ Signature</p> <p style="text-align: right;">_____/12/22/2010_____ Date</p> <p style="text-align: center;">_____/Toby H. Kusmer_____ Typed or printed name</p> <p style="text-align: right;">_____/617.535.4065_____ Telephone Number</p> <p><input checked="" type="checkbox"/> Terminal disclaimer fee under 37 CFR 1.20(d) included.</p> <p style="text-align: center;"><b>WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.</b></p> <p>*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner). Form PTO/SB/96 may be used for making this certification. See MPEP § 324.</p>	

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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.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	11840560			
<b>Filing Date:</b>	17-Aug-2007			
<b>Title of Invention:</b>	AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES			
<b>First Named Inventor/Applicant Name:</b>	Victor Larson			
<b>Filer:</b>	Toby H. Kusmer./Kelly Ciarmataro			
<b>Attorney Docket Number:</b>	077580-0063 (VRNK-1CP3CN2)			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<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>				
Statutory or terminal disclaimer	1814	1	140	140
<b>Total in USD (\$)</b>				<b>140</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	9099025
<b>Application Number:</b>	11840560
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1537
<b>Title of Invention:</b>	AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<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>	077580-0063 (VRNK-1CP3CN2)
<b>Receipt Date:</b>	22-DEC-2010
<b>Filing Date:</b>	17-AUG-2007
<b>Time Stamp:</b>	15:31:29
<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	\$140
RAM confirmation Number	2428
Deposit Account	501133
Authorized User	

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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		AmendB.pdf	49491	yes	11
			3b0dee6667f821a6bd8ee9e540aba56d23c6331e		
<b>Multipart Description/PDF files in .zip description</b>					
	<b>Document Description</b>	<b>Start</b>	<b>End</b>		
	Amendment After Final	1	1		
	Claims	2	9		
	Applicant Arguments/Remarks Made in an Amendment	10	11		
<b>Warnings:</b>					
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2	Terminal Disclaimer Filed	TermDisc.pdf	209736	no	2
			b6aaed797b9c4f603904c0347c2f0abe4aff39f0		
<b>Warnings:</b>					
<b>Information:</b>					
3	Fee Worksheet (PTO-875)	fee-info.pdf	30252	no	2
			42f90678323829c262ba0a902124fa19d214f990		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			289479		

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**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**

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Docket No.: 077580-0063 (VRNK-1CP3CN2)

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of Victor Larson et al. : Customer Number: 23630  
: :  
: Confirmation Number: 1537  
: :  
Application No.: 11/840,560 : Group Art Unit: 2453  
: :  
Filed: August 17, 2007 : Examiner: Lim, Krisna  
: :  
For: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING  
SECURE DOMAIN NAMES

**AMENDMENT "B"**

Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Office action dated October 21, 2010, please amend the above-identified application and consider the accompanying remarks as follows:

**Amendments to the claims** begin on page 2 of this paper

**Remarks** begin on page 10 of this paper.

(1)

**Application No.:** 11/840,560

**Amendments to the claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

- 1-3. (Cancelled)
4. (Previously Presented) A system for providing a domain name service for establishing a secure communication link, the system comprising:
  - a domain name service system configured and arranged to be connected to a communication network, store a plurality of domain names and corresponding network addresses, receive a query for a network address, and indicate in response to the query whether the domain name service system supports establishing a secure communication link.
5. (Previously Presented) The system of claim 4, wherein at least one of the plurality of domain names comprises a top-level domain name.
6. (Previously Presented) The system of claim 5, wherein the top-level domain name is a non-standard top-level domain name.
7. (Previously Presented) The system of claim 6, wherein the non-standard top-level domain name is one of .com, .org, .net, .gov, .edu, .mil and .int.
8. (Previously Presented) The system of claim 5, wherein the domain name service system is configured to authenticate the query using a cryptographic technique.
9. (Previously Presented) The system of claim 4, wherein the communication network includes the Internet.
10. (Previously Presented) The system of claim 4, wherein the domain name service system comprises an edge router.
11. (Previously Presented) The system of claim 4, wherein the domain name service system is connectable to a virtual private network through the communication network.

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12. (Previously Presented) The system of claim 11, wherein the virtual private network is one of a plurality of secure communication links in a hierarchy of secure communication links.

13. (Previously Presented) The system of claim 11, wherein the virtual private network is based on inserting into each data packet communicated over a secure communication link one or more data values that vary according to a pseudo-random sequence.

14. (Previously Presented) The system of claim 11, wherein the virtual private network is based on a network address hopping regime that is used to pseudorandomly change network addresses in packets transmitted between a first device and a second device.

15. (Previously Presented) The system of claim 11, wherein the virtual private network is based on comparing a value in each data packet transmitted between a first device and a second device to a moving window of valid values.

16. (Previously Presented) The system of claim 11, wherein the virtual private network is based on a comparison of a discriminator field in a header of each data packet to a table of valid discriminator fields maintained for a first device.

17. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to respond to the query for the network address.

18. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to provide, in response to the query, the network address corresponding to a domain name from the plurality of domain names and the corresponding network addresses.

19. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to receive the query initiated from a first location, the query requesting the network address associated with a domain name, wherein the domain name service system is configured to provide the network address associated with a second location, and wherein the domain name service system is configured to support establishing a secure communication link between the first location and the second location.

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20. (Previously Presented) The system of claim 4, wherein the domain name service system is connected to a communication network, stores a plurality of domain names and corresponding network addresses, and comprises an indication that the domain name service system supports establishing a secure communication link.

21. (Previously Presented) The system of claim 4, wherein at least one of the plurality of domain names is reserved for secure communication links.

22. (Previously Presented) The system of claim 4, wherein the domain name service system comprises a server.

23. (Previously Presented) The system of claim 22, wherein the domain name service system further comprises a domain name database, and wherein the domain name database stores the plurality of domain names and the corresponding network addresses.

24. (Previously Presented) The system of claim 4, wherein the domain name service system comprises a server, wherein the server comprises a domain name database, and wherein the domain name database stores the plurality of domain names and the corresponding network addresses.

25. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to store the corresponding network addresses for use in establishing secure communication links.

26. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to authenticate the query for the network address.

27. (Previously Presented) The system of claim 4, wherein at least one of the plurality of domain names comprises an indication that the domain name service system supports establishing a secure communication link.

28. (Previously Presented) The system of claim 4, wherein at least one of the plurality of domain names comprises a secure name.

29. (Previously Presented) The system of claim 4, wherein at least one of the plurality

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of domain names enables establishment of a secure communication link.

30. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location transparently to a user at the first location.

31. (Previously Presented) The system of claim 4, wherein the secure communication link uses encryption.

32. (Previously Presented) The system of claim 4, wherein the secure communication link is capable of supporting a plurality of services.

33. (Previously Presented) The system of claim 32, wherein the plurality of services comprises a plurality of communication protocols, a plurality of application programs, multiple sessions, or a combination thereof.

34. (Previously Presented) The system of claim 33, wherein the plurality of application programs comprises items selected from a group consisting of the following: video conferencing, e-mail, a word processing program, and telephony.

35. (Previously Presented) The system of claim 32, wherein the plurality of services comprises audio, video, or a combination thereof.

36. (Previously Presented) The system of claim 4, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location.

37. (Previously Presented) The system of claim 36, wherein the query is initiated from the first location, wherein the second location comprises a computer, and wherein the network address is an address associated with the computer.

38. (Previously Presented) The system of claim 4, wherein the domain name service system comprises a domain name database connected to a communication network and storing a plurality of domain names and corresponding network addresses for communication, wherein the domain name database is configured so as to provide a network address corresponding to a

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domain name in response to a query in order to establish a secure communication link.

39. (Currently Amended) A non-transitory machine-readable medium comprising instructions executable in a domain name service system, the instructions comprising code for: connecting the domain name service system to a communication network; storing a plurality of domain names and corresponding network addresses; receiving a query for a network address; and indicating in response to the query whether the domain name service system supports establishing a secure communication link.

40. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for storing the plurality of domain names and corresponding network addresses including at least one top-level domain name.

41. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for responding to the query for the network address.

42. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for providing, in response to the query, the network address corresponding to a domain name from the plurality of domain names and the corresponding network addresses.

43. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for receiving the query for a network address associated with a domain name and initiated from a first location, and providing a network address associated with a second location, and establishing a secure communication link between the first location and the second location.

44. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for indicating that the domain name service system supports the establishment of a secure communication link.

45. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for reserving at least one of the plurality of domain names for secure communication links.



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46. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the code resides on a server.

47. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for storing a plurality of domain names and corresponding network addresses so as to define a domain name database.

48. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the code resides on a server, and the instructions comprise code for creating a domain name database configured to store the plurality of domain names and the corresponding network addresses.

49. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for storing the corresponding network addresses for use in establishing secure communication links.

50. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the instructions comprise code for authenticating the query for the network address.

51. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein at least one of the plurality of domain names includes an indication that the domain name service system supports the establishment of a secure communication link.

52. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein at least one of the plurality of domain names includes a secure name.

53. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein at least one of the plurality of domain names is configured so as to enable establishment of a secure communication link.

54. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location transparently to a user at the first location.

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55. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the secure communication link uses encryption.

56. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the secure communication link is capable of supporting a plurality of services.

57. (Currently Amended) The non-transitory machine-readable medium of claim 56, wherein the plurality of services comprises a plurality of communication protocols, a plurality of application programs, multiple sessions, or a combination thereof.

58. (Currently Amended) The non-transitory machine-readable medium of claim 57, wherein the plurality of application programs comprises items selected from a group consisting of the following: video conferencing, e-mail, a word processing program, and telephony.

59. (Currently Amended) The non-transitory machine-readable medium of claim 56, wherein the plurality of services comprises audio, video, or a combination thereof.

60. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location.

61. (Currently Amended) The non-transitory machine-readable medium of claim 60, wherein the instructions include code for receiving a query initiated from the first location, wherein the second location comprises a computer, and wherein the network address is an address associated with the computer.

62. (Currently Amended) The non-transitory machine-readable medium of claim 39, wherein the domain name service system comprises a domain name database connected to a communication network and storing a plurality of domain names and corresponding network addresses for communication, wherein the domain name database is configured so as to provide a network address corresponding to a domain name in response to the query in order to establish a secure communication link.

63. (Currently Amended) A method of providing a domain name service for

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establishing a secure communication link, the method comprising:

connecting a domain name service system to a communication network[[],];

storing a plurality of domain names and corresponding network addresses; and

upon receiving a query for a network address for communication, indicating whether the domain name service system supports establishing a secure communication link.

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### **REMARKS**

Claims 4-63 are in the application. Claims 4-38 are being resubmitted as previously presented, and Claims 39-63 have been amended in order to more clearly define the invention.

Claims 39-62 have been rejected under 35 U.S.C. § 101 for claiming non-statutory subject matter. Claims 4-63 have been rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-59 of U.S. Patent No. 7,418,504. These rejections are respectfully traversed and reconsideration is requested in view of the foregoing amendments and following remarks

#### ***35 U.S.C. § 101***

Claims 39-62 have been rejected under 35 U.S.C. § 101 for claiming non-statutory subject matter. The Office Action recommends that the term “non-transitory” be added to the claims to overcome this rejection. The Applicant has amended claims 39-62 accordingly. The Applicant respectfully requests withdrawal of this rejection.

#### ***Double-Patenting***

Claims 4-63 have been rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-59 of U.S. Patent No. 7,418,504. The Applicant concurrently submits a terminal disclaimer to overcome this rejection. Accordingly, the Applicant respectfully request withdrawal of this rejection and submits that the claims are in condition for allowance.

#### ***Typographical Error***

The Office Action noted a typographical error in claim 63 – a comma and semicolon were together. The Applicant has amended claim 63 to correct this typographical error.

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### **CONCLUSION**

Claims 4-63, the remaining claims in the application are now considered in condition for allowance. An early and favorable action thereon is therefore earnestly solicited.

Please charge the Terminal Disclaimer Fee and any shortage of fees due in connection with the filing of this paper, to Deposit Account 50-1133 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP

/Toby H. Kusmer/

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(11)

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>11/840,560</b>		Filing Date <b>08/17/2007</b>		<input type="checkbox"/> To be Mailed			
<b>APPLICATION AS FILED – PART I</b>											
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/>		OR		OTHER THAN SMALL ENTITY	
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)	OR		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.											
<b>APPLICATION AS AMENDED – PART II</b>											
(Column 1)			(Column 2)			SMALL ENTITY		OR		OTHER THAN SMALL ENTITY	
AMENDMENT	<b>12/22/2010</b>	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)	
	Total <small>(37 CFR 1.16(o))</small>	* 60	Minus	** 60	= 0	X \$ =		OR	X \$2=	0	
	Independent <small>(37 CFR 1.16(h))</small>	* 3	Minus	***3	= 0	X \$ =		OR	X \$220=	0	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>										
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>										
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	<b>0</b>	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)	
	Total <small>(37 CFR 1.16(o))</small>	*	Minus	**	=	X \$ =		OR	X \$ =		
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus	***	=	X \$ =		OR	X \$ =		
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>										
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>										
						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: <b>/VIKKI SHORT/</b>											

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.

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McDermott Will & Emery  
600 13th Street, NW  
Washington, DC 20005-3096



**Courtesy Reminder for  
Application Serial No: 11/840,560**

Attorney Docket No: 077580-0063  
(VRNK-1CP3CN2  
Customer Number: 23630

Date of Electronic Notification: 10/21/2010

This is a courtesy reminder that new correspondence is available for this application. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

mweipdocket@mwe.com

Please verify that these email addresses are correct.

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>. If you have any questions, please email the Electronic Business Center (EBC) at [EBC@uspto.gov](mailto:EBC@uspto.gov) or call 1-866-217-9197.



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www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Includes details for application 11/840,560, inventor Victor Larson, and attorney McDermott Will & Emery.

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):

mweipdocket@mwe.com



<b>Office Action Summary</b>	<b>Application No.</b> 11/840,560	<b>Applicant(s)</b> LARSON ET AL.	
	<b>Examiner</b> Krisna Lim	<b>Art Unit</b> 2453	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 06 August 2010.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 4-63 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 4-63 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  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:
    - 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)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

1. Claims 4-63 are newly added for examination, and claims 1-3 was canceled.
2. As required by M.P.E.P. 609(C), the applicant's submissions of the Information Disclosure Statement dated 4/02/2010, 08/04/2010, 12/14/2009, 11/06/2009, 09/08/2009, 05/19/2009, 02/24/2009, 01/22/2009 and 12/16/2008 is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by M.P.E.P 609 C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.
3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01 (o). Correction of the following is required: The specification does not mention or define "computer readable medium" which is found in claims 39-62. Depending on the definition given "computer readable medium" may include embodiments that are not statutory in view of 35 USC § 101. Therefore, the applicant should amend the specification giving "computer machine readable medium" a definition that would be available to one having ordinary skill in the art at the time of the invention so that it can be determined if the limitations are statutory.
4. In claim 63, line 3, there is a typographical error because a comma and a semicolon are together.
5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
6. Claims 39-62 are rejected under 35 U.S.C. §101 because they are rejected under 35 US.C. § 101 as on-statutory subject matter.

The broadest reasonable interpretation of a claim drawn to a computer readable medium (also called machine readable medium and other such variations) typically covers forms of non-transitory tangible media and transitory propagating signals per se in view of the ordinary and customary meaning of computer readable media, particularly when the specification is silent. See MPEP 2111.01. See *In re Nuijten*, 500 F.3d 1346, 1356-57 (Fed. Cir. 2007) (transitory embodiments are not directed to statutory subject matter) and Interim Examination Instructions for Evaluating Subject Matter Eligibility under 35 U.S.C. § 101, Aug. 24, 2009; p. 2.

Note: Applicants are recommended to change "computer readable medium" to "non-transitory computer readable medium" to the claim. By adding "non-transitory" language would not raise the issue of new matter even the specification is silent because the broadest reasonable interpretation relies on the ordinary and customary meaning that includes signal per se.

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated

by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 4-63 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-59 of U.S. Patent No. 7,418,504.

Although the conflicting claims are not identical, they are not patentably distinct from each other because they are directed to a system for providing a domain name service for establishing a secure communication link and having similar components and functions. The differences are the modifications of the claimed languages. For example, in claim 4 of the present application uses the language of "a domain name

service system configured and arranged to be connected" while the claim 1 of the patent uses the similar language without "*and arranged*". Another example, in claim 39 of the present application uses the language of "indicating in response to the query whether the domain name service system supports establishing a secure communication link" while the claim 36 of the patent uses the language of "*supporting an indication that the domain name service system supports establishing a secure communication link*" instead. And another example is the difference between claim 63 of the present application and claim 60 of the patent. The difference is the present application uses the language of "*the domain name service system comprises an indication that the domain name service system supports establishing a secure communication link*" at the beginning of step while claim 63 of the present application uses the language of "indicating whether the domain name service system supports establishing a secure communication link".

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Application/Control Number: 11/840,560  
Art Unit: 2453

Page 6

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krisna Lim whose telephone number is 571-272-3956. The examiner can normally be reached on Tuesday to Friday from 7:10 AM to 5:40 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Krista Zele, can be reached on 571-272-7288. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KI

October 19, 2010

/Krisna Lim/

Primary Examiner, Art Unit 2453

<b>Index of Claims</b> 	<b>Application/Control No.</b> 11840560	<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>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	03/14/2010	10/19/2010						
	1	✓	-						
	2	✓	-						
	3	✓	-						
	4		✓						
	5		✓						
	6		✓						
	7		✓						
	8		✓						
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	31		✓						
	32		✓						
	33		✓						
	34		✓						
	35		✓						
	36		✓						

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 11840560	<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>

N	<b>Non-Elected</b>
I	<b>Interference</b>

A	<b>Appeal</b>
O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	03/14/2010	10/19/2010						
	37		✓						
	38		✓						
	39		✓						
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	61		✓						
	62		✓						
	63		✓						



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	11/840,560		
				Filing Date	08-17-2007		
				First Named Inventor	Victor Larson		
				Art Unit	2453		
				Examiner Name	Krisna Lim		
				Docket Number	077580-0063		
<b>U.S. PATENTS</b>							
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		
	A1037	5,870,610	02/1999	Beyda et al.			
<b>FOREIGN PATENT DOCUMENTS</b>							
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
	B1003	EP0838930	4/29/1988	Digital Equipment Corporation			
	B1004	EP0814589	12/29/1997	AT&T Corp.			
	B1005	GB2317792	04/01/1998	Secure Computing Corporation			
	B1006	WO98/27783	06/25/1998	Northern Telecom Limited			
	B1007	WO99/11019	03/04/1999	V One Corp			
	B1008	GB2334181	08/11/1999	NEC Technologies			
	B1009	GB2340702	02/23/2000	Sun Microsystems Inc.			
<b>OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
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.					
	C1244	Baumgartner et al, "Differentiated Services: A New Approach for Quality of Service in the Internet," International Conference on High Performance Networking, 255-273 (1998)					
	C1245	Chapman et al., "Domain Name System (DNS)," 278-296 (1995)					
	C1246	Davila et al., "Implementation of Virtual Private Networks at the Transport Layer," M. Mambo, Y. Zheng (Eds), Information Security (Second International) Workshop, ISW' 99. Lecture Notes in Computer Science (LNCS), Vol. 1729; 85-102 (1999)					
	C1247	De Raadt et al., "Cryptography in OpenBSD," 10 pages (1999)					
	C1248	Eastlake, "Domain Name System Security Extensions," Internet Citation, Retrieved from the Internet: URL:ftp://ftp.inet.no/pub/ietf/internet-drafts/draft-ietf-dnssec-secext2-05.txt (1998)					

/Krisna Lim/

10/17/2010

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./

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	11/840,560
		Filing Date	08-17-2007
		First Named Inventor	Victor Larson
		Art Unit	2453
		Examiner Name	Krisna Lim
		Docket Number	077580-0063

	C1249	Gunter et al., "An Architecture for Managing QoS-Enabled VRNs Over the Internet," Proceedings 24th Conference on Local Computer Networks. LCN' 99 IEEE Comput. Soc Los Alamitos, CA, pages 122-131 (1999)	
	C1250	Shimizu, "Special Feature: Mastering the Internet with Windows 2000", Internet Magazine, 63:296-307 (2000)	
	C1251	Stallings, "Cryptography and Network Security," Principals and Practice, 2nd Edition, pages 399-440 (1999)	
	C1252	Takata, "U.S. Vendors Take Serious Action to Act Against Crackers – A Tracking Tool and a Highly Safe DNS Software are Released", Nikkei Communications, 257:87(1997)	
	C1253	Wells, Email (Lancasterb1be@mail.msn.com), Subject: "Security Icon," (1998)	

/Krisna Lim/

10/17/2010

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

11840560 - GAU: 2453

Approved for use through 12/31/2008. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	11840560
	Filing Date	2007-08-17
	First Named Inventor	Larson, et al.
	Art Unit	
	Examiner Name	
	Attorney Docket Number	077580-063(VR NK-1CP3CN2)

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Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
	1	5771239		1998-06-23	Moroney, et al.			
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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
	1							
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FOREIGN PATENT DOCUMENTS							Remove	
Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup> j	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1							<input type="checkbox"/>
If you wish to add additional Foreign Patent Document citation information please click the Add button.							Add	
NON-PATENT LITERATURE DOCUMENTS							Remove	
Examiner 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, pages(s), volume-issue number(s), publisher, city and/or country where published.						T <sup>5</sup>

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		11840560	11840560 - GAU: 2453	
	Filing Date		2007-08-17		
	First Named Inventor	Larson, et al.			
	Art Unit				
	Examiner Name				
	Attorney Docket Number		077580-063(VR NK-1CP3CN2)		

	1	FASBENDER, A., et al., Variable and Scalable Security: Protection of Location Information in Mobile IP, IEEE VTS, 46th, 1996, 5 pp.	<input type="checkbox"/>
--	---	---	--------------------------

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

Examiner Signature	/Krisna Lim/	Date Considered	03/14/2010
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.

Subst. for form 1449/PTO

**Complete if Known**

<b>SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>		Application Number	11/840,560	
		Filing Date	August 17, 2007	
		First Named Inventor	Victor Larson	
		Art Unit	2157	
		Examiner Name	Vu, Kim Y.	
		Docket Number	077580-0063 (VRNK-1CP3CN2)	

U.S. PATENT DOCUMENTS

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

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						Yes	No

OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)

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	C1002	DNS-related correspondence dated September 7, 1993 to September 20, 1993. (Pre KX, KX Records)
	C1014	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/02/1996). (RFC 2543 Internet Draft 1)
	C1019	Aventail Corp., "AutoSOCKS v. 2.1 Datasheet," available at <a href="http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html">http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html</a> (1997). (AutoSOCKS, Aventail)
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	C1033	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (03/27/1997). (RFC 2543 Internet Draft 2)
	C1041	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/31/1997). (RFC 2543 Internet Draft 3)
	C1043	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/11/1997). (RFC 2543 Internet Draft 4)
	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5)
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	C1056	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/16/1998). (RFC 2543 Internet Draft 7)
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<b>SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Use as many sheets as necessary)				Subst. for form 1449/PTO		<b>Complete if Known</b>	
				Application Number		11/840,560	
				Filing Date		August 17, 2007	
				First Named Inventor		Victor Larson	
				Art Unit		2157	
				Examiner Name		Vu, Kim Y.	
Sheet	2	of	2	Docket Number	077580-0063 (VRNK-1CP3CN2)		

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	A1001	5,511,122	04/23/1996	Atkinson	
	A1003	5,805,803	09/08/1998	Birrell et al.	
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	B1000	WO 001/17775	03-30-2000	Science Applications International Corporation			
	B1001	WO 00/70458	11-23-2000	Comsec Corporation			
	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

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	C999	Appendix A of the Microsoft Corporation's Fourth Amended Invalidity Contentions dated Jan. 5, 2009.			
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	C1015	M.G. Reed, et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996. (Reed, Onion Routing)				
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				First Named Inventor	Victor Larson	
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.	C1051	C. Huitema, 45 al. "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998). (SGCP)			
	C1052	DISA "Secret Internet Protocol Router Network," SIPRNET Program Management Office (D3113) DISN Networks, DISN Transmission Services (May 8, 1998). (DISA, SIPRNET)			
	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1054	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (06/17/1998). (RFC 2543 Internet Draft 6) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1055	D. McDonald, et al. "PF_KEY Key Management API, Version 2," Network Working Group, RFC 2367 (July 1998). (RFC 2367)			
	C1056	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/16/1998). (RFC 2543 Internet Draft 7) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1057	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (08/07/1998). (RFC 2543 Internet Draft 8) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1058	Microsoft Corp., <i>Company Focuses on Quality and Customer Feedback</i> (August 18, 1998). (Focus, Microsoft Prior Art VPN Technology)			
	C1059	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (09/18/1998). (RFC 2543 Internet Draft 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1060	Atkinson, et al. "Security Architecture for the Internet Protocol," Network Working Group, RFC 2401 (November 1998). (RFC 2401, UNDERLYING SECURITY TECHNOLOGIES)			
	C1061	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/12/1998). (RFC 2543 Internet Draft 10) 9 <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1062	Donald Eastlake, <i>Domain Name System Security Extensions</i> , IETF DNS Security Working Group (December 1998). (DNSSEC-7)			
	C1063	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/15/1998). (RFC 2543 Internet Draft 11) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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				Art Unit	2157	
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	C1064	Aventail Corp., "Aventail Connect 3.1/2.6 Administrator's Guide," (1999). (Aventail Administrator 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1065	Aventail Corp., "Aventail Connect 3.1/2.6 User's Guide," (1999). (Aventail User 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1066	Aventail Corp., "Aventail ExtraWeb Server v3.2 Administrator's Guide," (1999). (Aventail ExtraWeb 3.2, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1067	Kaufman et al, "Implementing IPsec," (Copyright 1999). (Implementing IPSEC, VPN REFERENCES)				
	C1068	Network Solutions, Inc. "Enabling SSL," NSI Registry (1999). (Enabling SSL, UNDERLYING SECURITY TECHNOLOGIES)				
	C1069	Check Point Software Technologies Ltd. (1999) (Check Point, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1070	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , <draft-ietf-dnsind-rrc2052bis-02.txt> (January 1999). (Gulbrandsen 99, DNS SRV)				
	C1071	C. Scott, et al. <i>Virtual Private Networks</i> , O'Reilly and Associates, Inc., 2nd ed. (Jan. 1999). (Scott VPNs)				
	C1072	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (01/15/1999). (RFC 2543 Internet Draft 12) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1073	Goldschlag, et al., "Onion Routing for Anonymous and Private Internet Connections," Naval Research Laboratory, Center for High Assurance Computer Systems (January 28, 1999). (Goldschlag III, Onion Routing)				
	C1074	H. Schulzrinne, "Internet Telephony: architecture and protocols - an IETF perspective," Computer Networks, Vol. 31, No. 3 (February 1999). (Telephony, Schulzrinne)				
	C1075	M. Handley, et al. "SIP: Session Initiation Protocol," Network Working Group, RFC 2543 and Internet Drafts (12/96-3/99). (Handley, RFC 2543)				
	C1076	FreeSWAN Project, <i>Linux FreeSWAN Compatibility Guide</i> (March 4, 1999). (FreeSWAN Compatibility Guide, FreeSWAN)				
	C1077	Telcordia Technologies, "ANX Release 1 Document Corrections," AIAG (May 11, 1999). (Telcordia, ANX)				
	C1078	Ken Hornstein & Jeffrey Altman, <i>Distributing Kerberos KDC and Realm Information with DNS</i> <draft-eitf-cat-krb-dns-locate-oo.txt> (June 21, 1999). (Hornstein, DNS SRV)				
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	C1079	Bhattacharya et. al. "An LDAP Schema for Configuration and Administration of IPSec Based Virtual Private Networks (VPNs)", IETF Internet Draft (October 1999). (Bhattacharya LDAP VPN)				
	C1080	B. Patel, et al. "DHCP Configuration of IPSEC Tunnel Mode," IPSEC Working Group, Internet Draft 02 (10/15/1999). (Patel)				
	C1081	Goncalves, et al. <i>Check Point FireWall -1 Administration Guide</i> , McGraw-Hill Companies (2000). (Goncalves, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1082	"Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000). (FirstVPN Microsoft)				
	C1083	Gulbrandsen, Vixie, & Esibov, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2782 (February 2000). (RFC 2782, DNS SRV)				
	C1084	MITRE Organization, "Technical Description," Collaborative Operations in Joint Expeditionary Force Experiment (JEFX) 99 (February 2000). (MITRE, SIPRNET)				
	C1085	H. Schulzrinne, et al. "Application-Layer Mobility Using SIP," <i>Mobile Computing and Communications Review</i> , Vol. 4, No. 3. pp. 47-57 (July 2000). (Application, SIP)				
	C1086	Kindred et al, "Dynamic VPN Communities: Implementation and Experience," DARPA Information Survivability Conference and Exposition II (June 2001). (DARPA, VPN SYSTEMS)				
	C1087	ANX 101: Basic ANX Service Outline. (Outline, ANX)				
	C1088	ANX 201: Advanced ANX Service. (Advanced, ANX)				
	C1089	Appendix A: Certificate Profile for ANX IPsec Certificates. (Appendix, ANX)				
	C1090	Assured Digital Products. (Assured Digital) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1091	Aventail Corp., "Aventail AutoSOCKS the Client Key to Network Security," Aventail Corporation White Paper. (Network Security, Aventail)				
	C1092	Cindy Moran, "DISN Data Networks: Secret Internet Protocol Router Network (SIPRNet)." (Moran, SIPRNET)				
	C1093	Data Fellows F-Secure VPN+ (F-Secure VPN+)				
	C1094	"Interim Operational Systems Doctrine for the Remote Access Security Program (RASP) Secret Dial-In Solution. (RASP, SIPRNET)				
	C1095	<i>Onion Routing</i> , "Investigation of Route Selection Algorithms," available at <a href="http://www.onion-router.net/Archives/Route/index.html">http://www.onion-router.net/Archives/Route/index.html</a> . (Route Selection, Onion Routing)				
	C1096	Secure Computing, "Bullet-Proofing an Army Net," Washington Technology. (Secure, SIPRNET)				
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	C1097	SPARTA "Dynamic Virtual Private Network." (Sparta, VPN SYSTEMS)				
	C1098	Standard Operation Procedure for Using the 1910 Secure Modems. (Standard, SIPRNET)				
	C1099	Publicly available emails relating to FreeSWAN (MSFTVX00018833-MSFTVX00019206). (FreeSWAN emails, FreeSWAN)				
	C1100	Kaufman et al., "Implementing IPsec," (Copyright 1999) (Implementing IPsec)				
	C1101	Network Associates <i>Gauntlet Firewall For Unix User's Guide Version 5.0</i> (1999). (Gauntlet User's Guide – Unix, Firewall Products)				
	C1102	Network Associates <i>Gauntlet Firewall For Windows NT Getting Started Guide Version 5.0</i> (1999) (Gauntlet Getting Started Guide – NT, Firewall Products)				
	C1103	Network Associates <i>Gauntlet Firewall For Unix Getting Started Guide Version 5.0</i> (1999) (Gauntlet Unix Getting Started Guide, Firewall Products)				
	C1104	Network Associates <i>Release Notes Gauntlet Firewall for Unix 5.0</i> (March 19, 1999) (Gauntlet Unix Release Notes, Firewall Products)				
	C1105	Network Associates <i>Gauntlet Firewall For Windows NT Administrator's Guide Version 5.0</i> (1999) (Gauntlet NT Administrator's Guide, Firewall Products)				
	C1106	Trusted Information Systems, Inc. <i>Gauntlet Internet Firewall Firewall-to-Firewall Encryption Guide Version 3.1</i> (1996) (Gauntlet Firewall-to-Firewall, Firewall Products)				
	C1107	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)				
	C1108	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)				
	C1109	Dan Sterne <i>Dynamic Virtual Private Networks</i> (May 23, 2000) (Sterne DVPN, DVPN)				
	C1110	Darrell Kindred <i>Dynamic Virtual Private Networks (DVPN)</i> (December 21, 1999) (Kindred DVPN, DVPN)				
	C1111	Dan Sterne <i>et. al. TIS Dynamic Security Perimeter Research Project Demonstration</i> (March 9, 1998) (Dynamic Security Perimeter, DVPN)				
	C1112	Darrell Kindred <i>Dynamic Virtual Private Networks Capability Description</i> (January 5, 2000) (Kindred DVPN Capability, DVPN) 11				
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	C1113	October 7, and 28 1997 email from Domenic J. Turchi Jr. (SPARTA00001712-1714, 1808-1811) (Turchi DVPN email, DVPN)				
	C1114	James Just & Dan Sterne <i>Security Quickstart Task Update</i> (February 5, 1997) (Security Quickstart, DVPN)				
	C1115	Virtual Private Network Demonstration dated March 21, 1998 (SPARTA00001844-54) (DVPN Demonstration, DVPN)				
	C1116	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.1 Plan</i> (March 10, 1998) (IFD 1.1, DVPN)				
	C1117	Microsoft Corp. Windows NT Server Product Documentation: Administration Guide – Connection Point Services, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx</a> (Connection Point Services) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1118	Microsoft Corp. Windows NT Server Product Documentation: Administration Kit Guide – Connection Manager, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx</a> (Connection Manager) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1119	Microsoft Corp. Autodial Heuristics, <i>available at</i> <a href="http://support.microsoft.com/kb/164249">http://support.microsoft.com/kb/164249</a> (Autodial Heuristics) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1120	Microsoft Corp., Cariplo: Distributed Component Object Model, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx</a> (Cariplo I)				
	C1121	Marc Levy, COM Internet Services (Apr. 23, 1999), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx</a> (Levy)				
	C1122	Markus Horstmann and Mary Kirtland, DCOM Architecture (July 23, 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx</a> (Horstmann)				
	C1123	Microsoft Corp., DCOM: A Business Overview (Apr. 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx</a> (DCOM Business Overview I)				
	C1124	Microsoft Corp., DCOM Technical Overview (Nov. 1996), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx</a> (DCOM Technical Overview I)				
	C1125	Microsoft Corp., DCOM Architecture White Paper (1998) <i>available in</i> PDC DVD-ROM (DCOM Architecture)				
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	C1126	Microsoft Corp, DCOM – The Distributed Component Object Model, A Business Overview White Paper (Microsoft 1997) <i>available in</i> PDC DVD-ROM (DCOM Business Overview II)			
	C1127	Microsoft Corp., DCOM—Cariplo Home Banking Over The Internet White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (Cariplo II)			
	C1128	Microsoft Corp., DCOM Solutions in Action White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Solutions in Action)			
	C1129	Microsoft Corp., DCOM Technical Overview White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Technical Overview II)			
	C1130	125. Scott Suhy & Glenn Wood, DNS and Microsoft Windows NT 4.0, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx</a> (Suhy)			
	C1131	126. Aaron Skonnard, <i>Essential WinInet</i> 313-423 (Addison Wesley Longman 1998) (Essential WinInet)			
	C1132	Microsoft Corp. Installing, Configuring, and Using PPTP with Microsoft Clients and Servers, (1998) <i>available at</i> <a href="http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx">http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx</a> (Using PPTP)			
	C1133	Microsoft Corp., Internet Connection Services for MS RAS, Standard Edition, <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.mspx</a> (Internet Connection Services I)			
	C1134	Microsoft Corp., Internet Connection Services for RAS, Commercial Edition, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.mspx</a> (Internet Connection Services II)			
	C1135	Microsoft Corp., Internet Explorer 5 Corporate Deployment Guide – Appendix B: Enabling Connections with the Connection Manager Administration Kit, <i>available at</i> <a href="http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.mspx">http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.mspx</a> (IE5 Corporate Development)			
	C1136	Mark Minasi, <i>Mastering Windows NT Server 4</i> 1359-1442 (6th ed., January 15, 1999)(Mastering Windows NT Server)			
	C1137	<i>Hands On, Self-Paced Training for Supporting Version 4.0</i> 371-473 (Microsoft Press 1998) (Hands On)			
	C1138	Microsoft Corp., MS Point-to-Point Tunneling Protocol (Windows NT 4.0), <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.mspx">http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.mspx</a> (MS PPTP)			
	C1139	Kenneth Gregg, <i>et al.</i> , <i>Microsoft Windows NT Server Administrator's Bible</i> 173-206, 883-911, 974-1076 (IDG Books Worldwide 1999) (Gregg)			
	C1140	Microsoft Corp., Remote Access (Windows), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/bb545687(VS.85,printer).aspx">http://msdn2.microsoft.com/en-us/library/bb545687(VS.85,printer).aspx</a> (Remote Access)			
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.	C1141	Microsoft Corp., Understanding PPTP (Windows NT 4.0), available at <a href="http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.msp">http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.msp</a> (Understanding PPTP NT 4) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)					
	C1142	Microsoft Corp., Windows NT 4.0: Virtual Private Networking, available at <a href="http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.msp">http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.msp</a> (NT4 VPN) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)					
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	C1145	Microsoft Corp., Windows NT Server Product Documentation: Chapter 5 – Planning for Large-Scale Configurations, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/ras40/rasch05.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/ras40/rasch05.msp</a> (Large-Scale Configurations) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)					
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				Application Number	11/840,560
				Filing Date	August 17, 2007
				First Named Inventor	Victor Larson
				Art Unit	2157
				Examiner Name	VU, Kim Y.
Sheet	13	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)
<b>OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>					
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.			
	C1151	F-Secure, <i>F-Secure VPN+ Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (VPN+ Guide 3)			
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	C1156	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (Sept. 1998) (from FSECURE 00000009) (SSH Guide 9)			
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	C1174	156. <i>Finding Your Way Through the VPN Maze</i> (1999) ("PGP")			
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	C1176	TimeStep, <i>The Business Case for Secure VPNs</i> (1998) ("TimeStep")			
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	C1178	WatchGuard Technologies, Inc., <i>MSS Firewall Specifications</i> (1999) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1196	<i>IFE 3.1 Technology Dependencies</i> (2000)			
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	C1199	Information Assurance/NAI Labs, <i>Dynamic Virtual Private Networks Presentation</i> (2000)			
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	C1210	David G. Schaer, <i>MCSE Test Success: Proxy Server 2</i> (1998) (Schaer, Microsoft Prior Art VPN Technology)			
	C1211	John Savill, <i>The Windows NT and Windows 2000 Answer Book</i> (1999) (Savill, Microsoft Prior Art VPN Technology)			
	C1212	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)			
	C1213	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)			
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**U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Codez (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes-Number + Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
	B1000	WO 001/17775	03-30-2000	Science Applications International Corporation			
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	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

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	C1001	1. P. Mockapetris, "DNS Encoding of Network Names and Other Types," Network Working Group, RFC 1101 (April 1989) (RFC1101, DNS SRV)				
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	C1003	R. Atkinson, "An Internetwork Authentication Architecture," Naval Research Laboratory, Center for High Assurance Computing Systems (8/5/93). (Atkinson NRL, KX Records)				
	C1004	Henning Schulzrinne, <i>Personal Mobility For Multimedia Services In The Internet</i> , Proceedings of the Interactive Distributed Multimedia Systems and Services European Workshop at 143 (1996). (Schulzrinne 96)				
	C1005	Microsoft Corp., <i>Microsoft Virtual Private Networking: Using Point-to-Point Tunneling Protocol for Low-Cost, Secure, Remote Access Across the Internet</i> (1996) (printed from 1998 PDC DVD-ROM). (Point to Point, Microsoft Prior Art VPN Technology)				
	C1006	"Safe Surfing: How to Build a Secure World Wide Web Connection," IBM Technical Support Organization, (March 1996). (Safe Surfing, WEBSITE ART)				
	C1007	Goldschlag, et al., "Hiding Routing Information," Workshop on Information Hiding, Cambridge, UK (May 1996). (Goldschlag II, Onion Routing)				
	C1008	"IPSec Minutes From Montreal", IPSEC Working Group Meeting Notes, <a href="http://www.sandleman.ca/ipsec/1996/08/msg00018.html">http://www.sandleman.ca/ipsec/1996/08/msg00018.html</a> (June 1996). (IPSec Minutes, FreeSWAN)				
	C1009	J. M. Galvin, "Public Key Distribution with Secure DNS," Proceedings of the Sixth USENIX UNIX Security Symposium, San Jose, California, July 1996. (Galvin, DNSSEC)				
	C1010	J. Gilmore, et al. "Re: Key Management, anyone? (DNS Keying)," IPsec Working Group Mailing List Archives (8/96). (Gilmore DNS, FreeSWAN)				
	C1011	H. Orman, et al. "Re: 'Re: DNS? was Re: Key Management, anyone?'" IETF IPsec Working Group Mailing List Archive (8/96-9/96). (Orman DNS, FreeSWAN)				
	C1012	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2052 (October 1996). (RFC 2052, DNS SRV)				
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				Art Unit	2157	
				Examiner Name	VU, Kim Y.	
Sheet	3	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)	
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	C1013	Freier, et al. "The SSL Protocol Version 3.0," Transport Layer Security Working Group (November 18, 1996). (SSL, UNDERLYING SECURITY TECHNOLOGY)				
	C1014	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/02/1996). (RFC 2543 Internet Draft 1) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1015	M.G. Reed, et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996. (Reed, Onion Routing)				
	C1016	Kenneth F. Alden & Edward P. Wobber, <i>The AltaVista Tunnel: Using the Internet to Extend Corporate Networks</i> , Digital Technical Journal (1997) (Alden, AltaVista)				
	C1017	Automotive Industry Action Group, "ANX Release 1 Document Publication," AIAG (1997). (AIAG, ANX)				
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	C1019	Aventail Corp., "AutoSOCKS v. 2.1 Datasheet," available at <a href="http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html">http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html</a> (1997). (AutoSOCKS, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1020	Aventail Corp. "Aventail VPN Data Sheet," available at <a href="http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html">http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html</a> (1997). (Data Sheet, Aventail)				
	C1021	Aventail Corp., "Directed VPN Vs. Tunnel," available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html</a> (1997). (Directed VPN, Aventail)				
	C1022	Aventail Corp., "Managing Corporate Access to the Internet," Aventail AutoSOCKS White Paper available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/ipmwp.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/ipmwp.html</a> (1997). (Corporate Access, Aventail)				
	C1023	Aventail Corp., "Socks Version 5," Aventail Whitepaper, available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/sokswp.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/sokswp.html</a> (1997). (Socks, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1024	Aventail Corp., "VPN Server V2.0 Administration Guide," (1997). (VPN, Aventail)				
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	C1026	Microsoft Corp., <i>Installing Configuring and Using PPTP with Microsoft Clients and Servers</i> (1997). (Using PPTP, Microsoft Prior Art VPN Technology)				
	C1027	Microsoft Corp., <i>IP Security for Microsoft Windows NT Server 5.0</i> (1997) (printed from 1998 PDC DVD-ROM). (IP Security, Microsoft Prior Art VPN Technology)				
	C1028	Microsoft Corp., <i>Microsoft Windows NT Active Directory: An Introduction to the Next Generation Directory Services</i> (1997) (printed from 1998 PDC DVD-ROM). (Directory, Microsoft Prior Art VPN Technology)				
	C1029	Microsoft Corp., <i>Routing and Remote Access Service for Windows NT Server New Opportunities Today and Looking Ahead</i> (1997) (printed from 1998 PDC DVD-ROM). (Routing, Microsoft Prior Art VPN Technology)				
	C1030	Microsoft Corp., <i>Understanding Point-to-Point Tunneling Protocol PPTP</i> (1997) (printed from 1998 PDC DVD-ROM). (Understanding PPTP, Microsoft Prior Art VPN Technology)				
	C1031	J. Mark Smith et al., <i>Protecting a Private Network: The AltaVista Firewall</i> , Digital Technical Journal (1997). (Smith, AltaVista)				
	C1032	Naganand Doraswamy <i>Implementation of Virtual Private Networks (VPNs) with IPSecurity</i> , <draft-ietf-ipsec-vpn-00.txt> (March 12, 1997). (Doraswamy)				
	C1033	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (03/27/1997). (RFC 2543 Internet Draft 2) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1034	Aventail Corp., "Aventail and Cybersafe to Provide Secure Authentication For Internet and Intranet Communication," Press Release, April 3, 1997. (Secure Authentication, Aventail)				
	C1035	D. Wagner, et al. "Analysis of the SSL 3.0 Protocol," (April 15, 1997). (Analysis, UNDERLYING SECURITY TECHNOLOGIES)				
	C1036	Automotive Industry Action Group, "ANXO Certification Authority Service and Directory Service Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Definition, ANX)				
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	C1038	Aventail Corp., "Aventail Announces the First VPN Solution to Assure Interoperability Across Emerging Security Protocols," June 2, 1997. (First VPN, Aventail)				
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	C1039	Syverson, et al. "Private Web Browsing," Naval Research Laboratory, Center for High 8 Assurance Computer Systems (June 2, 1997). (Syverson, Onion Routing)			
	C1040	Bellcore, "Metrics, Criteria, and Measurement Technique Requirements for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (June 16, 1997). (AIAG Requirements, ANX)			
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	C1042	R. Atkinson, "Key Exchange Delegation Record for the DNS," Network Working Group, RFC 2230 (November 1997). (RFC 2230, KX Records)			
	C1043	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/11/1997). (RFC 2543 Internet Draft 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1044	1998 Microsoft Professional Developers Conference DVD ("1998 PDC DVD-ROM") (including screenshots captured therefrom and produced as MSFTVX 00018827-00018832). (Conference, Microsoft Prior Art VPN Technology)			
	C1045	Microsoft Corp., <i>Virtual Private Networking An Overview</i> (1998) (printed from 1998 PDC DVD-ROM) (Overview, Microsoft Prior Art VPN Technology)			
	C1046	Microsoft Corp., <i>Windows NT 5.0 Beta Has Public Premiere at Seattle Mini-Camp</i> — <i>Seminar attendees get first look at the performance and capabilities of Windows NT 5.0</i> (1998) (available at <a href="http://hap/www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue">hap //www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue</a> ). (NT Beta, Microsoft Prior Art VPN Technology)			
	C1047	"What ports does SSL use" available at <a href="http://stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html">stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html</a> (1998). (Ports, DNS SRV)			
	C1048	Aventail Corp., "Aventail VPN V2.6 Includes Support for More Than Ten Authentication Methods Making Extranet VPN Development Secure and Simple," Press Release, January 19, 1998. (VPN V2.6, Aventail)			
	C1049	R. G. Moskowitz, "Network Address Translation Issues with IPsec," Internet Draft, Internet Engineering Task Force, February 6, 1998. (Moskowitz)			
	C1050	H. Schulzrinne, et al, "Internet Telephony Gateway Location," Proceedings of IEEE INfocom '98, The Conference on Computer Communications, Vol. 2 ( March 29 – April 2, 1998). (Gateway, Schulzrinne)			
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	C1051	C. Huitema, 45 al. "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998). (SGCP)			
	C1052	DISA "Secret Internet Protocol Router Network," SIPRNET Program Management Office (D3113) DISN Networks, DISN Transmission Services (May 8, 1998). (DISA, SIPRNET)			
	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1054	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (06/17/1998). (RFC 2543 Internet Draft 6) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1055	D. McDonald, et al. "PF_KEY Key Management API, Version 2," Network Working Group, RFC 2367 (July 1998). (RFC 2367)			
	C1056	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/16/1998). (RFC 2543 Internet Draft 7) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1057	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (08/07/1998). (RFC 2543 Internet Draft 8) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1058	Microsoft Corp., <i>Company Focuses on Quality and Customer Feedback</i> (August 18, 1998). (Focus, Microsoft Prior Art VPN Technology)			
	C1059	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (09/18/1998). (RFC 2543 Internet Draft 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1060	Atkinson, et al. "Security Architecture for the Internet Protocol," Network Working Group, RFC 2401 (November 1998). (RFC 2401, UNDERLYING SECURITY TECHNOLOGIES)			
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	C1062	Donald Eastlake, <i>Domain Name System Security Extensions</i> , IETF DNS Security Working Group (December 1998). (DNSSEC-7)			
	C1063	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/15/1998). (RFC 2543 Internet Draft 11) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1064	Aventail Corp., "Aventail Connect 3.1/2.6 Administrator's Guide," (1999). (Aventail Administrator 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1065	Aventail Corp., "Aventail Connect 3.1/2.6 User's Guide," (1999). (Aventail User 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1066	Aventail Corp., "Aventail ExtraWeb Server v3.2 Administrator's Guide," (1999). (Aventail ExtraWeb 3.2, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1067	Kaufman et al, "Implementing IPsec," (Copyright 1999). (Implementing IPSEC, VPN REFERENCES)			
	C1068	Network Solutions, Inc. "Enabling SSL," NSI Registry (1999). (Enabling SSL, UNDERLYING SECURITY TECHNOLOGIES)			
	C1069	Check Point Software Technologies Ltd. (1999) (Check Point, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1070	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , <draft-ietf-dnsind-frc2052bis-02.txt> (January 1999). (Gulbrandsen 99, DNS SRV)			
	C1071	C. Scott, et al. <i>Virtual Private Networks</i> , O'Reilly and Associates, Inc., 2nd ed. (Jan. 1999). (Scott VPNs)			
	C1072	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (01/15/1999). (RFC 2543 Internet Draft 12) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1073	Goldschlag, et al., "Onion Routing for Anonymous and Private Internet Connections," Naval Research Laboratory, Center for High Assurance Computer Systems (January 28, 1999). (Goldschlag III, Onion Routing)			
	C1074	H. Schulzrinne, "Internet Telephony: architecture and protocols – an IETF perspective," <i>Computer Networks</i> , Vol. 31, No. 3 (February 1999). (Telephony, Schulzrinne)			
	C1075	M. Handley, et al. "SIP: Session Initiation Protocol," Network Working Group, RFC 2543 and Internet Drafts (12/96-3/99). (Handley, RFC 2543)			
	C1076	FreeSWAN Project, <i>Linux FreeSWAN Compatibility Guide</i> (March 4, 1999). (FreeSWAN Compatibility Guide, FreeSWAN)			
	C1077	Telcordia Technologies, "ANX Release 1 Document Corrections," AIAG (May 11, 1999). (Telcordia, ANX)			
	C1078	Ken Hornstein & Jeffrey Altman, <i>Distributing Kerberos KDC and Realm Information with DNS</i> <draft-eitf-cat-krb-dns-locate-oo.txt> (June 21, 1999). (Hornstein, DNS SRV)			
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	C1079	Bhattacharya et. al. "An LDAP Schema for Configuration and Administration of IPsec Based Virtual Private Networks (VPNs)", IETF Internet Draft (October 1999). (Bhattacharya LDAP VPN)			
	C1080	B. Patel, et al. "DHCP Configuration of IPSEC Tunnel Mode," IPSEC Working Group, Internet Draft 02 (10/15/1999). (Patel)			
	C1081	Goncalves, et al. <i>Check Point FireWall -1 Administration Guide</i> , McGraw-Hill Companies (2000). (Goncalves, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1082	"Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000). (FirstVPN Microsoft)			
	C1083	Gulbrandsen, Vixie, & Esibov, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2782 (February 2000). (RFC 2782, DNS SRV)			
	C1084	MITRE Organization, "Technical Description," Collaborative Operations in Joint Expeditionary Force Experiment (JEFX) 99 (February 2000). (MITRE, SIPRNET)			
	C1085	H. Schulzrinne, et al. "Application-Layer Mobility Using SIP," <i>Mobile Computing and Communications Review</i> , Vol. 4, No. 3. pp. 47-57 (July 2000). (Application, SIP)			
	C1086	Kindred et al, "Dynamic VPN Communities: Implementation and Experience," DARPA Information Survivability Conference and Exposition II (June 2001). (DARPA, VPN SYSTEMS)			
	C1087	ANX 101: Basic ANX Service.Outline. (Outline, ANX)			
	C1088	ANX 201: Advanced ANX Service. (Advanced, ANX)			
	C1089	Appendix A: Certificate Profile for ANX IPsec Certificates. (Appendix, ANX)			
	C1090	Assured Digital Products. (Assured Digital) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1091	Aventail Corp., "Aventail AutoSOCKS the Client Key to Network Security," Aventail Corporation White Paper. (Network Security, Aventail)			
	C1092	Cindy Moran, "DISN Data Networks: Secret Internet Protocol Router Network (SIPRNet)." (Moran, SIPRNET)			
	C1093	Data Fellows F-Secure VPN+ (F-Secure VPN+)			
	C1094	"Interim Operational Systems Doctrine for the Remote Access Security Program (RASP) Secret Dial-In Solution. (RASP, SIPRNET)			
	C1095	<i>Onion Routing</i> , "Investigation of Route Selection Algorithms," available at <a href="http://www.onion-router.net/Archives/Route/index.html">http://www.onion-router.net/Archives/Route/index.html</a> . (Route Selection, Onion Routing)			
	C1096	Secure Computing, "Bullet-Proofing an Army Net," Washington Technology. (Secure, SIPRNET)			
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				First Named Inventor	Victor Larson	
				Art Unit	2157	
				Examiner Name	VU, Kim Y.	
Sheet	9	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)	
<b>OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>						
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.				
	C1097	SPARTA "Dynamic Virtual Private Network." (Sparta, VPN SYSTEMS)				
	C1098	Standard Operation Procedure for Using the 1910 Secure Modems. (Standard, SIPRNET)				
	C1099	Publically available emails relating to FreeS/WAN (MSFTVX00018833-MSFTVX00019206). (FreeS/WAN emails, FreeS/WAN)				
	C1100	Kaufman et al., "Implementing IPsec," (Copyright 1999) (Implementing IPsec)				
	C1101	Network Associates <i>Gauntlet Firewall For Unix User's Guide Version 5.0</i> (1999). (Gauntlet User's Guide – Unix, Firewall Products)				
	C1102	Network Associates <i>Gauntlet Firewall For Windows NT Getting Started Guide Version 5.0</i> (1999) (Gauntlet Getting Started Guide – NT, Firewall Products)				
	C1103	Network Associates <i>Gauntlet Firewall For Unix Getting Started Guide Version 5.0</i> (1999) (Gauntlet Unix Getting Started Guide, Firewall Products)				
	C1104	Network Associates <i>Release Notes Gauntlet Firewall for Unix 5.0</i> (March 19, 1999) (Gauntlet Unix Release Notes, Firewall Products)				
	C1105	Network Associates <i>Gauntlet Firewall For Windows NT Administrator's Guide Version 5.0</i> (1999) (Gauntlet NT Administrator's Guide, Firewall Products)				
	C1106	Trusted Information Systems, Inc. <i>Gauntlet Internet Firewall Firewall-to-Firewall Encryption Guide Version 3.1</i> (1996) (Gauntlet Firewall-to-Firewall, Firewall Products)				
	C1107	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)				
	C1108	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)				
	C1109	Dan Sterne <i>Dynamic Virtual Private Networks</i> (May 23, 2000) (Sterne DVPN, DVPN)				
	C1110	Darrell Kindred <i>Dynamic Virtual Private Networks (DVPN)</i> (December 21, 1999) (Kindred DVPN, DVPN)				
	C1111	Dan Sterne <i>et. al. TIS Dynamic Security Perimeter Research Project Demonstration</i> (March 9, 1998) (Dynamic Security Perimeter, DVPN)				
	C1112	Darrell Kindred <i>Dynamic Virtual Private Networks Capability Description</i> (January 5, 2000) (Kindred DVPN Capability, DVPN) 11				
EXAMINER /Krisna Lim/				DATE CONSIDERED 03/14/2010		

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	C1113	October 7, and 28 1997 email from Domenic J. Turchi Jr. (SPARTA00001712-1714, 1808-1811) (Turchi DVPN email, DVPN)				
	C1114	James Just & Dan Sterne <i>Security Quickstart Task Update</i> (February 5, 1997) (Security Quickstart, DVPN)				
	C1115	Virtual Private Network Demonstration dated March 21, 1998 (SPARTA00001844-54) (DVPN Demonstration, DVPN)				
	C1116	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.1 Plan</i> (March 10, 1998) (IFD 1.1, DVPN)				
	C1117	Microsoft Corp. Windows NT Server Product Documentation: Administration Guide – Connection Point Services, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx</a> (Connection Point Services) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1118	Microsoft Corp. Windows NT Server Product Documentation: Administration Kit Guide – Connection Manager, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx</a> (Connection Manager) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1119	Microsoft Corp. Autodial Heuristics, <i>available at</i> <a href="http://support.microsoft.com/kb/164249">http://support.microsoft.com/kb/164249</a> (Autodial Heuristics) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1120	Microsoft Corp., Cariplo: Distributed Component Object Model, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx</a> (Cariplo I)				
	C1121	Marc Levy, COM Internet Services (Apr. 23, 1999), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx</a> (Levy)				
	C1122	Markus Horstmann and Mary Kirtland, DCOM Architecture (July 23, 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx</a> (Horstmann)				
	C1123	Microsoft Corp., DCOM: A Business Overview (Apr. 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx</a> (DCOM Business Overview I)				
	C1124	Microsoft Corp., DCOM Technical Overview (Nov. 1996), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx</a> (DCOM Technical Overview I)				
	C1125	Microsoft Corp., DCOM Architecture White Paper (1998) <i>available in</i> PDC DVD-ROM (DCOM Architecture)				
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	C1126	Microsoft Corp, DCOM – The Distributed Component Object Model, A Business Overview White Paper (Microsoft 1997) <i>available in</i> PDC DVD-ROM (DCOM Business Overview II)			
	C1127	Microsoft Corp., DCOM—Cariplo Home Banking Over The Internet White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (Cariplo II)			
	C1128	Microsoft Corp., DCOM Solutions in Action White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Solutions in Action)			
	C1129	Microsoft Corp., DCOM Technical Overview White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Technical Overview II)			
	C1130	125. Scott Suhy & Glenn Wood, DNS and Microsoft Windows NT 4.0, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx</a> (Suhy)			
	C1131	126. Aaron Skonnard, <i>Essential Winlnet</i> 313-423 (Addison Wesley Longman 1998) ( <i>Essential Winlnet</i> )			
	C1132	Microsoft Corp. Installing, Configuring, and Using PPTP with Microsoft Clients and Servers, (1998) <i>available at</i> <a href="http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx">http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx</a> (Using PPTP)			
	C1133	Microsoft Corp., Internet Connection Services for MS RAS, Standard Edition, <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.msp</a> (Internet Connection Services I)			
	C1134	Microsoft Corp., Internet Connection Services for RAS, Commercial Edition, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.msp</a> (Internet Connection Services II)			
	C1135	Microsoft Corp., Internet Explorer 5 Corporate Deployment Guide – Appendix B: Enabling Connections with the Connection Manager Administration Kit, <i>available at</i> <a href="http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.msp">http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.msp</a> (IE5 Corporate Development)			
	C1136	Mark Minasi, <i>Mastering Windows NT Server 4</i> 1359-1442 (6th ed., January 15, 1999)( <i>Mastering Windows NT Server</i> )			
	C1137	<i>Hands On, Self-Paced Training for Supporting Version 4.0</i> 371-473 (Microsoft Press 1998) ( <i>Hands On</i> )			
	C1138	Microsoft Corp., MS Point-to-Point Tunneling Protocol (Windows NT 4.0), <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.msp">http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.msp</a> (MS PPTP)			
	C1139	Kenneth Gregg, <i>et al.</i> , <i>Microsoft Windows NT Server Administrator's Bible</i> 173-206, 883-911, 974-1076 (IDG Books Worldwide 1999) (Gregg)			
	C1140	Microsoft Corp., Remote Access (Windows), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/bb545687(VS.85,printer).aspx">http://msdn2.microsoft.com/en-us/library/bb545687(VS.85,printer).aspx</a> (Remote Access)			
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	C1141	Microsoft Corp., Understanding PPTP (Windows NT 4.0), <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.msp">http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.msp</a> (Understanding PPTP NT 4) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1142	Microsoft Corp., Windows NT 4.0: Virtual Private Networking, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.msp">http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.msp</a> (NT4 VPN) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1143	Anthony Northrup, <i>NT Network Plumbing: Routers, Proxies, and Web Services</i> 299-399 (IDG Books Worldwide 1998) (Network Plumbing)				
	C1144	Microsoft Corp., Chapter 1 – Introduction to Windows NT Routing with Routing and Remote Access Service, <i>Available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch01.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch01.msp</a> (Intro to RRAS) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.) 13				
	C1145	Microsoft Corp., Windows NT Server Product Documentation: Chapter 5 – Planning for Large-Scale Configurations, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.msp</a> (Large-Scale Configurations) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1146	F-Secure, <i>F-Secure Evaluation Kit</i> (May 1999) (FSECURE 00000003) (Evaluation Kit 3) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1147	F-Secure, <i>F-Secure NameSurfer</i> (May 1999) (from FSECURE 00000003) (NameSurfer 3)				
	C1148	F-Secure, <i>F-Secure VPN Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (F-Secure VPN 3)				
	C1149	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (SSH Guide 3)				
	C1150	F-Secure, <i>F-Secure SSH2.0 for Windows NT and 95</i> (May 1999) (from FSECURE 00000003) (SSH 2.0 Guide 3)				
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	C1151	F-Secure, <i>F-Secure VPN+ Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (VPN+ Guide 3)			
	C1152	F-Secure, <i>F-Secure VPN+ 4.1</i> (1999) (from FSECURE 00000006) (VPN+ 4.1 Guide 6)			
	C1153	F-Secure, <i>F-Secure SSH</i> (1996) (from FSECURE 00000006) (F-Secure SSH 6)			
	C1154	F-Secure, <i>F-Secure SSH 2.0 for Windows NT and 95</i> (1998) (from FSECURE 00000006) (F-Secure SSH 2.0 Guide 6)			
	C1155	F-Secure, <i>F-Secure Evaluation Kit</i> (Sept. 1998) (FSECURE 00000009) (Evaluation Kit 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1156	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (Sept. 1998) (from FSECURE 00000009) (SSH Guide 9)			
	C1157	F-Secure, <i>F-Secure SSH 2.0 for Windows NT and 95</i> (Sept. 1998) (from FSECURE 00000009) (F-Secure SSH 2.0 Guide 9)			
	C1158	F-Secure, <i>F-Secure VPN+</i> (Sept. 1998) (from FSECURE 00000009) (VPN+ Guide 9)			
	C1159	F-Secure, <i>F-Secure Management Tools, Administrator's Guide</i> (1999) (from FSECURE 00000003) (F-Secure Management Tools)			
	C1160	F-Secure, <i>F-Secure Desktop, User's Guide</i> (1997) (from FSECURE 00000009) (FSecure Desktop User's Guide)			
	C1161	SafeNet, Inc., <i>VPN Policy Manager</i> (January 2000) (VPN Policy Manager)			
	C1162	F-Secure, <i>F-Secure VPN+ for Windows NT 4.0</i> (1998) (from FSECURE 00000009) (FSecure VPN+)			
	C1163	IRE, Inc., <i>SafeNet/Soft-PK Version 4</i> (March 28, 2000) (Soft-PK Version 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1164	IRE/SafeNet Inc., <i>VPN Technologies Overview</i> (March 28, 2000) (Safenet VPN Overview) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1165	IRE, Inc., <i>SafeNet / Security Center Technical Reference Addendum</i> (June 22, 1999) (Safenet Addendum)			
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	C1166	IRE, Inc., <i>System Description for VPN Policy Manager and SafeNet/SoftPK</i> (March 30, 2000) (VPN Policy Manager System Description)			
	C1167	IRE, Inc., <i>About SafeNet / VPN Policy Manager</i> (1999) (About Safenet VPN Policy Manager)			
	C1168	IRE, Inc., <i>SafeNet/VPN Policy Manager Quick Start Guide Version 1</i> (1999) (SafeNet VPN Policy Manager) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1169	Trusted Information Systems, Inc., <i>Gauntlet Internet Firewall, Firewall Product Functional Summary</i> (July 22, 1996) (Gauntlet Functional Summary)			
	C1170	Trusted Information Systems, Inc., <i>Running the Gauntlet Internet Firewall, An Administrator's Guide to Gauntlet Version 3.0</i> (May 31, 1995) (Running the Gauntlet Internet Firewall)			
	C1171	Ted Harwood, <i>Windows NT Terminal Server and Citrix Metaframe</i> (New Riders 1999) (Windows NT Harwood) 79			
	C1172	Todd W. Mathers and Shawn P. Genoway, <i>Windows NT Thing Client Solutions: Implementing Terminal Server and Citrix MetaFrame</i> (Macmillan Technial Publishing 1999) (Windows NT Mathers)			
	C1173	Bernard Aboba et al., <i>Securing L2TP using IPSEC</i> (February 2, 1999)			
	C1174	156. <i>Finding Your Way Through the VPN Maze</i> (1999) ("PGP")			
	C1175	Linux FreeSWAN Overview (1999) (Linux FreeSWAN) Overview			
	C1176	TimeStep, <i>The Business Case for Secure VPNs</i> (1998) ("TimeStep")			
	C1177	WatchGuard Technologies, Inc., <i>WatchGuard Firebox System Powerpoint</i> (2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1178	WatchGuard Technologies, Inc., <i>MSS Firewall Specifications</i> (1999) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1179	WatchGuard Technologies, Inc., <i>Request for Information, Security Services</i> (2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1180	WatchGuard Technologies, Inc., <i>Protecting the Internet Distributed Enterprise, White Paper</i> (February 2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1181	WatchGuard Technologies, Inc., <i>WatchGuard LiveSecurity for MSS Powerpoint</i> (Feb. 14 2000)			
	C1182	WatchGuard Technologies, Inc., <i>MSS Version 2.5, Add-On for WatchGuard SOHO Release Notes</i> (July 21, 2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1183	Air Force Research Laboratory, <i>Statement of Work for Information Assurance System Architecture and Integration</i> , PR No. N-8-6106 (Contract No. F30602-98-C-0012) (January 29, 1998)			
	C1184	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.2 Report, Rev. 1.0</i> (September 21, 1998)			
	C1185	BBN Information Assurance Contract, <i>TIS Labs Monthly Status Report</i> (March 16-April 30, 1998)			
	C1186	DARPA, <i>Dynamic Virtual Private Network (VPN) Powerpoint</i>			
	C1187	GTE Internetworking, <i>Contractor's Program Progress Report</i> (March 16-April 30, 1998)			
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				Art Unit	2157
				Examiner Name	VU, Kim Y.
Sheet	16	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)
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**U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Code <sub>2</sub> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Code <sub>3</sub> -Number <sub>4</sub> -Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
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	B1001	WO 00/70458	11-23-2000	Comsec Corporation			
	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

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	C999	Appendix A of the Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009.				
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	C1043	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/11/1997). (RFC 2543 Internet Draft 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1044	1998 Microsoft Professional Developers Conference DVD ("1998 PDC DVD-ROM") (including screenshots captured therefrom and produced as MSFTVX 00018827-00018832). (Conference, Microsoft Prior Art VPN Technology)				
	C1045	Microsoft Corp., <i>Virtual Private Networking An Overview</i> (1998) (printed from 1998 PDC DVD-ROM) (Overview, Microsoft Prior Art VPN Technology)				
	C1046	Microsoft Corp., <i>Windows NT 5.0 Beta Has Public Premiere at Seattle Mini-Camp Seminar attendees get first look at the performance and capabilities of Windows NT 5.0</i> (1998) (available at <a href="http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxptrue">http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxptrue</a> ). (NT Beta, Microsoft Prior Art VPN Technology)				
	C1047	"What ports does SSL use" available at <a href="http://stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html">stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html</a> (1998). (Ports, DNS SRV)				
	C1048	Aventail Corp., "Aventail VPN V2.6 Includes Support for More Than Ten Authentication Methods Making Extranet VPN Development Secure and Simple," Press Release, January 19, 1998. (VPN V2.6, Aventail)				
	C1049	R. G. Moskowitz, "Network Address Translation Issues with IPsec," Internet Draft, Internet Engineering Task Force, February 6, 1998. (Moskowitz)				
	C1050	H. Schulzrinne, et al, "Internet Telephony Gateway Location," Proceedings of IEEE INfocom '98, The Conference on Computer Communications, Vol. 2 ( March 29 - April 2, 1998). (Gateway, Schulzrinne)				
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			First Named Inventor	Victor Larson	
			Art Unit	2157	
			Examiner Name	VU, Kim Y.	
Sheet	6	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)
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	C1051	C. Huitema, 45 al. "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998). (SGCP)			
	C1052	DISA "Secret Internet Protocol Router Network," SIPRNET Program Management Office (D3113) DISN Networks, DISN Transmission Services (May 8, 1998). (DISA, SIPRNET)			
	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1055	D. McDonald, et al. "PF_KEY Key Management API, Version 2," Network Working Group, RFC 2367 (July 1998). (RFC 2367)			
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	C1058	Microsoft Corp., <i>Company Focuses on Quality and Customer Feedback</i> (August 18, 1998). (Focus, Microsoft Prior Art VPN Technology)			
	C1059	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (09/18/1998). (RFC 2543 Internet Draft 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1060	Atkinson, et al. "Security Architecture for the Internet Protocol," Network Working Group, RFC 2401 (November 1998). (RFC 2401, UNDERLYING SECURITY TECHNOLOGIES)			
	C1061	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/12/1998). (RFC 2543 Internet Draft 10) 9 <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1062	Donald Eastlake, <i>Domain Name System Security Extensions</i> , IETF DNS Security Working Group (December 1998). (DNSSEC-7)			
	C1063	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/15/1998). (RFC 2543 Internet Draft 11) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1064	Aventail Corp., "Aventail Connect 3.1/2.6 Administrator's Guide," (1999). (Aventail Administrator 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1065	Aventail Corp., "Aventail Connect 3.1/2.6 User's Guide," (1999). (Aventail User 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1066	Aventail Corp., "Aventail ExtraWeb Server v3.2 Administrator's Guide," (1999). (Aventail ExtraWeb 3.2, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1067	Kaufman et al, "Implementing IPsec," (Copyright 1999). (Implementing IPSEC, VPN REFERENCES)				
	C1068	Network Solutions, Inc. "Enabling SSL," NSI Registry (1999). (Enabling SSL, UNDERLYING SECURITY TECHNOLOGIES)				
	C1069	Check Point Software Technologies Ltd. (1999) (Check Point, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1070	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , <draft-ietf-dnsind-frc2052bis-02.txt> (January 1999). (Gulbrandsen 99, DNS SRV)				
	C1071	C. Scott, et al. <i>Virtual Private Networks</i> ; O'Reilly and Associates, Inc., 2nd ed. (Jan. 1999). (Scott VPNs)				
	C1072	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (01/15/1999). (RFC 2543 Internet Draft 12) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1073	Goldschlag, et al., "Onion Routing for Anonymous and Private Internet Connections," Naval Research Laboratory, Center for High Assurance Computer Systems (January 28, 1999). (Goldschlag III, Onion Routing)				
	C1074	H. Schulzrinne, "Internet Telephony: architecture and protocols – an IETF perspective," Computer Networks, Vol. 31, No. 3 (February 1999). (Telephony, Schulzrinne)				
	C1075	M. Handley, et al. "SIP: Session Initiation Protocol," Network Working Group, RFC 2543 and Internet Drafts (12/96-3/99). (Handley, RFC 2543)				
	C1076	FreeS/WAN Project, <i>Linux FreeS/WAN Compatibility Guide</i> (March 4, 1999). (FreeS/WAN Compatibility Guide, FreeS/WAN)				
	C1077	Telcordia Technologies, "ANX Release 1 Document Corrections," AIAG (May 11, 1999). (Telcordia, ANX)				
	C1078	Ken Hornstein & Jeffrey Altman, <i>Distributing Kerberos KDC and Realm Information with DNS</i> <draft-eitf-cat-krb-dns-locate-oo.txt> (June 21, 1999). (Hornstein, DNS SRV)				
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	C1079	Bhattacharya et. al. "An LDAP Schema for Configuration and Administration of IPsec Based Virtual Private Networks (VPNs)", IETF Internet Draft (October 1999). (Bhattacharya LDAP VPN)				
	C1080	B. Patel, et al. "DHCP Configuration of IPSEC Tunnel Mode," IPSEC Working Group, Internet Draft 02 (10/15/1999). (Patel)				
	C1081	Goncalves, et al. <i>Check Point FireWall -1 Administration Guide</i> , McGraw-Hill Companies (2000). (Goncalves, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1082	"Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000). (FirstVPN Microsoft)				
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	C1084	MITRE Organization, "Technical Description," Collaborative Operations in Joint Expeditionary Force Experiment (JEFX) 99 (February 2000). (MITRE, SIPRNET)				
	C1085	H. Schulzrinne, et al. "Application-Layer Mobility Using SIP," <i>Mobile Computing and Communications Review</i> , Vol. 4, No. 3. pp. 47-57 (July 2000). (Application, SIP)				
	C1086	Kindred et al, "Dynamic VPN Communities: Implementation and Experience," DARPA Information Survivability Conference and Exposition II (June 2001). (DARPA, VPN SYSTEMS)				
	C1087	ANX 101: Basic ANX Service Outline. (Outline, ANX)				
	C1088	ANX 201: Advanced ANX Service. (Advanced, ANX)				
	C1089	Appendix A: Certificate Profile for ANX IPsec Certificates. (Appendix, ANX)				
	C1090	Assured Digital Products. (Assured Digital) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1091	Aventail Corp., "Aventail AutoSOCKS the Client Key to Network Security," Aventail Corporation White Paper. (Network Security, Aventail)				
	C1092	Cindy Moran, "DISN Data Networks: Secret Internet Protocol Router Network (SIPRNet)." (Moran, SIPRNET)				
	C1093	Data Fellows F-Secure VPN+ (F-Secure VPN+)				
	C1094	"Interim Operational Systems Doctrine for the Remote Access Security Program (RASP) Secret Dial-In Solution. (RASP, SIPRNET)				
	C1095	<i>Onion Routing</i> , "Investigation of Route Selection Algorithms," available at <a href="http://www.onion-router.net/Archives/Route/index.html">http://www.onion-router.net/Archives/Route/index.html</a> . (Route Selection, Onion Routing)				
	C1096	Secure Computing, "Bullet-Proofing an Army Net," Washington Technology. (Secure, SIPRNET)				
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	C1097	SPARTA "Dynamic Virtual Private Network." (Sparta, VPN SYSTEMS)				
	C1098	Standard Operation Procedure for Using the 1910 Secure Modems. (Standard, SIPRNET)				
	C1099	Publically available emails relating to FreeS/WAN (MSFTVX00018833-MSFTVX00019206). (FreeS/WAN emails, FreeS/WAN)				
	C1100	Kaufman et al., "Implementing IPsec," (Copyright 1999) (Implementing IPsec)				
	C1101	Network Associates <i>Gauntlet Firewall For Unix User's Guide Version 5.0</i> (1999). (Gauntlet User's Guide – Unix, Firewall Products)				
	C1102	Network Associates <i>Gauntlet Firewall For Windows NT Getting Started Guide Version 5.0</i> (1999) (Gauntlet Getting Started Guide – NT, Firewall Products)				
	C1103	Network Associates <i>Gauntlet Firewall For Unix Getting Started Guide Version 5.0</i> (1999) (Gauntlet Unix Getting Started Guide, Firewall Products)				
	C1104	Network Associates <i>Release Notes Gauntlet Firewall for Unix 5.0</i> (March 19, 1999) (Gauntlet Unix Release Notes, Firewall Products)				
	C1105	Network Associates <i>Gauntlet Firewall For Windows NT Administrator's Guide Version 5.0</i> (1999) (Gauntlet NT Administrator's Guide, Firewall Products)				
	C1106	Trusted Information Systems, Inc. <i>Gauntlet Internet Firewall Firewall-to-Firewall Encryption Guide Version 3.1</i> (1996) (Gauntlet Firewall-to-Firewall, Firewall Products)				
	C1107	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)				
	C1108	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)				
	C1109	Dan Sterne <i>Dynamic Virtual Private Networks</i> (May 23, 2000) (Sterne DVPN, DVPN)				
	C1110	Darrell Kindred <i>Dynamic Virtual Private Networks (DVPN)</i> (December 21, 1999) (Kindred DVPN, DVPN)				
	C1111	Dan Sterne <i>et. al. TIS Dynamic Security Perimeter Research Project Demonstration</i> (March 9, 1998) (Dynamic Security Perimeter, DVPN)				
	C1112	Darrell Kindred <i>Dynamic Virtual Private Networks Capability Description</i> (January 5, 2000) (Kindred DVPN Capability, DVPN) 11				
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	C1113	October 7, and 28 1997 email from Domenic J. Turchi Jr. (SPARTA00001712-1714, 1808-1811) (Turchi DVPN email, DVPN)				
	C1114	James Just & Dan Sterne <i>Security Quickstart Task Update</i> (February 5, 1997) (Security Quickstart, DVPN)				
	C1115	Virtual Private Network Demonstration dated March 21, 1998 (SPARTA00001844-54) (DVPN Demonstration, DVPN)				
	C1116	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.1 Plan</i> (March 10, 1998) (IFD 1.1, DVPN)				
	C1117	Microsoft Corp. Windows NT Server Product Documentation: Administration Guide – Connection Point Services, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx</a> (Connection Point Services) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1118	Microsoft Corp. Windows NT Server Product Documentation: Administration Kit Guide – Connection Manager, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx</a> (Connection Manager) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1119	Microsoft Corp. Autodial Heuristics, <i>available at</i> <a href="http://support.microsoft.com/kb/164249">http://support.microsoft.com/kb/164249</a> (Autodial Heuristics) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1120	Microsoft Corp., Cariplo: Distributed Component Object Model, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx</a> (Cariplo I)				
	C1121	Marc Levy, COM Internet Services (Apr. 23, 1999), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx</a> (Levy)				
	C1122	Markus Horstmann and Mary Kirtland, DCOM Architecture (July 23, 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx</a> (Horstmann)				
	C1123	Microsoft Corp., DCOM: A Business Overview (Apr. 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx</a> (DCOM Business Overview I)				
	C1124	Microsoft Corp., DCOM Technical Overview (Nov. 1996), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx</a> (DCOM Technical Overview I)				
	C1125	Microsoft Corp., DCOM Architecture White Paper (1998) <i>available in</i> PDC DVD-ROM (DCOM Architecture)				
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	C1126	Microsoft Corp., DCOM – The Distributed Component Object Model, A Business Overview White Paper (Microsoft 1997) available in PDC DVD-ROM (DCOM Business Overview II)					
	C1127	Microsoft Corp., DCOM—Cariplo Home Banking Over The Internet White Paper (Microsoft 1996) available in PDC DVD-ROM (Cariplo II)					
	C1128	Microsoft Corp., DCOM Solutions in Action White Paper (Microsoft 1996) available in PDC DVD-ROM (DCOM Solutions in Action)					
	C1129	Microsoft Corp., DCOM Technical Overview White Paper (Microsoft 1996) available 12 in PDC DVD-ROM (DCOM Technical Overview II)					
	C1130	125. Scott Suhy & Glenn Wood, DNS and Microsoft Windows NT 4.0, (1996) available at <a href="http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx</a> (Suhy)					
	C1131	126. Aaron Skonnard, <i>Essential WinInet</i> 313-423 (Addison Wesley Longman 1998) (Essential WinInet)					
	C1132	Microsoft Corp. Installing, Configuring, and Using PPTP with Microsoft Clients and Servers, (1998) available at <a href="http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx">http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx</a> (Using PPTP)					
	C1133	Microsoft Corp., Internet Connection Services for MS RAS, Standard Edition, <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.msp</a> (Internet Connection Services I)					
	C1134	Microsoft Corp., Internet Connection Services for RAS, Commercial Edition, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.msp</a> (Internet Connection Services II)					
	C1135	Microsoft Corp., Internet Explorer 5 Corporate Deployment Guide – Appendix B: Enabling Connections with the Connection Manager Administration Kit, available at <a href="http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.msp">http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.msp</a> (IE5 Corporate Development)					
	C1136	Mark Minasi, <i>Mastering Windows NT Server 4</i> 1359-1442 (6th ed., January 15, 1999) (Mastering Windows NT Server)					
	C1137	<i>Hands On, Self-Paced Training for Supporting Version 4.0</i> 371-473 (Microsoft Press 1998) (Hands On)					
	C1138	Microsoft Corp., MS Point-to-Point Tunneling Protocol (Windows NT 4.0), available at <a href="http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.msp">http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.msp</a> (MS PPTP)					
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				First Named Inventor	Victor Larson
				Art Unit	2157
				Examiner Name	VU, Kim Y.
Sheet	12	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)
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EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Codez (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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						Yes	No
	B1000	WO 001/17775	03-30-2000	Science Applications International Corporation		Yes	No
	B1001	WO 00/70458	11-23-2000	Comsec Corporation			
	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

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			Application Number	11/840,560	
			Filing Date	August 17, 2007	
			First Named Inventor	Victor Larson	
			Art Unit	2157	
			Examiner Name	VU, Kim Y.	
Sheet	2	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)
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.			
	C998	Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009, VirnetX Inc. and Science Applications International Corp. v. Microsoft Corporation,			
	C999	Appendix A of the Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009.			
	C1000	Concordance Table For the References Cited in Tables on pages 6-15, 71-80 and 116-124 of the Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009.			
	C1001	1. P. Mockapetris, "DNS Encoding of Network Names and Other Types," Network Working Group, RFC 1101 (April 1989) (RFC1101, DNS SRV)			
	C1002	DNS-related correspondence dated September 7, 1993 to September 20, 1993. (Pre KX, KX Records) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1003	R. Atkinson, "An Internetwork Authentication Architecture," Naval Research Laboratory, Center for High Assurance Computing Systems (8/5/93). (Atkinson NRL, KX Records)			
	C1004	Henning Schulzrinne, <i>Personal Mobility For Multimedia Services In The Internet</i> , Proceedings of the Interactive Distributed Multimedia Systems and Services European Workshop at 143 (1996). (Schulzrinne 96)			
	C1005	Microsoft Corp., <i>Microsoft Virtual Private Networking: Using Point-to-Point Tunneling Protocol for Low-Cost, Secure, Remote Access Across the Internet</i> (1996) (printed from 1998 PDC DVD-ROM). (Point to Point, Microsoft Prior Art VPN Technology)			
	C1006	"Safe Surfing: How to Build a Secure World Wide Web Connection," IBM Technical Support Organization, (March 1996). (Safe Surfing, WEBSITE ART)			
	C1007	Goldschlag, et al., "Hiding Routing Information," Workshop on Information Hiding, Cambridge, UK (May 1996). (Goldschlag II, Onion Routing)			
	C1008	"IPSec Minutes From Montreal", IPSEC Working Group Meeting Notes, <a href="http://www.sandleman.ca/ipsec/1996/08/msg00018.html">http://www.sandleman.ca/ipsec/1996/08/msg00018.html</a> (June 1996). (IPSec Minutes, FreeS/WAN)			
	C1009	J. M. Galvin, "Public Key Distribution with Secure DNS," Proceedings of the Sixth USENIX UNIX Security Symposium, San Jose, California, July 1996. (Galvin, DNSSEC)			
	C1010	J. Gilmore, et al. "Re: Key Management, anyone? (DNS Keying)," IPsec Working Group Mailing List Archives (8/96). (Gilmore DNS, FreeS/WAN)			
	C1011	H. Orman, et al. "Re: 'Re: DNS? was Re: Key Management, anyone?'" IETF IPsec Working Group Mailing List Archive (8/96-9/96). (Orman DNS, FreeS/WAN)			
	C1012	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2052 (October 1996). (RFC 2052, DNS SRV)			
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	C1013	Freier, et al. "The SSL Protocol Version 3.0," Transport Layer Security Working Group (November 18, 1996). (SSL, UNDERLYING SECURITY TECHNOLOGY)					
	C1014	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/02/1996). (RFC 2543 Internet Draft 1) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>					
	C1015	M.G. Reed, et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996. (Reed, Onion Routing)					
	C1016	Kenneth F. Alden & Edward P. Wobber, <i>The AltaVista Tunnel: Using the Internet to Extend Corporate Networks</i> , Digital Technical Journal (1997) (Alden, AltaVista)					
	C1017	Automotive Industry Action Group, "ANX Release 1 Document Publication," AIAG (1997). (AIAG, ANX)					
	C1018	Automotive Industry Action Group, "ANX Release 1 Draft Document Publication," AIAG Publications (1997). (AIAG Release, ANX)					
	C1019	Aventail Corp., "AutoSOCKS v. 2.1 Datasheet," available at <a href="http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html">http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html</a> (1997). (AutoSOCKS, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>					
	C1020	Aventail Corp. "Aventail VPN Data Sheet," available at <a href="http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html">http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html</a> (1997). (Data Sheet, Aventail)					
	C1021	Aventail Corp., "Directed VPN Vs. Tunnel," available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html</a> (1997). (Directed VPN, Aventail)					
	C1022	Aventail Corp., "Managing Corporate Access to the Internet," Aventail AutoSOCKS White Paper available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/ipmwp.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/ipmwp.html</a> (1997). (Corporate Access, Aventail)					
	C1023	Aventail Corp., "Socks Version 5," Aventail Whitepaper, available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/soc kswp.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/soc kswp.html</a> (1997). (Socks, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>					
	C1024	Aventail Corp., "VPN Server V2.0 Administration Guide," (1997). (VPN, Aventail)					
	C1025	Goldschlag, et al. "Privacy on the Internet," Naval Research Laboratory, Center for High Assurance Computer Systems (1997). (Goldschlag I, Onion Routing)					
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				Examiner Name	VU, Kim Y.
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	C1026	Microsoft Corp., <i>Installing Configuring and Using PPTP with Microsoft Clients and Servers</i> (1997). (Using PPTP, Microsoft Prior Art VPN Technology)			
	C1027	Microsoft Corp., <i>IP Security for Microsoft Windows NT Server 5.0</i> (1997) (printed from 1998 PDC DVD-ROM). (IP Security, Microsoft Prior Art VPN Technology)			
	C1028	Microsoft Corp., <i>Microsoft Windows NT Active Directory: An Introduction to the Next Generation Directory Services</i> (1997) (printed from 1998 PDC DVD-ROM). (Directory, Microsoft Prior Art VPN Technology)			
	C1029	Microsoft Corp., <i>Routing and Remote Access Service for Windows NT Server New Opportunities Today and Looking Ahead</i> (1997) (printed from 1998 PDC DVD-ROM). (Routing, Microsoft Prior Art VPN Technology)			
	C1030	Microsoft Corp., <i>Understanding Point-to-Point Tunneling Protocol PPTP</i> (1997) (printed from 1998 PDC DVD-ROM). (Understanding PPTP, Microsoft Prior Art VPN Technology)			
	C1031	J. Mark Smith et.al., <i>Protecting a Private Network: The AltaVista Firewall</i> , Digital Technical Journal (1997): (Smith, AltaVista)			
	C1032	Naganand Doraswamy <i>Implementation of Virtual Private Networks (VPNs) with IPSecurity</i> , <draft-ietf-ipsec-vpn-00.txt> (March 12, 1997). (Doraswamy)			
	C1033	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (03/27/1997). (RFC. 2543-Internet Draft 2) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1034	Aventail Corp., "Aventail and Cybersafe to Provide Secure Authentication For Internet and Intranet Communication," Press Release, April 3, 1997. (Secure Authentication, Aventail)			
	C1035	D. Wagner, et al. "Analysis of the SSL 3.0 Protocol," (April 15, 1997). (Analysis, UNDERLYING SECURITY TECHNOLOGIES)			
	C1036	Automotive Industry Action Group, "ANXO Certification Authority Service and Directory Service Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Defintion, ANX)			
	C1037	Automotive Industry Action Group, "ANXO Certification Process and ANX Registration Process Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Certification, ANX)			
	C1038	Aventail Corp., "Aventail Announces the First VPN Solution to Assure Interoperability Across Emerging Security Protocols," June 2, 1997. (First VPN, Aventail)			
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	C1039	Syverson, et al. "Private Web Browsing," Naval Research Laboratory, Center for High 8 Assurance Computer Systems (June 2, 1997). (Syverson, Onion Routing)			
	C1040	Bellcore, "Metrics, Criteria, and Measurement Technique Requirements for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (June 16, 1997). (AIAG Requirements, ANX)			
	C1041	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/31/1997). (RFC 2543 Internet Draft 3) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1042	R. Atkinson, "Key Exchange Delegation Record for the DNS," Network Working Group, RFC 2230 (November 1997). (RFC 2230, KX Records)			
	C1043	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/11/1997). (RFC 2543 Internet Draft 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1044	1998 Microsoft Professional Developers Conference DVD ("1998 PDC DVD-ROM") (including screenshots captured therefrom and produced as MSFTVX 00018827-00018832). (Conference, Microsoft Prior Art VPN Technology)			
	C1045	Microsoft Corp., <i>Virtual Private Networking An Overview</i> (1998) (printed from 1998 PDC DVD-ROM) (Overview, Microsoft Prior Art VPN Technology)			
	C1046	Microsoft Corp., <i>Windows NT 5.0 Beta Has Public Premiere at Seattle Mini-Camp Seminar attendees get first look at the performance and capabilities of Windows NT 5.0</i> (1998) (available at <a href="http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue">http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue</a> ). (NT Beta, Microsoft Prior Art VPN Technology)			
	C1047	"What ports does SSL use" available at <a href="http://stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html">stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html</a> (1998). (Ports, DNS SRV)			
	C1048	Aventail Corp., "Aventail VPN V2.6 Includes Support for More Than Ten Authentication Methods Making Extranet VPN Development Secure and Simple," Press Release, January 19, 1998. (VPN V2.6, Aventail)			
	C1049	R. G. Moskowitz, "Network Address Translation Issues with IPsec," Internet Draft, Internet Engineering Task Force, February 6, 1998. (Moskowitz)			
	C1050	H. Schulzrinne, et al, "Internet Telephony Gateway Location," Proceedings of IEEE Infocom '98, The Conference on Computer Communications, Vol. 2 ( March 29 - April 2, 1998). (Gateway, Schulzrinne)			
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	C1051	C. Huitema, 45 al. "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998). (SGCP)			
	C1052	DISA "Secret Internet Protocol Router Network," SIPRNET Program Management Office (D3113) DISN Networks, DISN Transmission Services (May 8, 1998). (DISA, SIPRNET)			
	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1054	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (06/17/1998). (RFC 2543 Internet Draft 6) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1055	D. McDonald, et al. "PF_KEY Key Management API, Version 2," Network Working Group, RFC 2367 (July 1998). (RFC 2367)			
	C1056	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/16/1998). (RFC 2543 Internet Draft 7) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1057	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (08/07/1998). (RFC 2543 Internet Draft 8) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1058	Microsoft Corp., <i>Company Focuses on Quality and Customer Feedback</i> (August 18, 1998). (Focus, Microsoft Prior Art VPN Technology)			
	C1059	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (09/18/1998). (RFC 2543 Internet Draft 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1060	Atkinson, et al. "Security Architecture for the Internet Protocol," Network Working Group, RFC 2401 (November 1998). (RFC 2401, UNDERLYING SECURITY TECHNOLOGIES)			
	C1061	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/12/1998). (RFC 2543 Internet Draft 10) 9 <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1062	Donald Eastlake, <i>Domain Name System Security Extensions</i> , IETF DNS Security Working Group (December 1998). (DNSSEC-7)			
	C1063	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/15/1998). (RFC 2543 Internet Draft 11) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1064	Aventail Corp., "Aventail Connect 3.1/2.6 Administrator's Guide," (1999). (Aventail Administrator 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1065	Aventail Corp., "Aventail Connect 3.1/2.6 User's Guide," (1999). (Aventail User 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1066	Aventail Corp., "Aventail ExtraWeb Server v3.2 Administrator's Guide," (1999). (Aventail ExtraWeb 3.2, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1067	Kaufman et al, "Implementing IPsec," (Copyright 1999). (Implementing IPSEC, VPN REFERENCES)			
	C1068	Network Solutions, Inc. "Enabling SSL," NSI Registry (1999). (Enabling SSL, UNDERLYING SECURITY TECHNOLOGIES)			
	C1069	Check Point Software Technologies Ltd. (1999) (Check Point, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1070	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , <draft-ietf-dnsind-frc2052bis-02.txt> (January 1999). (Gulbrandsen 99, DNS SRV)			
	C1071	C. Scott, et al. <i>Virtual Private Networks</i> , O'Reilly and Associates, Inc., 2nd ed. (Jan. 1999). (Scott VPNs)			
	C1072	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (01/15/1999). (RFC 2543 Internet Draft 12) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1073	Goldschlag, et al., "Onion Routing for Anonymous and Private Internet Connections," Naval Research Laboratory, Center for High Assurance Computer Systems (January 28, 1999). (Goldschlag III, Onion Routing)			
	C1074	H. Schulzrinne, "Internet Telephony: architecture and protocols – an IETF perspective," Computer Networks, Vol. 31, No. 3 (February 1999). (Telephony, Schulzrinne)			
	C1075	M. Handley, et al. "SIP: Session Initiation Protocol," Network Working Group, RFC 2543 and Internet Drafts (12/96-3/99). (Handley, RFC 2543)			
	C1076	FreeS/WAN Project, <i>Linux FreeS/WAN Compatibility Guide</i> (March 4, 1999). (FreeS/WAN Compatibility Guide, FreeS/WAN)			
	C1077	Telcordia Technologies, "ANX Release 1 Document Corrections," AIAG (May 11, 1999). (Telcordia, ANX)			
	C1078	Ken Hornstein & Jeffrey Altman, <i>Distributing Kerberos KDC and Realm Information with DNS</i> <draft-ietf-cat-krb-dns-locate-oo.txt> (June 21, 1999). (Hornstein, DNS SRV)			
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	C1079	Bhattacharya et al. "An LDAP Schema for Configuration and Administration of IPsec Based Virtual Private Networks (VPNs)", IETF Internet Draft (October 1999). (Bhattacharya LDAP VPN)				
	C1080	B. Patel, et al. "DHCP Configuration of IPSEC Tunnel Mode," IPSEC Working Group, Internet Draft 02 (10/15/1999). (Patel)				
	C1081	Goncalves, et al. <i>Check Point FireWall -1 Administration Guide</i> , McGraw-Hill Companies (2000). (Goncalves, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1082	"Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000). (FirstVPN Microsoft)				
	C1083	Gulbrandsen, Vixie, & Esibov, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2782 (February 2000). (RFC 2782, DNS SRV)				
	C1084	MITRE Organization, "Technical Description," Collaborative Operations in Joint Expeditionary Force Experiment (JEFX) 99 (February 2000). (MITRE, SIPRNET)				
	C1085	H. Schulzrinne, et al. "Application-Layer Mobility Using SIP," <i>Mobile Computing and Communications Review</i> , Vol. 4, No. 3. pp. 47-57 (July 2000). (Application, SIP)				
	C1086	Kindred et al, "Dynamic VPN Communities: Implementation and Experience," DARPA Information Survivability Conference and Exposition II (June 2001). (DARPA, VPN SYSTEMS)				
	C1087	ANX 101: Basic ANX Service Outline. (Outline, ANX)				
	C1088	ANX 201: Advanced ANX Service. (Advanced, ANX)				
	C1089	Appendix A: Certificate Profile for ANX IPsec Certificates. (Appendix, ANX)				
	C1090	Assured Digital Products. (Assured Digital) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1091	Aventail Corp., "Aventail AutoSOCKS the Client Key to Network Security," Aventail Corporation White Paper. (Network Security, Aventail)				
	C1092	Cindy Moran, "DISN Data Networks: Secret Internet Protocol Router Network (SIPRNet)." (Moran, SIPRNET)				
	C1093	Data Fellows F-Secure VPN+ (F-Secure VPN+)				
	C1094	"Interim Operational Systems Doctrine for the Remote Access Security Program (RASP) Secret Dial-In Solution. (RASP, SIPRNET)				
	C1095	<i>Onion Routing</i> , "Investigation of Route Selection Algorithms," available at <a href="http://www.onion-router.net/Archives/Route/index.html">http://www.onion-router.net/Archives/Route/index.html</a> . (Route Selection, Onion Routing)				
	C1096	Secure Computing, "Bullet-Proofing an Army Net," Washington Technology. (Secure, SIPRNET)				
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				Filing Date	August 17, 2007
				First Named Inventor	Victor Larson
				Art Unit	2157
				Examiner Name	VU, Kim Y.
Sheet	9	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)
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	C1097	SPARTA "Dynamic Virtual Private Network." (Sparta, VPN SYSTEMS)			
	C1098	Standard Operation Procedure for Using the 1910 Secure Modems. (Standard, SIPRNET)			
	C1099	Publicly available emails relating to FreeSWAN (MSFTVX00018833-MSFTVX00019206). (FreeSWAN emails, FreeSWAN)			
	C1100	Kaufman et al., "Implementing IPsec," (Copyright 1999) (Implementing IPsec)			
	C1101	Network Associates <i>Gauntlet Firewall For Unix User's Guide Version 5.0</i> (1999). (Gauntlet User's Guide – Unix, Firewall Products)			
	C1102	Network Associates <i>Gauntlet Firewall For Windows NT Getting Started Guide Version 5.0</i> (1999) (Gauntlet Getting Started Guide – NT, Firewall Products)			
	C1103	Network Associates <i>Gauntlet Firewall For Unix Getting Started Guide Version 5.0</i> (1999) (Gauntlet Unix Getting Started Guide, Firewall Products)			
	C1104	Network Associates <i>Release Notes Gauntlet Firewall for Unix 5.0</i> (March 19, 1999) (Gauntlet Unix Release Notes, Firewall Products)			
	C1105	Network Associates <i>Gauntlet Firewall For Windows NT Administrator's Guide Version 5.0</i> (1999) (Gauntlet NT Administrator's Guide, Firewall Products)			
	C1106	Trusted Information Systems, Inc. <i>Gauntlet Internet Firewall Firewall-to-Firewall Encryption Guide Version 3.1</i> (1996) (Gauntlet Firewall-to-Firewall, Firewall Products)			
	C1107	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)			
	C1108	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)			
	C1109	Dan Sterne <i>Dynamic Virtual Private Networks</i> (May 23, 2000) (Sterne DVPN, DVPN)			
	C1110	Darrell Kindred <i>Dynamic Virtual Private Networks (DVPN)</i> (December 21, 1999) (Kindred DVPN, DVPN)			
	C1111	Dan Sterne <i>et. al. TIS Dynamic Security Perimeter Research Project Demonstration</i> (March 9, 1998) (Dynamic Security Perimeter, DVPN)			
	C1112	Darrell Kindred <i>Dynamic Virtual Private Networks Capability Description</i> (January 5, 2000) (Kindred DVPN Capability, DVPN) 11			
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	C1113	October 7, and 28 1997 email from Domenic J. Turchi Jr. (SPARTA00001712-1714, 1808-1811) (Turchi DVPN email, DVPN)			
	C1114	James Just & Dan Sterne <i>Security Quickstart Task Update</i> (February 5, 1997) (Security Quickstart, DVPN)			
	C1115	Virtual Private Network Demonstration dated March 21, 1998 (SPARTA00001844-54) (DVPN Demonstration, DVPN)			
	C1116	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.1 Plan</i> (March 10, 1998) (IFD 1.1, DVPN)			
	C1117	Microsoft Corp. Windows NT Server Product Documentation: Administration Guide – Connection Point Services, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx</a> (Connection Point Services) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1118	Microsoft Corp. Windows NT Server Product Documentation: Administration Kit Guide – Connection Manager, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx</a> (Connection Manager) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1119	Microsoft Corp. Autodial Heuristics, available at <a href="http://support.microsoft.com/kb/164249">http://support.microsoft.com/kb/164249</a> (Autodial Heuristics) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior-art to the patents-in-suit.)			
	C1120	Microsoft Corp., Cariplo: Distributed Component Object Model, (1996) available at <a href="http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx</a> (Cariplo I)			
	C1121	Marc Levy, COM Internet Services (Apr. 23, 1999), available at <a href="http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx</a> (Levy)			
	C1122	Markus Horstmann and Mary Kirtland, DCOM Architecture (July 23, 1997), available at <a href="http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx</a> (Horstmann)			
	C1123	Microsoft Corp., DCOM: A Business Overview (Apr. 1997), available at <a href="http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx</a> (DCOM Business Overview I)			
	C1124	Microsoft Corp., DCOM Technical Overview (Nov. 1996), available at <a href="http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx</a> (DCOM Technical Overview I)			
	C1125	Microsoft Corp., DCOM Architecture White Paper (1998) available in PDC DVD-ROM (DCOM Architecture)			
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	C1126	Microsoft Corp., DCOM – The Distributed Component Object Model, A Business Overview White Paper (Microsoft 1997) <i>available in</i> PDC DVD-ROM (DCOM Business Overview II)				
	C1127	Microsoft Corp., DCOM—Cariplo Home Banking Over The Internet White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (Cariplo II)				
	C1128	Microsoft Corp., DCOM Solutions in Action White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Solutions in Action)				
	C1129	Microsoft Corp., DCOM Technical Overview White Paper (Microsoft 1996) <i>available in</i> 12 PDC DVD-ROM (DCOM Technical Overview II)				
	C1130	125. Scott Suhy & Glenn Wood, DNS and Microsoft Windows NT 4.0, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx</a> (Suhy)				
	C1131	126. Aaron Skonnard, <i>Essential WinInet</i> 313-423 (Addison Wesley Longman 1998) (Essential WinInet)				
	C1132	Microsoft Corp. Installing, Configuring, and Using PPTP with Microsoft Clients and Servers, (1998) <i>available at</i> <a href="http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx">http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx</a> (Using PPTP)				
	C1133	Microsoft Corp., Internet Connection Services for MS RAS, Standard Edition, <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.mspx</a> (Internet Connection Services I)				
	C1134	Microsoft Corp., Internet Connection Services for RAS, Commercial Edition, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.mspx</a> (Internet Connection Services II)				
	C1135	Microsoft Corp., Internet Explorer 5 Corporate Deployment Guide – Appendix B:Enabling Connections with the Connection Manager Administration Kit, <i>available at</i> <a href="http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.mspx">http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.mspx</a> (IE5 Corporate Development)				
	C1136	Mark Minasi, <i>Mastering Windows NT Server 4</i> 1359-1442 (6th ed., January 15, 1999)(Mastering Windows NT Server)				
	C1137	<i>Hands On, Self-Paced Training for Supporting Version 4.0</i> 371-473 (Microsoft Press 1998) (Hands On)				
	C1138	Microsoft Corp., MS Point-to-Point Tunneling Protocol (Windows NT 4.0), <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.mspx">http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.mspx</a> (MS PPTP)				
	C1139	Kenneth Gregg, <i>et al.</i> , <i>Microsoft Windows NT Server Administrator's Bible</i> 173-206, 883-911, 974-1076 (IDG Books Worldwide 1999) (Gregg)				
	C1140	Microsoft Corp., Remote Access (Windows), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/bb545687(VS.85.printer).aspx">http://msdn2.microsoft.com/en-us/library/bb545687(VS.85.printer).aspx</a> (Remote Access)				
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	C1141	Microsoft Corp., Understanding PPTP (Windows NT 4.0), available at <a href="http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.mspx">http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.mspx</a> (Understanding PPTP NT 4) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1142	Microsoft Corp., Windows NT 4.0: Virtual Private Networking, available at <a href="http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.mspx">http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.mspx</a> (NT4 VPN) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1143	Anthony Northrup, <i>NT Network Plumbing: Routers, Proxies, and Web Services</i> 299-399 (IDG Books Worldwide 1998) (Network Plumbing)				
	C1144	Microsoft Corp., Chapter 1 – Introduction to Windows NT Routing with Routing and Remote Access Service, Available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch01.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch01.mspx</a> (Intro to RRAS) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.) 13				
	C1145	Microsoft Corp., Windows NT Server Product Documentation: Chapter 5 – Planning for Large-Scale Configurations, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.mspx</a> (Large-Scale Configurations) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1146	F-Secure, <i>F-Secure Evaluation Kit</i> (May 1999) (FSECURE 00000003) (Evaluation Kit 3) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1147	F-Secure, <i>F-Secure NameSurfer</i> (May 1999) (from FSECURE 00000003) (NameSurfer 3)				
	C1148	F-Secure, <i>F-Secure VPN Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (F-Secure VPN 3)				
	C1149	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (SSH Guide 3)				
	C1150	F-Secure, <i>F-Secure SSH2.0 for Windows NT and 95</i> (May 1999) (from FSECURE 00000003) (SSH 2.0 Guide 3)				
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	C1151	F-Secure, <i>F-Secure VPN+ Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (VPN+ Guide 3)			
	C1152	F-Secure, <i>F-Secure VPN+ 4.1</i> (1999) (from FSECURE 00000006) (VPN+ 4.1 Guide 6)			
	C1153	F-Secure, <i>F-Secure SSH</i> (1996) (from FSECURE 00000006) (F-Secure SSH 6)			
	C1154	F-Secure, <i>F-Secure SSH 2.0 for Windows NT and 95</i> (1998) (from FSECURE 00000006) (F-Secure SSH 2.0 Guide 6)			
	C1155	F-Secure, <i>F-Secure Evaluation Kit</i> (Sept. 1998) (FSECURE 00000009) (Evaluation Kit 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1156	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (Sept. 1998) (from FSECURE 00000009) (SSH Guide 9)			
	C1157	F-Secure, <i>F-Secure SSH 2.0 for Windows NT and 95</i> (Sept. 1998) (from FSECURE 00000009) (F-Secure SSH 2.0 Guide 9)			
	C1158	F-Secure, <i>F-Secure VPN+</i> (Sept. 1998) (from FSECURE 00000009) (VPN+ Guide 9)			
	C1159	F-Secure, <i>F-Secure Management Tools, Administrator's Guide</i> (1999) (from FSECURE 00000003) (F-Secure Management Tools)			
	C1160	F-Secure, <i>F-Secure Desktop, User's Guide</i> (1997) (from FSECURE 00000009) (FSecure Desktop User's Guide)			
	C1161	SafeNet, Inc., <i>VPN Policy Manager</i> (January 2000) (VPN Policy Manager)			
	C1162	F-Secure, <i>F-Secure VPN+ for Windows NT 4.0</i> (1998) (from FSECURE 00000009) (FSecure VPN+)			
	C1163	IRE, Inc., <i>SafeNet/Soft-PK Version 4</i> (March 28, 2000) (Soft-PK Version 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1164	IRE/SafeNet Inc., <i>VPN Technologies Overview</i> (March 28, 2000) (Safenet VPN Overview) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1165	IRE, Inc., <i>SafeNet / Security Center Technical Reference Addendum</i> (June 22, 1999) (Safenet Addendum)			
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	C1166	IRE, Inc., <i>System Description for VPN Policy Manager and SafeNet/SoftPK</i> (March 30, 2000) (VPN Policy Manager System Description)				
	C1167	IRE, Inc., <i>About SafeNet / VPN Policy Manager</i> (1999) (About Safenet VPN Policy Manager)				
	C1168	IRE, Inc., <i>SafeNet/VPN Policy Manager Quick Start Guide Version 1</i> (1999) (SafeNet VPN Policy Manager) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1169	Trusted Information Systems, Inc., <i>Gauntlet Internet Firewall, Firewall Product Functional Summary</i> (July 22, 1996) (Gauntlet Functional Summary)				
	C1170	Trusted Information Systems, Inc., <i>Running the Gauntlet Internet Firewall, An Administrator's Guide to Gauntlet Version 3.0</i> (May 31, 1995) (Running the Gauntlet Internet Firewall)				
	C1171	Ted Harwood, <i>Windows NT Terminal Server and Citrix Metaframe</i> (New Riders 1999) (Windows NT Harwood) 79				
	C1172	Todd W. Matehrs and Shawn P. Genoway, <i>Windows NT Thing Client Solutions: Implementing Terminal Server and Citrix MetaFrame</i> (Macmillan Technial Publishing 1999) (Windows NT Mathers)				
	C1173	Bernard Aboba et al., <i>Securing L2TP using IPSEC</i> (February 2, 1999)				
	C1174	156. <i>Finding Your Way Through the VPN Maze</i> (1999) ("PGP")				
	C1175	Linux FreeSWAN Overview (1999) (Linux FreeSWAN) Overview)				
	C1176	TimeStep, <i>The Business Case for Secure VPNs</i> (1998) ("TimeStep")				
	C1177	WatchGuard Technologies, Inc., <i>WatchGuard Firebox System Powerpoint</i> (2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1178	WatchGuard Technologies, Inc., <i>MSS Firewall Specifications</i> (1999) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1179	WatchGuard Technologies, Inc., <i>Request for Information, Security Services</i> (2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1180	WatchGuard Technologies, Inc., <i>Protecting the Internet Distributed Enterprise, White Paper</i> (February 2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
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				Art Unit	2157
				Examiner Name	VU, Kim Y.
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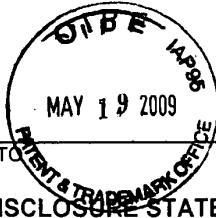
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	C1212	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)			
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	C1218	Chapter 1: Introduction to Firewall Technology, Administration Guide; 12/19/07, <a href="http://www.books24x7.com/book/id_762/viewer_r.asp?bookid=762&amp;chunked=41065062">http://www.books24x7.com/book/id_762/viewer_r.asp?bookid=762&amp;chunked=41065062</a>			
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	C1226	Emails from various individuals to Linux IPsec re: DNS-LDAP Splicing			
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EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Codez (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes-Number +-Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
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	B1001	WO 00/70458	11-23-2000	Comsec Corporation			
	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

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	C999	Appendix A of the Microsoft Corporation's Fourth Amended Invalidity Contentions dated Jan. 5, 2009.				
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				Filing Date	August 17, 2007	
				First Named Inventor	Victor Larson	
				Art Unit	2157	
Examiner Name	VU, Kim Y.					
Sheet	5	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)	
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	C1039	Syverson, et al. "Private Web Browsing," Naval Research Laboratory, Center for High 8 Assurance Computer Systems (June 2, 1997). (Syverson, Onion Routing)				
	C1040	Bellcore, "Metrics, Criteria, and Measurement Technique Requirements for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (June 16, 1997). (AIAG Requirements, ANX)				
	C1041	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/31/1997). (RFC 2543 Internet Draft 3) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1042	R. Atkinson, "Key Exchange Delegation Record for the DNS," Network Working Group, RFC 2230 (November 1997). (RFC 2230, KX Records)				
	C1043	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/11/1997). (RFC 2543 Internet Draft 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1044	1998 Microsoft Professional Developers Conference DVD ("1998 PDC DVD-ROM") (including screenshots captured therefrom and produced as MSFTVX 00018827-00018832). (Conference, Microsoft Prior Art VPN Technology)				
	C1045	Microsoft Corp., <i>Virtual Private Networking An Overview</i> (1998) (printed from 1998 PDC DVD-ROM) (Overview, Microsoft Prior Art VPN Technology)				
	C1046	Microsoft Corp., <i>Windows NT 5.0 Beta Has Public Premiere at Seattle Mini-Camp Seminar attendees get first look at the performance and capabilities of Windows NT 5.0</i> (1998) (available at <a href="http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue">http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue</a> ). (NT Beta, Microsoft Prior Art VPN Technology)				
	C1047	"What ports does SSL use" available at <a href="http://stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html">stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html</a> (1998). (Ports, DNS SRV)				
	C1048	Aventail Corp., "Aventail VPN V2.6 Includes Support for More Than Ten Authentication Methods Making Extranet VPN Development Secure and Simple," Press Release, January 19, 1998. (VPN V2.6, Aventail)				
	C1049	R. G. Moskowitz, "Network Address Translation Issues with IPsec," Internet Draft, Internet Engineering Task Force, February 6, 1998. (Moskowitz)				
	C1050	H. Schulzrinne, et al, "Internet Telephony Gateway Location," Proceedings of IEEE Infocom '98, The Conference on Computer Communications, Vol. 2 ( March 29 - April 2, 1998). (Gateway, Schulzrinne)				
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	C1051	C. Huitema, 45 al. "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998). (SGCP)			
	C1052	DISA "Secret Internet Protocol Router Network," SIPRNET Program Management Office (D3113) DISN Networks, DISN Transmission Services (May 8, 1998). (DISA, SIPRNET)			
	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1054	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (06/17/1998). (RFC 2543 Internet Draft 6) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1055	D. McDonald, et al. "PF_KEY Key Management API, Version 2," Network Working Group, RFC 2367 (July 1998). (RFC 2367)			
	C1056	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (07/16/1998). (RFC 2543 Internet Draft 7) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1057	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (08/07/1998). (RFC 2543 Internet Draft 8) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1058	Microsoft Corp., <i>Company Focuses on Quality and Customer Feedback</i> (August 18, 1998). (Focus, Microsoft Prior Art VPN Technology)			
	C1059	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (09/18/1998). (RFC 2543 Internet Draft 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1060	Atkinson, et al. "Security Architecture for the Internet Protocol," Network Working Group, RFC 2401 (November 1998). (RFC 2401, UNDERLYING SECURITY TECHNOLOGIES)			
	C1061	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/12/1998). (RFC 2543 Internet Draft 10) 9 <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1062	Donald Eastlake, <i>Domain Name System Security Extensions</i> , IETF DNS Security Working Group (December 1998). (DNSSEC-7)			
	C1063	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (12/15/1998). (RFC 2543 Internet Draft 11) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1064	Aventail Corp., "Aventail Connect 3.1/2.6 Administrator's Guide," (1999). (Aventail Administrator 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1065	Aventail Corp., "Aventail Connect 3.1/2.6 User's Guide," (1999). (Aventail User 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1066	Aventail Corp., "Aventail ExtraWeb Server v3.2 Administrator's Guide," (1999). (Aventail ExtraWeb 3.2, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1067	Kaufman et al, "Implementing IPsec," (Copyright 1999). (Implementing IPSEC, VPN REFERENCES)				
	C1068	Network Solutions, Inc. "Enabling SSL," NSI Registry (1999). (Enabling SSL, UNDERLYING SECURITY TECHNOLOGIES)				
	C1069	Check Point Software Technologies Ltd. (1999) (Check Point, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1070	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , <draft-ietf-dnsind-frc2052bis-02.txt> (January 1999). (Gulbrandsen 99, DNS SRV)				
	C1071	C. Scott, et al. <i>Virtual Private Networks</i> , O'Reilly and Associates, Inc., 2nd ed. (Jan. 1999). (Scott VPNs)				
	C1072	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (01/15/1999). (RFC 2543 Internet Draft 12) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1073	Goldschlag, et al., "Onion Routing for Anonymous and Private Internet Connections," Naval Research Laboratory, Center for High Assurance Computer Systems (January 28, 1999). (Goldschlag III, Onion Routing)				
	C1074	H. Schulzrinne, "Internet Telephony: architecture and protocols – an IETF perspective," Computer Networks, Vol. 31, No. 3 (February 1999). (Telephony, Schulzrinne)				
	C1075	M. Handley, et al. "SIP: Session Initiation Protocol," Network Working Group, RFC 2543 and Internet Drafts (12/96-3/99). (Handley, RFC 2543)				
	C1076	FreeSWAN Project, <i>Linux FreeSWAN Compatibility Guide</i> (March 4, 1999). (FreeSWAN Compatibility Guide, FreeSWAN)				
	C1077	Telcordia Technologies, "ANX Release 1 Document Corrections," AIAG (May 11, 1999). (Telcordia, ANX)				
	C1078	Ken Hornstein & Jeffrey Altman, <i>Distributing Kerberos KDC and Realm Information with DNS</i> <draft-ietf-cat-krb-dns-locate-oo.txt> (June 21, 1999). (Hornstein, DNS SRV)				
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	C1079	Bhattacharya et. al. "An LDAP Schema for Configuration and Administration of IPsec Based Virtual Private Networks (VPNs)", IETF Internet Draft (October 1999). (Bhattacharya LDAP VPN)				
	C1080	B. Patel, et al. "DHCP Configuration of IPSEC Tunnel Mode," IPSEC Working Group, Internet Draft 02 (10/15/1999). (Patel)				
	C1081	Goncalves, et al. <i>Check Point FireWall -1 Administration Guide</i> , McGraw-Hill Companies (2000). (Goncalves, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1082	"Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000). (FirstVPN Microsoft)				
	C1083	Gulbrandsen, Vixie, & Esibov, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2782 (February 2000). (RFC 2782, DNS SRV)				
	C1084	MITRE Organization, "Technical Description," Collaborative Operations in Joint Expeditionary Force Experiment (JEFX) 99 (February 2000). (MITRE, SIPRNET)				
	C1085	H. Schulzrinne, et al. "Application-Layer Mobility Using SIP," <i>Mobile Computing and Communications Review</i> , Vol. 4, No. 3. pp. 47-57 (July 2000). (Application, SIP)				
	C1086	Kindred et al, "Dynamic VPN Communities: Implementation and Experience," DARPA Information Survivability Conference and Exposition II (June 2001). (DARPA, VPN SYSTEMS)				
	C1087	ANX 101: Basic ANX Service Outline. (Outline, ANX)				
	C1088	ANX 201: Advanced ANX Service. (Advanced, ANX)				
	C1089	Appendix A: Certificate Profile for ANX IPsec Certificates. (Appendix, ANX)				
	C1090	Assured Digital Products. (Assured Digital) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1091	Aventail Corp., "Aventail AutoSOCKS the Client Key to Network Security," Aventail Corporation White Paper. (Network Security, Aventail)				
	C1092	Cindy Moran, "DISN Data Networks: Secret Internet Protocol Router Network (SIPRNet)." (Moran, SIPRNET)				
	C1093	Data Fellows F-Secure VPN+ (F-Secure VPN+)				
	C1094	"Interim Operational Systems Doctrine for the Remote Access Security Program (RASP) Secret Dial-In Solution. (RASP, SIPRNET)				
	C1095	<i>Onion Routing</i> , "Investigation of Route Selection Algorithms," available at <a href="http://www.onion-router.net/Archives/Route/index.html">http://www.onion-router.net/Archives/Route/index.html</a> . (Route Selection, Onion Routing)				
	C1096	Secure Computing, "Bullet-Proofing an Army Net," Washington Technology. (Secure, SIPRNET)				
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	C1097	SPARTA "Dynamic Virtual Private Network." (Sparta, VPN SYSTEMS)					
	C1098	Standard Operation Procedure for Using the 1910 Secure Modems. (Standard, SIPRNET)					
	C1099	Publically available emails relating to FreeS/WAN (MSFTVX00018833-MSFTVX00019206). (FreeS/WAN emails, FreeS/WAN)					
	C1100	Kaufman et al., "Implementing IPsec," (Copyright 1999) (Implementing IPsec)					
	C1101	Network Associates <i>Gauntlet Firewall For Unix User's Guide Version 5.0</i> (1999). (Gauntlet User's Guide – Unix, Firewall Products)					
	C1102	Network Associates <i>Gauntlet Firewall For Windows NT Getting Started Guide Version 5.0</i> (1999) (Gauntlet Getting Started Guide – NT, Firewall Products)					
	C1103	Network Associates <i>Gauntlet Firewall For Unix Getting Started Guide Version 5.0</i> (1999) (Gauntlet Unix Getting Started Guide, Firewall Products)					
	C1104	Network Associates <i>Release Notes Gauntlet Firewall for Unix 5.0</i> (March 19, 1999) (Gauntlet Unix Release Notes, Firewall Products)					
	C1105	Network Associates <i>Gauntlet Firewall For Windows NT Administrator's Guide Version 5.0</i> (1999) (Gauntlet NT Administrator's Guide, Firewall Products)					
	C1106	Trusted Information Systems, Inc. <i>Gauntlet Internet Firewall Firewall-to-Firewall Encryption Guide Version 3.1</i> (1996) (Gauntlet Firewall-to-Firewall, Firewall Products)					
	C1107	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)					
	C1108	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)					
	C1109	Dan Sterne <i>Dynamic Virtual Private Networks</i> (May 23, 2000) (Sterne DVPN, DVPN)					
	C1110	Darrell Kindred <i>Dynamic Virtual Private Networks (DVPN)</i> (December 21, 1999) (Kindred DVPN, DVPN)					
	C1111	Dan Sterne <i>et. al. TIS Dynamic Security Perimeter Research Project Demonstration</i> (March 9, 1998) (Dynamic Security Perimeter, DVPN)					
	C1112	Darrell Kindred <i>Dynamic Virtual Private Networks Capability Description</i> (January 5, 2000) (Kindred DVPN Capability, DVPN) 11					
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	C1113	October 7, and 28 1997 email from Domenic J. Turchi Jr. (SPARTA00001712-1714, 1808-1811) (Turchi DVPN email, DVPN)				
	C1114	James Just & Dan Sterne <i>Security Quickstart Task Update</i> (February 5, 1997) (Security Quickstart, DVPN)				
	C1115	Virtual Private Network Demonstration dated March 21, 1998 (SPARTA00001844-54) (DVPN Demonstration, DVPN)				
	C1116	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.1 Plan</i> (March 10, 1998) (IFD 1.1, DVPN)				
	C1117	Microsoft Corp. Windows NT Server Product Documentation: Administration Guide – Connection Point Services, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winttas/proddocs/inetconctservice/cpsops.mspx">http://www.microsoft.com/technet/archive/winttas/proddocs/inetconctservice/cpsops.mspx</a> (Connection Point Services) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1118	Microsoft Corp. Windows NT Server Product Documentation: Administration Kit Guide – Connection Manager, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winttas/proddocs/inetconctservice/cmak.mspx">http://www.microsoft.com/technet/archive/winttas/proddocs/inetconctservice/cmak.mspx</a> (Connection Manager) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1119	Microsoft Corp. Autodial Heuristics, <i>available at</i> <a href="http://support.microsoft.com/kb/164249">http://support.microsoft.com/kb/164249</a> (Autodial Heuristics) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)				
	C1120	Microsoft Corp., Cariplo: Distributed Component Object Model, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx</a> (Cariplo I)				
	C1121	Marc Levy, COM Internet Services (Apr. 23, 1999), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx</a> (Levy)				
	C1122	Markus Horstmann and Mary Kirtland, DCOM Architecture (July 23, 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx</a> (Horstmann)				
	C1123	Microsoft Corp., DCOM: A Business Overview (Apr. 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx</a> (DCOM Business Overview I)				
	C1124	Microsoft Corp., DCOM Technical Overview (Nov. 1996), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx</a> (DCOM Technical Overview I)				
	C1125	Microsoft Corp., DCOM Architecture White Paper (1998) <i>available in</i> PDC DVD-ROM (DCOM Architecture)				
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	C1126	Microsoft Corp., DCOM – The Distributed Component Object Model, A Business Overview White Paper (Microsoft 1997) <i>available in</i> PDC DVD-ROM (DCOM Business Overview II)					
	C1127	Microsoft Corp., DCOM—Cariplo Home Banking Over The Internet White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (Cariplo II)					
	C1128	Microsoft Corp., DCOM Solutions in Action White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Solutions in Action)					
	C1129	Microsoft Corp., DCOM Technical Overview White Paper (Microsoft 1996) <i>available in</i> 12 PDC DVD-ROM (DCOM Technical Overview II)					
	C1130	125. Scott Suhy & Glenn Wood, DNS and Microsoft Windows NT 4.0, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx</a> (Suhy)					
	C1131	126. Aaron Skonnard, <i>Essential Winlnet</i> 313-423 (Addison Wesley Longman 1998) (Essential Winlnet)					
	C1132	Microsoft Corp. Installing, Configuring, and Using PPTP with Microsoft Clients and Servers, (1998) <i>available at</i> <a href="http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx">http://msdn2.microsoft.com/enus/library/ms811078(printer).aspx</a> (Using PPTP)					
	C1133	Microsoft Corp., Internet Connection Services for MS RAS, Standard Edition, <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.mspx</a> (Internet Connection Services I)					
	C1134	Microsoft Corp., Internet Connection Services for RAS, Commercial Edition, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.mspx</a> (Internet Connection Services II)					
	C1135	Microsoft Corp., Internet Explorer 5 Corporate Deployment Guide – Appendix B: Enabling Connections with the Connection Manager Administration Kit, <i>available at</i> <a href="http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.mspx">http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.mspx</a> (IE5 Corporate Development)					
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	C1137	<i>Hands On, Self-Paced Training for Supporting Version 4.0</i> 371-473 (Microsoft Press 1998) (Hands On)					
	C1138	Microsoft Corp., MS Point-to-Point Tunneling Protocol (Windows NT 4.0), <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.mspx">http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.mspx</a> (MS PPTP)					
	C1139	Kenneth Gregg, <i>et al.</i> , <i>Microsoft Windows NT Server Administrator's Bible</i> 173-206, 883-911, 974-1076 (IDG Books Worldwide 1999) (Gregg)					
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				Application Number	11/840,560
First Named Inventor	Victor Larson		Art Unit	2157	
Examiner Name	VU, Kim Y.		Docket Number	077580-0063 (VRNK-1CP3CN2)	
Sheet	12	of	17		
OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)					
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	C1141	Microsoft Corp., Understanding PPTP (Windows NT 4.0), available at <a href="http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.mspx">http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.mspx</a> (Understanding PPTP NT 4) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1142	Microsoft Corp., Windows NT 4.0: Virtual Private Networking, available at <a href="http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.mspx">http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.mspx</a> (NT4 VPN) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1143	Anthony Northrup, <i>NT Network Plumbing: Routers, Proxies, and Web Services</i> 299-399 (IDG Books Worldwide 1998) (Network Plumbing)			
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	C1145	Microsoft Corp., Windows NT Server Product Documentation: Chapter 5 – Planning for Large-Scale Configurations, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.mspx</a> (Large-Scale Configurations) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
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	C1149	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (SSH Guide 3)			
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	C1151	F-Secure, <i>F-Secure VPN+ Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (VPN+ Guide 3)					
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	C1155	F-Secure, <i>F-Secure Evaluation Kit</i> (Sept. 1998) (FSECURE 00000009) (Evaluation Kit 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>					
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	C1164	IRE/SafeNet Inc., <i>VPN Technologies Overview</i> (March 28, 2000) (Safenet VPN Overview) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>					
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	C1167	IRE, Inc., <i>About SafeNet / VPN Policy Manager</i> (1999) (About Safenet VPN Policy Manager)					
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	C1176	TimeStep, <i>The Business Case for Secure VPNs</i> (1998) ("TimeStep")					
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	C1179	WatchGuard Technologies, Inc., <i>Request for Information, Security Services</i> (2000) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>					
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	C1211	John Savill, <i>The Windows NT and Windows 2000 Answer Book</i> (1999) (Savill, Microsoft Prior Art VPN Technology)				
	C1212	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)				
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	C1216	Ran Atkinson, <i>Use of DNS to Distribute Keys</i> , 7 Sept. 1993, <a href="http://ops.ietf.org/lists/namedroppers/namedroppers.199x/msg00945.html">http://ops.ietf.org/lists/namedroppers/namedroppers.199x/msg00945.html</a>				
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	C1222	Accessware – The Third Wave in Network Security, Conclave from Internet Dynamics; <a href="http://web.archive.org/web/11980210013830/interdyn.com/Accessware.html">http://web.archive.org/web/11980210013830/interdyn.com/Accessware.html</a>				
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**U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1000	5,311,593	05/10/1994	Carmi	
	A1001	5,511,122	04/23/1996	Atkinson	
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	A1006	60/134,547	05/17/1999	Victor Sheymov	
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	A1009	6,119,171	09/12/2000	Alkhatib	
	A1010	6,937,597	08/30/2005	Rosenberg et al.	
	A1011	7,072,964	07/04/2006	Whittle et al.	
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	A1013	6,079,020	06/20/2000	Liu	
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EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes - Number 4 - Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
						Yes	No
	B1000	WO 001/17775	03-30-2000	Science Applications International Corporation			
	B1001	WO 00/70458	11-23-2000	Comsec Corporation			
	B1002	WO 01/016766	03-08-2001	Science Applications International Corporation			

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Subst. for form 1449/PTO <b>SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (Use as many sheets as necessary)			<b>Complete if Known</b>			
			Application Number		11/840,560	
			Filing Date		August 17, 2007	
			First Named Inventor		Victor Larson	
			Art Unit		2157	
Examiner Name		VU, Kim Y.				
Sheet	2	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)	
<b>OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>						
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.				
	C998	Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009, VirnetX Inc. and Science Applications International Corp. v. Microsoft Corporation,				
	C999	Appendix A of the Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009.				
	C1000	Concordance Table For the References Cited in Tables on pages 6-15, 71-80 and 116-124 of the Microsoft Corporation's Fourth Amended Invalidation Contentions dated Jan. 5, 2009.				
	C1001	1. P. Mockapetris, "DNS Encoding of Network Names and Other Types," Network Working Group, RFC 1101 (April 1989) (RFC1101, DNS SRV)				
	C1002	DNS-related correspondence dated September 7, 1993 to September 20, 1993. (Pre KX, KX Records) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1003	R. Atkinson, "An Internetwork Authentication Architecture," Naval Research Laboratory, Center for High Assurance Computing Systems (8/5/93). (Atkinson NRL, KX Records)				
	C1004	Henning Schulzrinne, <i>Personal Mobility For Multimedia Services In The Internet</i> , Proceedings of the Interactive Distributed Multimedia Systems and Services European Workshop at 143 (1996). (Schulzrinne 96)				
	C1005	Microsoft Corp., <i>Microsoft Virtual Private Networking: Using Point-to-Point Tunneling Protocol for Low-Cost, Secure, Remote Access Across the Internet</i> (1996) (printed from 1998 PDC DVD-ROM). (Point to Point, Microsoft Prior Art VPN Technology)				
	C1006	"Safe Surfing: How to Build a Secure World Wide Web Connection," IBM Technical Support Organization, (March 1996). (Safe Surfing, WEBSITE ART)				
	C1007	Goldschlag, et al., "Hiding Routing Information," Workshop on Information Hiding, Cambridge, UK (May 1996). (Goldschlag II, Onion Routing)				
	C1008	"IPSec Minutes From Montreal", IPSEC Working Group Meeting Notes, <a href="http://www.sandleman.ca/ipsec/1996/08/msg00018.html">http://www.sandleman.ca/ipsec/1996/08/msg00018.html</a> (June 1996). (IPSec Minutes, FreeSWAN)				
	C1009	J. M. Galvin, "Public Key Distribution with Secure DNS," Proceedings of the Sixth USENIX UNIX Security Symposium, San Jose, California, July 1996. (Galvin, DNSSEC)				
	C1010	J. Gilmore, et al. "Re: Key Management, anyone? (DNS Keying)," IPsec Working Group Mailing List Archives (8/96). (Gilmore DNS, FreeSWAN)				
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	C1012	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2052 (October 1996). (RFC 2052, DNS SRV)				
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	C1013	Freier, et al. "The SSL Protocol Version 3.0," Transport Layer Security Working Group (November 18, 1996). (SSL, UNDERLYING SECURITY TECHNOLOGY)				
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	C1016	Kenneth F. Alden & Edward P. Wobber, <i>The AltaVista Tunnel: Using the Internet to Extend Corporate Networks</i> , Digital Technical Journal (1997) (Alden, AltaVista)				
	C1017	Automotive Industry Action Group, "ANX Release 1 Document Publication," AIAG (1997). (AIAG, ANX)				
	C1018	Automotive Industry Action Group, "ANX Release 1 Draft Document Publication," AIAG Publications (1997). (AIAG Release, ANX)				
	C1019	Aventail Corp., "AutoSOCKS v. 2.1 Datasheet," available at <a href="http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html">http://www.archive.org/web/19970212013409/www.aventail.com/prod/autosk2ds.html</a> (1997). (AutoSOCKS, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1020	Aventail Corp. "Aventail VPN Data Sheet," available at <a href="http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html">http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html</a> (1997). (Data Sheet, Aventail)				
	C1021	Aventail Corp., "Directed VPN Vs. Tunnel," available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html</a> (1997). (Directed VPN, Aventail)				
	C1022	Aventail Corp., "Managing Corporate Access to the Internet," Aventail AutoSOCKS White Paper available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/ipmwp.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/ipmwp.html</a> (1997). (Corporate Access, Aventail)				
	C1023	Aventail Corp., "Socks Version 5," Aventail Whitepaper, available at <a href="http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/socswp.html">http://web.archive.org/web/19970620030312/www.aventail.com/educate/whitepaper/socswp.html</a> (1997). (Socks, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1024	Aventail Corp., "VPN Server V2.0 Administration Guide," (1997). (VPN, Aventail)				
	C1025	Goldschlag, et al. "Privacy on the Internet," Naval Research Laboratory, Center for High Assurance Computer Systems (1997). (Goldschlag I, Onion Routing)				
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	C1026	Microsoft Corp., <i>Installing Configuring and Using PPTP with Microsoft Clients and Servers</i> (1997). (Using PPTP, Microsoft Prior Art VPN Technology)				
	C1027	Microsoft Corp., <i>IP Security for Microsoft Windows NT Server 5.0</i> (1997) (printed from 1998 PDC DVD-ROM). (IP Security, Microsoft Prior Art VPN Technology)				
	C1028	Microsoft Corp., <i>Microsoft Windows NT Active Directory: An Introduction to the Next Generation Directory Services</i> (1997) (printed from 1998 PDC DVD-ROM). (Directory, Microsoft Prior Art VPN Technology)				
	C1029	Microsoft Corp., <i>Routing and Remote Access Service for Windows NT Server New Opportunities Today and Looking Ahead</i> (1997) (printed from 1998 PDC DVD-ROM). (Routing, Microsoft Prior Art VPN Technology)				
	C1030	Microsoft Corp., <i>Understanding Point-to-Point Tunneling Protocol PPTP</i> (1997) (printed from 1998 PDC DVD-ROM). (Understanding PPTP, Microsoft Prior Art VPN Technology)				
	C1031	J. Mark Smith et al., <i>Protecting a Private Network: The AltaVista Firewall</i> , Digital Technical Journal (1997). (Smith, AltaVista)				
	C1032	Naganand Doraswamy <i>Implementation of Virtual Private Networks (VPNs) with IP Security</i> , <draft-ietf-ipsec-vpn-00.txt> (March 12, 1997). (Doraswamy)				
	C1033	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (03/27/1997). (RFC 2543 Internet Draft 2) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1034	Aventail Corp., "Aventail and Cybersafe to Provide Secure Authentication For Internet and Intranet Communication," Press Release, April 3, 1997. (Secure Authentication, Aventail)				
	C1035	D. Wagner, et al. "Analysis of the SSL 3.0 Protocol," (April 15, 1997). (Analysis, UNDERLYING SECURITY TECHNOLOGIES)				
	C1036	Automotive Industry Action Group, "ANXO Certification Authority Service and Directory Service Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Definition, ANX)				
	C1037	Automotive Industry Action Group, "ANXO Certification Process and ANX Registration Process Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Certification, ANX)				
	C1038	Aventail Corp., "Aventail Announces the First VPN Solution to Assure Interoperability Across Emerging Security Protocols," June 2, 1997. (First VPN, Aventail)				
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	C1039	Syverson, et al. "Private Web Browsing," Naval Research Laboratory, Center for High 8 Assurance Computer Systems (June 2, 1997). (Syverson, Onion Routing)			
	C1040	Bellcore, "Metrics, Criteria, and Measurement Technique Requirements for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (June 16, 1997). (AIAG Requirements, ANX)			
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	C1042	R. Atkinson, "Key Exchange Delegation Record for the DNS," Network Working Group, RFC 2230 (November 1997). (RFC 2230, KX Records)			
	C1043	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (11/11/1997). (RFC 2543 Internet Draft 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
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	C1045	Microsoft Corp., <i>Virtual Private Networking An Overview</i> (1998) (printed from 1998 PDC DVD-ROM) (Overview, Microsoft Prior Art VPN Technology)			
	C1046	Microsoft Corp., <i>Windows NT 5.0 Beta Has Public Premiere at Seattle Mini-Camp</i> Seminar attendees get first look at the performance and capabilities of Windows NT 5.0 (1998) (available at <a href="http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue">http://www.microsoft.com/presspass/features/1998/10-19nt5.mspxpftrue</a> ). (NT Beta, Microsoft Prior Art VPN Technology)			
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	C1049	R. G. Moskowitz, "Network Address Translation Issues with IPsec," Internet Draft, Internet Engineering Task Force, February 6, 1998. (Moskowitz)			
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	C1051	C. Huitema, 45 al. "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998). (SGCP)				
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	C1053	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (05/14/1998). (RFC 2543 Internet Draft 5) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
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	C1064	Aventail Corp., "Aventail Connect 3.1/2.6 Administrator's Guide," (1999). (Aventail Administrator 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1065	Aventail Corp., "Aventail Connect 3.1/2.6 User's Guide," (1999). (Aventail User 3.1, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1066	Aventail Corp., "Aventail ExtraWeb Server v3.2 Administrator's Guide," (1999). (Aventail ExtraWeb 3.2, Aventail) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
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	C1068	Network Solutions, Inc. "Enabling SSL," NSI Registry (1999). (Enabling SSL, UNDERLYING SECURITY TECHNOLOGIES)				
	C1069	Check Point Software Technologies Ltd. (1999) (Check Point, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1070	Arnt Gulbrandsen & Paul Vixie, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , <draft-ietf-dnsind-frc2052bis-02.txt> (January 1999). (Gulbrandsen 99, DNS SRV)				
	C1071	C. Scott, et al: <i>Virtual Private Networks</i> , O'Reilly and Associates, Inc.; 2nd ed. (Jan. 1999). (Scott VPNs)				
	C1072	M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (01/15/1999). (RFC 2543 Internet Draft 12) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1073	Goldschlag, et al., "Onion Routing for Anonymous and Private Internet Connections," Naval Research Laboratory, Center for High Assurance Computer Systems (January 28, 1999). (Goldschlag III, Onion Routing)				
	C1074	H. Schulzrinne, "Internet Telephony: architecture and protocols – an IETF perspective," Computer Networks, Vol. 31, No. 3 (February 1999). (Telephony, Schulzrinne)				
	C1075	M. Handley, et al. "SIP: Session Initiation Protocol," Network Working Group, RFC 2543 and Internet Drafts (12/96-3/99). (Handley, RFC 2543)				
	C1076	FreeSWAN Project, <i>Linux FreeSWAN Compatibility Guide</i> (March 4, 1999). (FreeSWAN Compatibility Guide, FreeSWAN)				
	C1077	Telcordia Technologies, "ANX Release 1 Document Corrections," AIAG (May 11, 1999). (Telcordia, ANX)				
	C1078	Ken Hornstein & Jeffrey Altman, <i>Distributing Kerberos KDC and Realm Information with DNS</i> <draft-eitf-cat-krb-dns-locate-oo.txt> (June 21, 1999). (Hornstein, DNS SRV)				
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				Art Unit	2157	
				Examiner Name	VU, Kim Y.	
Sheet	8	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)	
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	C1079	Bhattacharya et. al. "An LDAP Schema for Configuration and Administration of IPsec Based Virtual Private Networks (VPNs)", IETF Internet Draft (October 1999). (Bhattacharya LDAP VPN)				
	C1080	B. Patel, et al. "DHCP Configuration of IPSEC Tunnel Mode," IPSEC Working Group, Internet Draft 02 (10/15/1999). (Patel)				
	C1081	Goncalves, et al. <i>Check Point FireWall -1 Administration Guide</i> , McGraw-Hill Companies (2000). (Goncalves, Checkpoint FW) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1082	"Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000). (FirstVPN Microsoft)				
	C1083	Gulbrandsen, Vixie, & Esibov, <i>A DNS RR for specifying the location of services (DNS SRV)</i> , IETF RFC 2782 (February 2000). (RFC 2782, DNS SRV)				
	C1084	MITRE Organization, "Technical Description," Collaborative Operations in Joint Expeditionary Force Experiment (JEFX) 99 (February 2000). (MITRE, SIPRNET)				
	C1085	H. Schulzrinne, et al. "Application-Layer Mobility Using SIP," <i>Mobile Computing and Communications Review</i> , Vol. 4, No. 3. pp. 47-57 (July 2000). (Application, SIP)				
	C1086	Kindred et al, "Dynamic VPN Communities: Implementation and Experience," DARPA Information Survivability Conference and Exposition II (June 2001). (DARPA, VPN SYSTEMS)				
	C1087	ANX 101: Basic ANX Service Outline. (Outline, ANX)				
	C1088	ANX 201: Advanced ANX Service. (Advanced, ANX)				
	C1089	Appendix A: Certificate Profile for ANX IPsec Certificates. (Appendix, ANX)				
	C1090	Assured Digital Products. (Assured Digital) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>				
	C1091	Aventail Corp., "Aventail AutoSOCKS the Client Key to Network Security," Aventail Corporation White Paper. (Network Security, Aventail)				
	C1092	Cindy Moran, "DISN Data Networks: Secret Internet Protocol Router Network (SIPRNet)." (Moran, SIPRNET)				
	C1093	Data Fellows F-Secure VPN+ (F-Secure VPN+)				
	C1094	"Interim Operational Systems Doctrine for the Remote Access Security Program (RASP) Secret Dial-In Solution. (RASP, SIPRNET)				
	C1095	<i>Onion Routing</i> , "Investigation of Route Selection Algorithms," available at <a href="http://www.onion-router.net/Archives/Route/index.html">http://www.onion-router.net/Archives/Route/index.html</a> . (Route Selection, Onion Routing)				
	C1096	Secure Computing, "Bullet-Proofing an Army Net," Washington Technology. (Secure, SIPRNET)				
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	C1097	SPARTA "Dynamic Virtual Private Network." (Sparta, VPN SYSTEMS)				
	C1098	Standard Operation Procedure for Using the 1910 Secure Modems. (Standard, SIPRNET)				
	C1099	Publically available emails relating to FreeSWAN (MSFTVX00018833-MSFTVX00019206). (FreeSWAN emails, FreeSWAN)				
	C1100	Kaufman et al., "Implementing IPsec," (Copyright 1999) (Implementing IPsec)				
	C1101	Network Associates <i>Gauntlet Firewall For Unix User's Guide Version 5.0</i> (1999). (Gauntlet User's Guide – Unix, Firewall Products)				
	C1102	Network Associates <i>Gauntlet Firewall For Windows NT Getting Started Guide Version 5.0</i> (1999) (Gauntlet Getting Started Guide – NT, Firewall Products)				
	C1103	Network Associates <i>Gauntlet Firewall For Unix Getting Started Guide Version 5.0</i> (1999) (Gauntlet Unix Getting Started Guide, Firewall Products)				
	C1104	Network Associates <i>Release Notes Gauntlet Firewall for Unix 5.0</i> (March 19, 1999) (Gauntlet Unix Release Notes, Firewall Products)				
	C1105	Network Associates <i>Gauntlet Firewall For Windows NT Administrator's Guide Version 5.0</i> (1999) (Gauntlet NT Administrator's Guide, Firewall Products)				
	C1106	Trusted Information Systems, Inc. <i>Gauntlet Internet Firewall Firewall-to-Firewall Encryption Guide Version 3.1</i> (1996) (Gauntlet Firewall-to-Firewall, Firewall Products)				
	C1107	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)				
	C1108	Network Associates <i>Gauntlet Firewall For UNIX Global Virtual Private Network User's Guide Version 5.0</i> (1999) (Gauntlet Unix GVPN, GVPN)				
	C1109	Dan Sterne <i>Dynamic Virtual Private Networks</i> (May 23, 2000) (Sterne DVPN, DVPN)				
	C1110	Darrell Kindred <i>Dynamic Virtual Private Networks (DVPN)</i> (December 21, 1999) (Kindred DVPN, DVPN)				
	C1111	Dan Sterne <i>et.al. TIS Dynamic Security Perimeter Research Project Demonstration</i> (March 9, 1998) (Dynamic Security Perimeter, DVPN)				
	C1112	Darrell Kindred <i>Dynamic Virtual Private Networks Capability Description</i> (January 5, 2000) (Kindred DVPN Capability, DVPN) 11				
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	C1113	October 7, and 28 1997 email from Domenic J. Turchi Jr. (SPARTA00001712-1714, 1808-1811) (Turchi DVPN email, DVPN)			
	C1114	James Just & Dan Sterne <i>Security Quickstart Task Update</i> (February 5, 1997) (Security Quickstart, DVPN)			
	C1115	Virtual Private Network Demonstration dated March 21, 1998 (SPARTA00001844-54) (DVPN Demonstration, DVPN)			
	C1116	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.1 Plan</i> (March 10, 1998) (IFD 1.1, DVPN)			
	C1117	Microsoft Corp. Windows NT Server Product Documentation: Administration Guide – Connection Point Services, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cpsops.mspx</a> (Connection Point Services) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1118	Microsoft Corp. Windows NT Server Product Documentation: Administration Kit Guide – Connection Manager, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/cmak.mspx</a> (Connection Manager) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1119	Microsoft Corp. Autodial Heuristics, <i>available at</i> <a href="http://support.microsoft.com/kb/164249">http://support.microsoft.com/kb/164249</a> (Autodial Heuristics) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1120	Microsoft Corp., Cariplo: Distributed Component Object Model, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809332(printer).aspx</a> (Cariplo I)			
	C1121	Marc Levy, COM Internet Services (Apr. 23, 1999), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809302(printer).aspx</a> (Levy)			
	C1122	Markus Horstmann and Mary Kirtland, DCOM Architecture (July 23, 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809311(printer).aspx</a> (Horstmann)			
	C1123	Microsoft Corp., DCOM: A Business Overview (Apr. 1997), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809320(printer).aspx</a> (DCOM Business Overview I)			
	C1124	Microsoft Corp., DCOM Technical Overview (Nov. 1996), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms809340(printer).aspx</a> (DCOM Technical Overview I)			
	C1125	Microsoft Corp., DCOM Architecture White Paper (1998) <i>available in</i> PDC DVD-ROM (DCOM Architecture)			
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	C1126	Microsoft Corp, DCOM – The Distributed Component Object Model, A Business Overview White Paper (Microsoft 1997) <i>available in</i> PDC DVD-ROM (DCOM Business Overview II)					
	C1127	Microsoft Corp., DCOM—Cariplo Home Banking Over The Internet White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (Cariplo II)					
	C1128	Microsoft Corp., DCOM Solutions in Action White Paper (Microsoft 1996) <i>available in</i> PDC DVD-ROM (DCOM Solutions in Action)					
	C1129	Microsoft Corp., DCOM Technical Overview White Paper (Microsoft 1996) <i>available in</i> 12 PDC DVD-ROM (DCOM Technical Overview II)					
	C1130	125. Scott Suhy & Glenn Wood, DNS and Microsoft Windows NT 4.0, (1996) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms810277(printer).aspx</a> (Suhy)					
	C1131	126. Aaron Skonnard, <i>Essential WinInet</i> 313-423 (Addison Wesley Longman 1998) (Essential WinInet)					
	C1132	Microsoft Corp. Installing, Configuring, and Using PPTP with Microsoft Clients and Servers, (1998) <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/ms811078(printer).aspx">http://msdn2.microsoft.com/en-us/library/ms811078(printer).aspx</a> (Using PPTP)					
	C1133	Microsoft Corp., Internet Connection Services for MS RAS, Standard Edition, <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstart.msp</a> (Internet Connection Services I)					
	C1134	Microsoft Corp., Internet Connection Services for RAS, Commercial Edition, <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.msp">http://www.microsoft.com/technet/archive/winntas/proddocs/inetconctservice/bcgstrtc.msp</a> (Internet Connection Services II)					
	C1135	Microsoft Corp., Internet Explorer 5 Corporate Deployment Guide – Appendix B: Enabling Connections with the Connection Manager Administration Kit, <i>available at</i> <a href="http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.msp">http://www.microsoft.com/technet/prodtechnol/ie/deploy/deploy5/appendb.msp</a> (IE5 Corporate Development)					
	C1136	Mark Minasi, <i>Mastering Windows NT Server 4</i> 1359-1442 (6th ed., January 15, 1999) (Mastering Windows NT Server)					
	C1137	<i>Hands On, Self-Paced Training for Supporting Version 4.0</i> 371-473 (Microsoft Press 1998) (Hands On)					
	C1138	Microsoft Corp., MS Point-to-Point Tunneling Protocol (Windows NT 4.0), <i>available at</i> <a href="http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.msp">http://www.microsoft.com/technet/archive/winntas/maintain/featusability/pptpwp3.msp</a> (MS PPTP)					
	C1139	Kenneth Gregg, <i>et al.</i> , <i>Microsoft Windows NT Server Administrator's Bible</i> 173-206, 883-911, 974-1076 (IDG Books Worldwide 1999) (Gregg)					
	C1140	Microsoft Corp., Remote Access (Windows), <i>available at</i> <a href="http://msdn2.microsoft.com/en-us/library/bb545687(VS.85,printer).aspx">http://msdn2.microsoft.com/en-us/library/bb545687(VS.85,printer).aspx</a> (Remote Access)					
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	C1141	Microsoft Corp., Understanding PPTP (Windows NT 4.0), available at <a href="http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.aspx">http://www.microsoft.com/technet/archive/winntas/plan/pptpudst.aspx</a> (Understanding PPTP NT 4) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1142	Microsoft Corp., Windows NT 4.0: Virtual Private Networking, available at <a href="http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.aspx">http://www.microsoft.com/technet/archive/winntas/deploy/confeat/vpntwk.aspx</a> (NT4 VPN) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1143	Anthony Northrup, <i>NT Network Plumbing: Routers, Proxies, and Web Services</i> 299-399 (IDG Books Worldwide 1998) (Network Plumbing)			
	C1144	Microsoft Corp., Chapter 1 – Introduction to Windows NT Routing with Routing and Remote Access Service, Available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch01.aspx">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch01.aspx</a> (Intro to RRAS) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.) 13			
	C1145	Microsoft Corp., Windows NT Server Product Documentation: Chapter 5 – Planning for Large-Scale Configurations, available at <a href="http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.aspx">http://www.microsoft.com/technet/archive/winntas/proddocs/rras40/rrasch05.aspx</a> (Large-Scale Configurations) (Although undated, this reference refers to the operation of prior art versions of Microsoft Windows such as Windows NT 4.0. Accordingly, upon information and belief, this reference is prior art to the patents-in-suit.)			
	C1146	F-Secure, <i>F-Secure Evaluation Kit</i> (May 1999) (FSECURE 00000003) (Evaluation Kit 3) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1147	F-Secure, <i>F-Secure NameSurfer</i> (May 1999) (from FSECURE 00000003) (NameSurfer 3)			
	C1148	F-Secure, <i>F-Secure VPN Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (F-Secure VPN 3)			
	C1149	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (SSH Guide 3)			
	C1150	F-Secure, <i>F-Secure SSH2.0 for Windows NT and 95</i> (May 1999) (from FSECURE 00000003) (SSH 2.0 Guide 3)			
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	C1151	F-Secure, <i>F-Secure VPN+ Administrator's Guide</i> (May 1999) (from FSECURE 00000003) (VPN+ Guide 3)			
	C1152	F-Secure, <i>F-Secure VPN+ 4.1</i> (1999) (from FSECURE 00000006) (VPN+ 4.1 Guide 6)			
	C1153	F-Secure, <i>F-Secure SSH</i> (1996) (from FSECURE 00000006) (F-Secure SSH 6)			
	C1154	F-Secure, <i>F-Secure SSH 2.0 for Windows NT and 95</i> (1998) (from FSECURE 00000006) (F-Secure SSH 2.0 Guide 6)			
	C1155	F-Secure, <i>F-Secure Evaluation Kit</i> (Sept. 1998) (FSECURE 00000009) (Evaluation Kit 9) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1156	F-Secure, <i>F-Secure SSH User's &amp; Administrator's Guide</i> (Sept. 1998) (from FSECURE 00000009) (SSH Guide 9)			
	C1157	F-Secure, <i>F-Secure SSH 2.0 for Windows NT and 95</i> (Sept. 1998) (from FSECURE 00000009) (F-Secure SSH 2.0 Guide 9)			
	C1158	F-Secure, <i>F-Secure VPN+</i> (Sept. 1998) (from FSECURE 00000009) (VPN+ Guide 9)			
	C1159	F-Secure, <i>F-Secure Management Tools, Administrator's Guide</i> (1999) (from FSECURE 00000003) (F-Secure Management Tools)			
	C1160	F-Secure, <i>F-Secure Desktop, User's Guide</i> (1997) (from FSECURE 00000009) (FSecure Desktop User's Guide)			
	C1161	SafeNet, Inc., <i>VPN Policy Manager</i> (January 2000) (VPN Policy Manager)			
	C1162	F-Secure, <i>F-Secure VPN+ for Windows NT 4.0</i> (1998) (from FSECURE 00000009) (FSecure VPN+)			
	C1163	IRE, Inc., <i>SafeNet/Soft-PK Version 4</i> (March 28, 2000) (Soft-PK Version 4) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1164	IRE/SafeNet Inc., <i>VPN Technologies Overview</i> (March 28, 2000) (Safenet VPN Overview) <b>[Due to difficulty locating this reference, a copy has not been provided]</b>			
	C1165	IRE, Inc., <i>SafeNet / Security Center Technical Reference Addendum</i> (June 22, 1999) (Safenet Addendum)			
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	C1166	IRE, Inc., <i>System Description for VPN Policy Manager and SafeNet/SoftPK</i> (March 30, 2000) (VPN Policy Manager System Description)					
	C1167	IRE, Inc., <i>About SafeNet / VPN Policy Manager</i> (1999) (About Safenet VPN Policy Manager)					
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				Filing Date	August 17, 2007	
				First Named Inventor	Victor Larson	
				Art Unit	2157	
				Examiner Name	VU, Kim Y.	
Sheet	15	of	17	Docket Number	077580-0063 (VRNK-1CP3CN2)	
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	C1184	GTE Internetworking & BBN Technologies <i>DARPA Information Assurance Program Integrated Feasibility Demonstration (IFD) 1.2 Report, Rev. 1.0</i> (September 21, 1998)				
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	C1186	DARPA, <i>Dynamic Virtual Private Network (VPN) Powerpoint</i>				
	C1187	GTE Internetworking, <i>Contractor's Program Progress Report</i> (March 16-April 30, 1998)				
	C1188	Darrell Kindred, <i>Dynamic Virtual Private Networks (DVPN) Countermeasure Characterization</i> (January 30, 2001)				
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	C1191	Information Assurance/NAI Labs, <i>Dynamic Virtual Private Networks (VPNs) and Integrated Security Management</i> (2000)				
	C1192	Information Assurance/NAI Labs, <i>Create/Add DVPN Enclave</i> (2000)				
	C1193	NAI Labs, <i>IFE 3.1 Integration Demo</i> (2000)				
	C1194	Information Assurance, <i>Science Fair Agenda</i> (2000)				
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	C1196	<i>IFE 3.1 Technology Dependencies</i> (2000)				
	C1197	<i>IFE 3.1 Topology</i> (February 9, 2000)				
	C1198	Information Assurance, <i>Information Assurance Integration: IFE 3.1, Hypothesis &amp; Thread Development</i> (January 10-11, 2000)				
	C1199	Information Assurance/NAI Labs, <i>Dynamic Virtual Private Networks Presentation</i> (2000)				
	C1200	Information Assurance/NAI Labs, <i>Dynamic Virtual Private Networks Presentation v.2</i> (2000)				
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	C1205	David Johnson et. al., <i>A Guide To Microsoft Proxy Server 2.0</i> (1999) (Johnson, Microsoft Prior Art VPN Technology)				
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	C1207	Kevin Schuler, <i>Microsoft Proxy Server 2</i> (1998) (Schuler, Microsoft Prior Art VPN Technology)				
	C1208	Erik Rozell et. al., <i>MCSE Proxy Server 2 Study Guide</i> (1998) (Rozell, Microsoft Prior 15 Art VPN Technology)				
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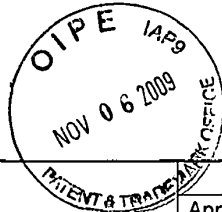
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	C1212	Network Associates <i>Gauntlet Firewall Global Virtual Private Network User's Guide for Windows NT Version 5.0</i> (1999) (Gauntlet NT GVPN, GVPN)			
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	C1215	AutoSOCKS v2.1, Datasheet, <a href="http://web.archive.org/web/19970212013409/www.aventail.com/prod/autoskds.html">http://web.archive.org/web/19970212013409/www.aventail.com/prod/autoskds.html</a>			
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	C1226	Emails from various individuals to Linux IPsec re: DNS-LDAP Splicing			
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				First Named Inventor	Victor Larson			
				Art Unit	2157			
				Examiner Name	VU, Kim Y.			
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	C1227	Microsoft Corporation's Fifth Amended Invalidation Contentions dated September 18, 2009, VirnetX Inc. and Science Applications International Corp. v. Microsoft Corporation and invalidity claim charts for U.S. Patent Nos. 7,188,180 and 6,839,759						
	C1228	The IPSEC Protocol as described in Atkinson, et al., "Security Architecture for the Internet Protocol," Network Working Group, RFC 2401 (November 1998) ("RFC 2401"); <a href="http://web.archive.org/web/19991007070353/http://www.imib.med.tu-dresden.de/imib/Internet/Literatur/ipsec-docu_eng.html">http://web.archive.org/web/19991007070353/http://www.imib.med.tu-dresden.de/imib/Internet/Literatur/ipsec-docu_eng.html</a>						
	C1229	S. Kent and R. Atkinson, "IP Authentication Header," RFC 2402 (November 1998); <a href="http://web.archive.org/web/19991007070353/http://www.imib.med.tu-dresden.de/imib/Internet/Literatur/ipsec-docu_eng.html">http://web.archive.org/web/19991007070353/http://www.imib.med.tu-dresden.de/imib/Internet/Literatur/ipsec-docu_eng.html</a>						
	C1230	C. Madson and R. Glenn, "The Use of HMAC-MD5-96 within ESP and AH," RFC 2403 (November 1998); <a href="http://web.archive.org/web/19991007070353/http://www.imib.med.tu-dresden.de/imib/Internet/Literatur/ipsec-docu_eng.html">http://web.archive.org/web/19991007070353/http://www.imib.med.tu-dresden.de/imib/Internet/Literatur/ipsec-docu_eng.html</a>						
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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		11840560		
	Filing Date		2007-08-17		
	First Named Inventor	Larson, et al.			
	Art Unit				
	Examiner Name				
	Attorney Docket Number		077580-063(VR NK-1CP3CN2)		

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	2	6223287		2001-04-00	Douglas, et al.	

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		11840560
	Filing Date		2007-08-17
	First Named Inventor	Larson, et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number		077580-063(VRNK-1CP3CN2)

Examiner 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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
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Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

11840560 - GAU: 2453

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	11840560
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	Art Unit	
	Examiner Name	
	Attorney Docket Number	077580-063(VR NK-1CP3CN2)

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	1	5303302		1994-04-12	Burrows		
	2	5629984		1997-05-13	McManis		

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		11840560	11840560 - GAU: 2453	
	Filing Date		2007-08-17		
	First Named Inventor	Larson, et al.			
	Art Unit				
	Examiner Name				
	Attorney Docket Number		077580-063(VR NK-1CP3CN2)		

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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	11/840,560
				Filing Date	08-17-2007
				First Named Inventor	Victor Larson
				Art Unit	2453
				Examiner Name	Krisna Lim
				Docket Number	077580-0063

U.S. PATENT APPLICATION PUBLICATIONS					
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	B8	US2007/0266141	11/2007	Norton, Michael Anthony	
	B9	US2008/0235507	09/2008	Ishikawa et al.	

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						Yes	No
	C1	JP04-363941	12/16/1992	Nippon Telegr & Teleph Corp		English Abstract	
	C2	JP09-018492	01/17/1997	Nippon Telegr & Teleph Corp		English Abstract	
	C3	JP10-070531	03/10/1998	Brother Ind Ltd.		English Abstract	
	C4	JP62-214744	9/21/1987	Hitachi Ltd.		English Abstract	

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.	
	D1	Yuan Dong Feng, "A novel scheme combining interleaving technique with cipher in Rayleigh fading channels," Proceedings of the International Conference on Communication technology, 2:S47-02-1-S47-02-4 (1998)	
	D2	D.W. Davies and W.L. Price, edited by Tadahiro Uezono, "Network Security", Japan, Nikkei McGraw-Hill, December 5, 1958, First Edition, first copy, p. 102-108	
EXAMINER		/Krisna Lim/	DATE CONSIDERED 10/17/2010

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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	11/840,560
				Filing Date	08-17-2007
				First Named Inventor	Victor Larson
				Art Unit	2453
				Examiner Name	Krisna Lim
				Docket Number	077580-0063
U.S. PATENTS					
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	A18	7,039,713	05/2006	Van Gunter et al.	
	A19	7,167,904	01/2007	Devarajan et al.	
	A20	7,188,175	03/2007	McKeeth, James A.	
	A21	7,461,334	12/2008	Lu et al.	
	A22	7,490,151	02/2009	Munger et al.	
	A23	7,493,403	02/2009	Shull et al.	
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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
	B1	US2001/0049741	12/2001	Skene et al.	
	B2	US2004/0199493	10/2004	Ruiz et al.	
	B3	US2004/0199520	10/2004	Ruiz et al.	
	B4	US2004/0199608	10/2004	Rechterman et al.	
	B5	US2004/0199620	10/2004	Ruiz et al.	
	B6	US2007/0208869	09/2007	Adelman et al.	
	B7	US2007/0214284	09/2007	King et al.	

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Subst. for form 1449/PTO <b>SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>				<b>Complete if Known</b>	
				Application Number	<b>11/840,560</b>
				Filing Date	<b>August 17, 2007</b>
				First Named Inventor	<b>Victor Larson</b>
				Art Unit	<b>2157</b>
				Examiner Name	<b>VU, Kim Y.</b>
Sheet	<b>1</b>	of	<b>1</b>	Docket Number	<b>077580-0063 (VRNK-1CP3CN2)</b>

**U.S. PATENT DOCUMENTS**

EXAMINER'S INITIALS	CITE NO.	Document Number Number-Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1020	US 7,461,334	12/02/08	Lu, et al.	
	A1021	US 7,353,841	04/08/08	Kono, et al.	
	A1022	US 7,188,175	03/06/07	McKeeth, James A.	
	A1023	US 7,167,904	01/23/07	Devarajan, et al.	
	A1024	US 7,039,713	05/02/06	Van Gunter, et al.	
	A1025	US 6,757,740	06/29/04	Parekh, et al.	
	A1026	US 6,752,166	06/22/04	Lull, et al.	
	A1027	US 6,687,746	02/03/04	Shuster, et al.	
	A1028	US 6,338,082	01/08/02	Schneider, Eric	
	A1029	US 6,333,272	12/25/01	McMillin, et al.	
	A1030	US 6,314,463	11/06/01	Abbott, et al.	
	A1031	US 6,298,341	10/02/01	Mann, et al.	
	A1032	US 6,262,987	07/17/01	Mogul, Jeffrey C.	
	A1033	US 6,199,112	03/06/04	Wilson, Stephen K.	
	A1034	US 6,052,788	04/18/00	Wesinger, et al.	
	A1035	US 2,895,502	07/21/59	Garland Roper Charles, et al.	
	A1036	US 2001/0049741	12/06/01	Skene, et al.	

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EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes-Number + Kind Codes (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Figures Appear	Translation	
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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.
	C1240	David Kosiur, "Building and Managing Virtual Private Networks" (1998)
	C1241	P. Mockapetris, "Domain Names - Implementation and Specification," Network Working Group, RFC 1035 (November 1987)
	C1242	Request for Inter Partes Reexamination of Patent No. 6,502,135, dated Nov. 25, 2009.
	C1243	Request for Inter Partes Reexamination of Patent No. 7,188,180, dated Nov. 25, 2009.

EXAMINER <b>/Krisna Lim/</b>	DATE CONSIDERED <b>03/14/2010</b>
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 BST99 1638591-1.077580.0063

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./

<b>Search Notes</b>  	<b>Application/Control No.</b>  11840560	<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	226, 221	3/14/2010	kl
726	15	3/14/2010	kl

SEARCH NOTES		
Search Notes	Date	Examiner
EAST, Inventors	3/14/2010	kl

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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Docket No.: 077580-0063 (VRNK-1CP3CN2)

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of Victor Larson et al. : Customer Number: 23,630  
: :  
: Confirmation Number: 1537  
: :  
Application No.: 11/840,560 : Group Art Unit: 2453  
: :  
Filed: August 17, 2007 : Examiner: Lim, Krisna  
: :  
For: AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING  
SECURE DOMAIN NAMES

**REVISED AMENDMENT "A"**

MS Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Advisory Office action dated July 15, 2010, and the substantive Office action on the merits dated March 19, 2010, please amend the above-identified application and consider the accompanying remarks as follows:

**Amendments to the specification** begin on page 2 of this paper.

**Amendments to the claims** begin on page 3 of this paper

**Remarks** begin on page 10 of this paper.



**Amendments to the specification:**

Please delete paragraph [0001] in its entirety, and substitute therefor:

**[0001]** This application claims priority from and is a continuation of a co-pending U.S. application serial number 10/714,849, filed November 18, 2003, now U.S. Patent No. 7,418,504, which is a continuation of U.S. application serial number 09/558,210, filed April 26, 2000, now abandoned, which in turn is a continuation-in-part of previously-filed U.S. application serial number 09/504,783, filed on February 15, 2000, now U.S. Patent No. 6,502,135, issued December 31, 2002, which in turn claims priority from and is a continuation-in-part patent application of previously-filed U.S. application serial number 09/429,643, filed on October 29, 1999, now U.S. Patent No. 7,010,604, issued March 07, 2006. The subject matter of U.S. application serial number 09/429,643, now U.S. Patent No. 7,010,604, which is bodily incorporated herein, derives from provisional U.S. application numbers 60/106,261 (filed October 30, 1998) and 60/137,704 (filed June 7, 1999), both now abandoned. The present application is also related to U.S. application serial number 09/558,209, filed April 26, 2000, now abandoned, and which is incorporated by reference herein.

**Amendments to the claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.-3. (Cancelled)

4. (New) A system for providing a domain name service for establishing a secure communication link, the system comprising:

a domain name service system configured and arranged to be connected to a communication network, store a plurality of domain names and corresponding network addresses, receive a query for a network address, and indicate in response to the query whether the domain name service system supports establishing a secure communication link.

5. (New) The system of claim 4, wherein at least one of the plurality of domain names comprises a top-level domain name.

6. (New) The system of claim 5, wherein the top-level domain name is a non-standard top-level domain name.

7. (New) The system of claim 6, wherein the non-standard top-level domain name is one of .scom, .sorg, .snet, .sgov, .sedu, .smil and .sint.

8. (New) The system of claim 5, wherein the domain name service system is configured to authenticate the query using a cryptographic technique.

9. (New) The system of claim 4, wherein the communication network includes the Internet.

10. (New) The system of claim 4, wherein the domain name service system comprises an edge router.

11. (New) The system of claim 4, wherein the domain name service system is connectable to a virtual private network through the communication network.

12. (New) The system of claim 11, wherein the virtual private network is one of a plurality of secure communication links in a hierarchy of secure communication links.

13. (New) The system of claim 11, wherein the virtual private network is based on inserting into each data packet communicated over a secure communication link one or more data values that vary according to a pseudo-random sequence.

14. (New) The system of claim 11, wherein the virtual private network is based on a network address hopping regime that is used to pseudorandomly change network addresses in packets transmitted between a first device and a second device.

15. (New) The system of claim 11, wherein the virtual private network is based on comparing a value in each data packet transmitted between a first device and a second device to a moving window of valid values.

16. (New) The system of claim 11, wherein the virtual private network is based on a comparison of a discriminator field in a header of each data packet to a table of valid discriminator fields maintained for a first device.

17. (New) The system of claim 4, wherein the domain name service system is configured to respond to the query for the network address.

18. (New) The system of claim 4, wherein the domain name service system is configured to provide, in response to the query, the network address corresponding to a domain name from the plurality of domain names and the corresponding network addresses.

19. (New) The system of claim 4, wherein the domain name service system is configured to receive the query initiated from a first location, the query requesting the network address associated with a domain name, wherein the domain name service system is configured to provide the network address associated with a second location, and wherein the domain name service system is configured to support establishing a secure communication link between the first location and the second location.

20. (New) The system of claim 4, wherein the domain name service system is

connected to a communication network, stores a plurality of domain names and corresponding network addresses, and comprises an indication that the domain name service system supports establishing a secure communication link.

21. (New) The system of claim 4, wherein at least one of the plurality of domain names is reserved for secure communication links.

22. (New) The system of claim 4, wherein the domain name service system comprises a server.

23. (New) The system of claim 22, wherein the domain name service system further comprises a domain name database, and wherein the domain name database stores the plurality of domain names and the corresponding network addresses.

24. (New) The system of claim 4, wherein the domain name service system comprises a server, wherein the server comprises a domain name database, and wherein the domain name database stores the plurality of domain names and the corresponding network addresses.

25. (New) The system of claim 4, wherein the domain name service system is configured to store the corresponding network addresses for use in establishing secure communication links.

26. (New) The system of claim 4, wherein the domain name service system is configured to authenticate the query for the network address.

27. (New) The system of claim 4, wherein at least one of the plurality of domain names comprises an indication that the domain name service system supports establishing a secure communication link.

28. (New) The system of claim 4, wherein at least one of the plurality of domain names comprises a secure name.

29. (New) The system of claim 4, wherein at least one of the plurality of domain names enables establishment of a secure communication link.

30. (New) The system of claim 4, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location transparently to a user at the first location.

31. (New) The system of claim 4, wherein the secure communication link uses encryption.

32. (New) The system of claim 4, wherein the secure communication link is capable of supporting a plurality of services.

33. (New) The system of claim 32, wherein the plurality of services comprises a plurality of communication protocols, a plurality of application programs, multiple sessions, or a combination thereof.

34. (New) The system of claim 33, wherein the plurality of application programs comprises items selected from a group consisting of the following: video conferencing, e-mail, a word processing program, and telephony.

35. (New) The system of claim 32, wherein the plurality of services comprises audio, video, or a combination thereof.

36. (New) The system of claim 4, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location.

37. (New) The system of claim 36, wherein the query is initiated from the first location, wherein the second location comprises a computer, and wherein the network address is an address associated with the computer.

38. (New) The system of claim 4, wherein the domain name service system comprises a domain name database connected to a communication network and storing a plurality of domain names and corresponding network addresses for communication, wherein the domain name database is configured so as to provide a network address corresponding to a domain name in response to a query in order to establish a secure communication link.

39. (New) A machine-readable medium comprising instructions executable in a domain name service system, the instructions comprising code for: connecting the domain name service system to a communication network; storing a plurality of domain names and corresponding network addresses; receiving a query for a network address; and indicating in response to the query whether the domain name service system supports establishing a secure communication link.

40. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for storing the plurality of domain names and corresponding network addresses including at least one top-level domain name.

41. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for responding to the query for the network address.

42. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for providing, in response to the query, the network address corresponding to a domain name from the plurality of domain names and the corresponding network addresses.

43. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for receiving the query for a network address associated with a domain name and initiated from a first location, and providing a network address associated with a second location, and establishing a secure communication link between the first location and the second location.

44. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for indicating that the domain name service system supports the establishment of a secure communication link.

45. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for reserving at least one of the plurality of domain names for secure communication links.

46. (New) The machine-readable medium of claim 39, wherein the code resides on a server.

47. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for storing a plurality of domain names and corresponding network addresses so as to define a domain name database.

48. (New) The machine-readable medium of claim 39, wherein the code resides on a server, and the instructions comprise code for creating a domain name database configured to store the plurality of domain names and the corresponding network addresses.

49. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for storing the corresponding network addresses for use in establishing secure communication links.

50. (New) The machine-readable medium of claim 39, wherein the instructions comprise code for authenticating the query for the network address.

51. (New) The machine-readable medium of claim 39, wherein at least one of the plurality of domain names includes an indication that the domain name service system supports the establishment of a secure communication link.

52. (New) The machine-readable medium of claim 39, wherein at least one of the plurality of domain names includes a secure name.

53. (New) The machine-readable medium of claim 39, wherein at least one of the plurality of domain names is configured so as to enable establishment of a secure communication link.

54. (New) The machine-readable medium of claim 39, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location transparently to a user at the first location.

55. (New) The machine-readable medium of claim 39, wherein the secure communication link uses encryption.

56. (New) The machine-readable medium of claim 39, wherein the secure communication link is capable of supporting a plurality of services.

57. (New) The machine-readable medium of claim 56, wherein the plurality of services comprises a plurality of communication protocols, a plurality of application programs, multiple sessions, or a combination thereof.

58. (New) The machine-readable medium of claim 57, wherein the plurality of application programs comprises items selected from a group consisting of the following: video conferencing, e-mail, a word processing program, and telephony.

59. (New) The machine-readable medium of claim 56, wherein the plurality of services comprises audio, video, or a combination thereof.

60. (New) The machine-readable medium of claim 39, wherein the domain name service system is configured to enable establishment of a secure communication link between a first location and a second location.

61. (New) The machine-readable medium of claim 60, wherein the instructions include code for receiving a query initiated from the first location, wherein the second location comprises a computer, and wherein the network address is an address associated with the computer.

62. (New) The machine-readable medium of claim 39, wherein the domain name service system comprises a domain name database connected to a communication network and storing a plurality of domain names and corresponding network addresses for communication, wherein the domain name database is configured so as to provide a network address corresponding to a domain name in response to the query in order to establish a secure communication link.

63. (New) A method of providing a domain name service for establishing a secure communication link, the method comprising: connecting a domain name service system to a communication network, ; storing a plurality of domain names and corresponding network addresses; and upon receiving a query for a network address for communication, indicating whether the domain name service system supports establishing a secure communication link.



## REMARKS

The response filed 28 June 2010 is being resubmitted with the amendment to the specification, paragraph [0001], marked to indicate the changes made. This response is therefore now compliant with the requirements of 37 C.F.R. §§ 1.121 and 1.4.

Claims 4-63 remain in the application. Claims 1-3 have been cancelled, subject to refiling those claims in a continuation application of the present application. Claims 4-63 have been added by this amendment. The Examiner's attention is directed to the parent application, Applicant's patent, U.S. Patent No. 7,418,504 (the "'504 Patent"). Pending claims 4-63 are similar to claims 1-59 of the '504 Patent, except that they have been modified to add the limitation in independent claim 4 (and similar limitations to claims 39 and 63) that there is an indication in response to a query whether the domain name service system supports establishing a secure communication link. New claim 19 (corresponding to claim 16 of the '504 Patent) has also been amended with minor changes.

In the Official action on the merits of March 19, 2010, the Examiner has objected to the disclosure because the first paragraph of the specification needs to be updated. The Examiner has also indicated that the information disclosure statement filed May 19, 2009 fails to comply with 37 C.F.R. § 1.98(a)(3) because it does not include a concise explanation of the relevance of each of the cited references. Claims 1 has been rejected under 35 U.S.C. §112, second paragraph, as indefinite, while claims 2-3 have been rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential steps. Claim 2 has also been rejected under 35 U.S.C. §112, first paragraph, because one skilled in the art clearly would not know how to use the claimed invention. Claims 1-3 have been rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,418,504 (from which the current applications claims priority). Finally claims 1-3 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Shrader (US Patent No 5,864,666). The objections and rejections are traversed and reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Regarding the Examiner's objection to the specification, the Examiner has requested that applicants indicate the current status of the applications identified in paragraph [0001].

Applicants accordingly have amended paragraph [0001] to comply with the Examiner's request. Accordingly, the objection should be withdrawn.

The Examiner has indicated that the information disclosure statement filed May 19, 2009 fails to comply with 37 C.F.R. § 1.98(a)(3) because it does not include a concise explanation of the relevance. As stated in applicants' document:

All of the documents herein submitted have been produced by Microsoft Corp. in VirnetX Inc. and Science Applications International Corp. v. Microsoft Corp. civil action currently pending before the U.S. District Court for the Eastern District of Texas. Although the undersigned attorney has not reviewed these documents to assess their materiality, these documents are submitted under the assumption that they may be material to the patentability of the claims pending in this application.

While applicants' regret the large number of documents cited in the litigation by the opposing party, the inability to review the documents, and therefore the inability to assess the materiality of the references, nevertheless applicants felt compelled to cite the references in the file history of the present application, because the two patents in the cited litigation (US Patent Nos. 6,502,135 B1 and 7,188,180 B2) and that of the present application all relate to secure communications. The present application claims priority from a chain of applications, including the one that issued as U.S. Patent No. 6,502,135. U.S. Patent No. 7,188,180 claims priority from a chain of applications, including the same one that issued as U.S. Patent No. 6,502, 135. Accordingly, the applicants request that the Examiner reconsider his position, and review and enter the information disclosure statement of May 19, 2010.

Regarding the rejection of Claims 1 has been rejected under 35 U.S.C. §112, second paragraph, as indefinite, the Examiner states that "it is unclear from where a query is sent", "it is unclear from where the query message is requesting a secure computer network address," "it is unclear how a portal authenticates a query," and finally "the interrelationship or interfunction between a portal and a domain name database is unclear." It is submitted that these cited limitations do not make the claims indefinite. The source of the query message can be from any source in communication with the system for providing a domain name service. As recited in new claim 4, the domain name service system is configured and arranged to be (1) connected to a communication network, (2) store a plurality of domain names and corresponding network

addresses, (3) receive a query for a network address, and (4) indicate in response to the query whether the domain name service system supports establishing a secure communication link. All four limitations are required by the claim.

The Examiner also finds fault since there is no express recitation of the interrelationship between the portal and domain database. While the applicants disagree with this rejection, none of the currently presented claims include the limitation of “the portal.” Accordingly, this objection is believed to be overcome.

The Examiner also believed that original claim 2-3 were incomplete for “omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.” Claims 4-63 recite adequate limitations to satisfy the statutory requirements of 35 U.S.C. §112.

Claim 4 recites the restrictive limitations of a domain name service system required to be “configured and arranged to be connected to a communication network, store a plurality of domain names and corresponding network addresses, receive a query for a network address, and indicate in response to the query whether the domain name service system supports establishing a secure communication link.”

Claim 39 recites “a machine-readable medium comprising instructions executable in a domain name service system, the instructions comprising code for: connecting the domain name service system to a communication network; storing a plurality of domain names and corresponding network addresses; receiving a query for a network address; and indicating in response to the query whether the domain name service system supports establishing a secure communication link.” This clearly provides limitations acceptable under 35 U.S.C. §112.

Finally, claim 63 recites “a method of providing a domain name service for establishing a secure communication link, the method comprising: connecting a domain name service system to a communication network; storing a plurality of domain names and corresponding network addresses; and upon receiving a query for a network address for communication, indicating whether the domain name service system supports establishing a secure communication link.” Claim 63 recites method steps that clearly recite method limitations within the requirements of

35 U.S.C. §112.

Finally, original claim 2 was also rejected under 35 U.S.C. §112, first paragraph, is not supported by an “undue breadth ... asserted utility or a well established utility.” Applicants disagree. New claim 4 recites that the system provides “a domain name service for establishing a secure communication link.” New claim 39 recites a “machine-readable medium comprising instructions executable in a domain name service system, the instructions comprising code for connecting the domain name service system to a communication network; storing a plurality of domain names and corresponding network addresses; receiving a query for a network address; and indicating in response to the query whether the domain name service system supports establishing a secure communication link.”

Claims 1-3 have been rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,418,504 (from which the current applications claims priority). Applicants agree to submit a terminal disclaimer should the Examiner maintain this rejection against new claims 4-63.

Finally claims 1-3 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Shrader (US Patent No 5,864,666). The latter patent describes a system for administering tunneling on a firewall computer between a secure computer network and a nonsecure computer network (col. 1, lines 40 and 41). The system includes a user interface. The user interface is presented having a first pane in which a tunnel definition can be entered. A query is run on an entered tunnel definition to determine whether any existing tunnel definitions match the entered tunnel definition. The results of the query are then displayed on a scatter bar in another pane in the user interface. Locations of matching tunnel definitions are then indicated by lines through the scatter bar. A small bar is displayed proximate to the scatter bar. The small bar indicates the position of the displayed list of tunnel definitions relative to a complete list of tunnel definitions represented by the scatter bar. At this point, an action may be performed on a selected definition. (col 1., lines 53-65).

The patent reference also describes the use of an Internet firewall product that allows administrators to create a physical firewall between a secure network and an unsecured network. The firewall product is described as providing a number of functions including “specialized

domain name services.” (col. 2, lines 11-18). However “IP tunneling is a feature provided by internet firewalls which is the primary subject of the present invention.”

The “IP Tunnel Query Page” is shown in detail in Figs. 6 and 7, and is described in detail in col. 7, line 34-col. 10, line 46. Clearly the page is used by a human administrator to determine tunnel definitions.

The reference thus describes a system to allow a human network administrator to administer tunneling on a firewall computer between a secure computer network and a nonsecure computer network. The system includes an interface that provides graphical depictions of tunnels between addresses in the networks as lines connecting icons representing network addresses. The system allows the user to display a selected tunnel definition in response to the user input. The only apparent query that the system responds to is a “query on an entered tunnel definition to determine whether any existing tunnel definitions match the entered tunnel definition.” Clearly the system of Shrader does not provide a domain name service system “configured and arranged to be connected to a communication network, store a plurality of domain names and corresponding network addresses, receive a query for a network address, and indicate in response to the query whether the domain name service system supports establishing a secure communication link”, as recited in applicants’ claim 4, nor a “machine-readable medium comprising instructions executable in a domain name service system, the instructions comprising code for: connecting the domain name service system to a communication network; storing a plurality of domain names and corresponding network addresses; receiving a query for a network address; and indicating in response to the query whether the domain name service system supports establishing a secure communication link,” as recited in applicants claim 39, nor a “method of providing a domain name service for establishing a secure communication link, the method comprising: connecting a domain name service system to a communication network, ; storing a plurality of domain names and corresponding network addresses; and upon receiving a query for a network address for communication, indicating whether the domain name service system supports establishing a secure communication link,” as recited in applicants’ claim 63.

In summary therefore, the remaining claims 4-63, the remaining claims in the application, are believed to be in condition for allowance. An early and favorable action thereon is therefore

Application No.: 11/840,560  
Revised Amendment A of August 6, 2010

earnestly solicited.

The Examiner is invited to call the undersigned agent if there are any questions.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 50-1133 and please credit any excess fees to such deposit account.

Respectfully submitted,

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## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	8170141
<b>Application Number:</b>	11840560
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	1537
<b>Title of Invention:</b>	AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
<b>First Named Inventor/Applicant Name:</b>	Victor Larson
<b>Customer Number:</b>	23630
<b>Filer:</b>	Toby H. Kusmer.
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	077580-0063 (VRNK-1CP3CN2)
<b>Receipt Date:</b>	06-AUG-2010
<b>Filing Date:</b>	17-AUG-2007
<b>Time Stamp:</b>	14:02:12
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Revised_Amend_A.pdf	63480 <small>3cc214c315164e9f489f5d9391330507a63f86dd</small>	yes	15

<b>Multipart Description/PDF files in .zip description</b>		
<b>Document Description</b>	<b>Start</b>	<b>End</b>
Amendment/Req. Reconsideration-After Non-Final Reject	1	2
Claims	3	9
Applicant Arguments/Remarks Made in an Amendment	10	15

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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.



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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875					Application or Docket Number <b>11/840,560</b>		Filing Date <b>08/17/2007</b>		<input type="checkbox"/> To be Mailed									
<b>APPLICATION AS FILED – PART I</b>																		
(Column 1)			(Column 2)			SMALL ENTITY <input type="checkbox"/>		OR			OTHER THAN SMALL ENTITY							
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								
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<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 \$ =				OR		X \$ =						
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =		*		X \$ =				OR		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>												TOTAL		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.																		
<b>APPLICATION AS AMENDED – PART II</b>																		
(Column 1)			(Column 2)			(Column 3)			SMALL ENTITY		OR			OTHER THAN SMALL ENTITY				
AMENDMENT	<b>08/06/2010</b>		CLAIMS REMAINING AFTER AMENDMENT				HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)		RATE (\$)		ADDITIONAL FEE (\$)	
	Total <small>(37 CFR 1.16(o))</small>		* 60		Minus		** 60		= 0		X \$ =				OR		X \$2= 0	
	Independent <small>(37 CFR 1.16(h))</small>		* 3		Minus		***3		= 0		X \$ =				OR		X \$220= 0	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>																	
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>																	
TOTAL ADD'L FEE												OR		TOTAL ADD'L FEE		0		
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT				HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)		RATE (\$)		ADDITIONAL FEE (\$)	
	Total <small>(37 CFR 1.16(o))</small>		*		Minus		**		=		X \$ =				OR		X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>		*		Minus		***		=		X \$ =				OR		X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>																	
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>																	
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".																		
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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.**

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077580-0057 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	11/840,560
		Filing Date	08-17-2007
		First Named Inventor	Victor Larson
		Art Unit	2453
		Examiner Name	Krisna Lim
		Docket Number	077580-0063

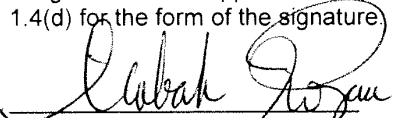
**CERTIFICATION STATEMENT**

Please See 37 CFR 1.97 and 1.98 to make the appropriate selection(s)

- Information Disclosure Statement is being filed before the receipt of a first office action.
- Items contained in this Information Disclosure Statement were first cited in any communication from a foreign patent office in a counterpart foreign application.
- No item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned, after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of this 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.
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**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.

  
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Date: August 3, 2010

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	11/840,560	
				Filing Date	08-17-2007	
				First Named Inventor	Victor Larson	
				Art Unit	2453	
				Examiner Name	Krisna Lim	
			Docket Number	077580-0063		
<b>U.S. PATENTS</b>						
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	
	A1037	5,870,610	02/1999	Beyda et al.		
<b>FOREIGN PATENT DOCUMENTS</b>						
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
	B1003	EP0838930	4/29/1988	Digital Equipment Corporation		
	B1004	EP0814589	12/29/1997	AT&T Corp.		
	B1005	GB2317792	04/01/1998	Secure Computing Corporation		
	B1006	WO98/27783	06/25/1998	Northern Telecom Limited		
	B1007	WO99/11019	03/04/1999	V One Corp		
	B1008	GB2334181	08/11/1999	NEC Technologies		
	B1009	GB2340702	02/23/2000	Sun Microsystems Inc.		
<b>OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>						
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.				
	C1244	Baumgartner et al, "Differentiated Services: A New Approach for Quality of Service in the Internet," International Conference on High Performance Networking, 255-273 (1998)				
	C1245	Chapman et al., "Domain Name System (DNS)," 278-296 (1995)				
	C1246	Davila et al., "Implementation of Virtual Private Networks at the Transport Layer," M. Mambo, Y. Zheng (Eds), Information Security (Second International) Workshop, ISW' 99. Lecture Notes in Computer Science (LNCS), Vol. 1729; 85-102 (1999)				
	C1247	De Raadt et al., "Cryptography in OpenBSD," 10 pages (1999)				
	C1248	Eastlake, "Domain Name System Security Extensions," Internet Citation, Retrieved from the Internet: URL:ftp://ftp.inet.no/pub/ietf/internet-drafts/draft-ietf-dnssec-secext2-05.txt (1998)				

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(Use as many sheets as necessary)</i>		Application Number	11/840,560
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		First Named Inventor	Victor Larson
		Art Unit	2453
		Examiner Name	Krisna Lim
		Docket Number	077580-0063

	C1249	Gunter et al., "An Architecture for Managing QoS-Enabled VRNs Over the Internet," Proceedings 24th Conference on Local Computer Networks. LCN' 99 IEEE Comput. Soc Los Alamitos, CA, pages 122-131 (1999)	
	C1250	Shimizu, "Special Feature: Mastering the Internet with Windows 2000", Internet Magazine, 63:296-307 (2000)	
	C1251	Stallings, "Cryptography and Network Security," Principals and Practice, 2nd Edition, pages 399-440 (1999)	
	C1252	Takata, "U.S. Vendors Take Serious Action to Act Against Crackers – A Tracking Tool and a Highly Safe DNS Software are Released", Nikkei Communications, 257:87(1997)	
	C1253	Wells, Email (Lancasterb1be@mail.msn.com), Subject: "Security Icon," (1998)	



(12) **EUROPEAN PATENT APPLICATION**

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(54) **Pseudo network adapter for frame capture, encapsulation and encryption**

(57) A new pseudo network adapter provides an interface for capturing packets from a local communications protocol stack for transmission on the virtual private network, and includes a Dynamic Host Configuration Protocol (DHCP) server emulator, and an Address Resolution Protocol (ARP) server emulator. The new system indicates to the local communications protocol stack that nodes on a remote private network are reachable through a gateway that is in turn reachable through the pseudo network adapter. A transmit path in the system processes data packets from the local communications protocol stack for transmission through the pseudo network adapter. An encryption engine encrypts the data packets and an encapsulation engine encapsulates the encrypted data packets into tunnel data frames. The network adapter further includes an interface into a transport layer of the local communications protocol stack for capturing received data packets from the remote server node, and a receive path for processing received data packets captured from the transport layer of the local communications protocol stack. The receive path includes a decapsulation engine, and a decryption engine, and passes the decrypted, decapsulated data packets back to the local communications protocol stack for delivery to a user.

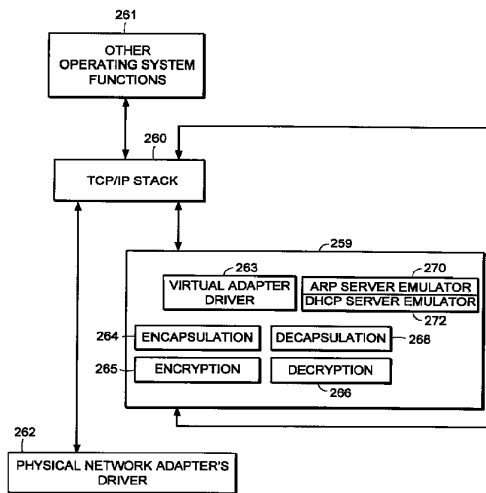


FIG. 15

EP 0 838 930 A2

**Description****FIELD OF THE INVENTION**

The invention relates generally to establishing secure virtual private networks. The invention relates specifically to a pseudo network adapter for capturing, encapsulating and encrypting messages or frames.

**BACKGROUND**

In data communications it is often required that secure communications be provided between users of network stations (also referred to as "network nodes") at different physical locations. Secure communications must potentially extend over public networks as well as through secure private networks. Secure private networks are protected by "firewalls", which separate the private network from a public network. Firewalls ordinarily provide some combination of packet filtering, circuit gateway, and application gateway technology, insulating the private network from unwanted communications with the public network.

One approach to providing secure communications is to form a virtual private network. In a virtual private network, secure communications are provided by encapsulating and encrypting messages. Encapsulated messaging in general is referred to as "tunneling". Tunnels using encryption may provide protected communications between users separated by a public network, or among a subset of users of a private network.

Encryption may for example be performed using an encryption algorithm using one or more encryption "keys". When an encryption key is used, the value of the key determines how the data is encrypted and decrypted. When a public-key encryption system is used, a key pair is associated with each communicating entity. The key pair consists of an encryption key and a decryption key. The two keys are formed such that it is unfeasible to generate one key from the other. Each entity makes its encryption key public, while keeping its decryption key secret. When sending a message to node A, for example, the transmitting entity uses the public key of node A to encrypt the message, and then the message can only be decrypted by node A using node A's private key.

In a symmetric key encryption system a single key is used as the basis for both encryption and decryption. An encryption key in a symmetric key encryption system is sometimes referred to as a "shared" key. For example, a pair of communicating nodes A and B could communicate securely as follows: a first shared key is used to encrypt data sent from node A to node B, while a second shared key is to be used to encrypt data sent from node B to node A. In such a system, the two shared keys must be known by both node A and node B. More examples of encryption algorithms and keyed encryption are disclosed in many textbooks, for example

"Applied Cryptography - Protocols, Algorithms, and Source Code in C", by Bruce Schneier, published by John Wiley and Sons, New York, New York, copyright 1994.

Information regarding what encryption key or keys are to be used, and how they are to be used to encrypt data for a given secure communications session is referred to as "key exchange material". Key exchange material may for example determine what keys are used and a time duration for which each key is valid. Key exchange material for a pair of communicating stations must be known by both stations before encrypted data can be exchanged in a secure communications session. How key exchange material is made known to the communicating stations for a given secure communications session is referred to as "session key establishment".

A tunnel may be implemented using a virtual or "pseudo" network adapter that appears to the communications protocol stack as a physical device and which provides a virtual private network. A pseudo network adapter must have the capability to receive packets from the communications protocol stack, and to pass received packets back through the protocol stack either to a user or to be transmitted.

A tunnel endpoint is the point at which any encryption/decryption and encapsulation/decapsulation provided by a tunnel is performed. In existing systems, the tunnel end points are pre-determined network layer addresses. The source network layer address in a received message is used to determine the "credentials" of an entity requesting establishment of a tunnel connection. For example, a tunnel server uses the source network layer address to determine whether a requested tunnel connection is authorized. The source network layer address is also used to determine which cryptographic key or keys to use to decrypt received messages.

Existing tunneling technology is typically performed by encapsulating encrypted network layer packets (also referred to as "frames") at the network layer. Such systems provide "network layer within network layer" encapsulation of encrypted messages. Tunnels in existing systems are typically between firewall nodes which have statically allocated IP addresses. In such existing systems, the statically allocated IP address of the firewall is the address of a tunnel end point within the firewall. Existing systems fail to provide a tunnel which can perform authorization based for an entity which must dynamically allocate its network layer address. This is especially problematic for a user wishing to establish a tunnel in a mobile computing environment, and who requests a dynamically allocated IP address from an Internet Service Provider (ISP).

Because existing virtual private networks are based on network layer within network layer encapsulation, they are generally only capable of providing connectionless datagram type services. Because datagram type services do not guarantee delivery of packets, existing

tunnels can only easily employ encryption methods over the data contained within each transmitted packet. Encryption based on the contents of multiple packets is desirable, such as cipher block chaining or stream ciphering over multiple packets. For example, encrypted data would advantageously be formed based not only on the contents of the present packet data being encrypted, but also based on some attribute of the connection or session history between the communicating stations. Examples of encryption algorithms and keyed encryption are disclosed in many textbooks, for example "Applied Cryptography - Protocols, Algorithms, and Source Code in C", by Bruce Schneier, published by John Wiley and Sons, New York, New York, copyright 1994.

Thus there is required a new pseudo network adapter providing a virtual private network having a dynamically determined end point to support a user in a mobile computing environment. The new pseudo network adapter should appear to the communications protocol stack of the node as an interface to an actual physical device. The new pseudo network adapter should support guaranteed, in-order delivery of frames over a tunnel to conveniently support cipher block chaining mode or stream cipher encryption over multiple packets.

#### **SUMMARY OF THE INVENTION**

A new pseudo network adapter is disclosed providing a virtual private network. The new system includes an interface for capturing packets from a local communications protocol stack for transmission on the virtual private network. The interface appears to the local communications stack as a network adapter device driver for a network adapter.

The invention, in its broad form, includes a pseudo network adapter as recited in claim 1, providing a virtual network and a method therefor as recited in claim 9.

The system as described hereinafter further includes a Dynamic Host Configuration Protocol (DHCP) server emulator, and an Address Resolution Protocol (ARP) server emulator. The new system indicates to the local communications protocol stack that nodes on a remote private network are reachable through a gateway that is in turn reachable through the pseudo network adapter. The new pseudo network adapter includes a transmit path for processing data packets from the local communications protocol stack for transmission through the pseudo network adapter. The transmit path includes an encryption engine for encrypting the data packets and an encapsulation engine for encapsulating the encrypted data packets into tunnel data frames. The pseudo network adapter passes the tunnel data frames back to the local communications protocol stack for transmission to a physical network adapter on a remote server node.

Preferably, as described hereinafter, the pseudo

network adapter includes a digest value in a digest field in each of the tunnel data frames. A keyed hash function is a hash function which takes data and a shared cryptographic key as inputs, and outputs a digital signature referred to as a digest. The value of the digest field is equal to an output of a keyed hash function applied to data consisting of the data packet encapsulated within the tunnel data frame concatenated with a counter value equal to a total number of tunnel data frames previously transmitted to the remote server node. In another aspect of the system, the pseudo network adapter processes an Ethernet header in each one of the captured data packets, including removing the Ethernet header.

The new pseudo network adapter further includes an interface into a transport layer of the local communications protocol stack for capturing received data packets from the remote server node, and a receive path for processing received data packets captured from the transport layer of the local communications protocol stack. The receive path includes a decapsulation engine, and a decryption engine, and passes the decrypted, decapsulated data packets back to the local communications protocol stack for delivery to a user.

Thus there is disclosed a new pseudo network adapter providing a virtual private network having dynamically determined end points to support users in a mobile computing environment. The new pseudo network adapter provides a system for capturing a fully formed frame prior to transmission. The new pseudo network adapter appears to the communications protocol stack of the station as an interface to an actual physical device. The new pseudo network adapter further includes encryption capabilities to conveniently provide secure communications between tunnel end points using stream mode encryption or cipher block chaining over multiple packets.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

A more detailed understanding of the invention may be had from the following description of a preferred embodiment, given by way of example and to be understood in conjunction with the accompanying drawing in which:

- ◆ Fig. 1 is a block diagram showing the Open Systems Interconnection (OSI) reference model;
- ◆ Fig. 2 is a block diagram showing the TCP/IP internet protocol suite;
- ◆ Fig. 3 is a block diagram showing an exemplary embodiment of a tunnel connection across a public network between two tunnel servers;
- ◆ Fig. 4 is a flow chart showing an exemplary embodiment of steps performed to establish a tunnel con-

- nection;
- ◆ Fig. 5 is a flow chart showing an exemplary embodiment of steps performed to perform session key management for a tunnel connection; 5
  - ◆ Fig. 6 is a block diagram showing an exemplary embodiment of a relay frame;
  - ◆ Fig. 7 is a block diagram showing an exemplary embodiment of a connection request frame; 10
  - ◆ Fig. 8 is a block diagram showing an exemplary embodiment of a connection response frame; 15
  - ◆ Fig. 9 is a block diagram showing an exemplary embodiment of a data frame;
  - ◆ Fig. 10 is a block diagram showing an exemplary embodiment of a close connection frame; 20
  - ◆ Fig. 11 is a state diagram showing an exemplary embodiment of a state machine forming a tunnel connection in a network node initiating a tunnel connection; 25
  - ◆ Fig. 12 is a state diagram showing an exemplary embodiment of a state machine forming a tunnel connection in a server computer; 30
  - ◆ Fig. 13 is a state diagram showing an exemplary embodiment of a state machine forming a tunnel connection in a relay node;
  - ◆ Fig. 14 is a block diagram showing an exemplary embodiment of a tunnel connection between a client computer (tunnel client) and a server computer (tunnel server); 35
  - ◆ Fig. 15 is a block diagram showing an exemplary embodiment of a pseudo network adapter; 40
  - ◆ Fig. 16 is a block diagram showing an exemplary embodiment of a pseudo network adapter;
  - ◆ Fig. 17 is a flow chart showing steps performed by an exemplary embodiment of a pseudo network adapter during packet transmission; 45
  - ◆ Fig. 18 is a flow chart showing steps performed by an exemplary embodiment of a pseudo network adapter during packet receipt; 50
  - ◆ Fig. 19 is a data flow diagram showing data flow in an exemplary embodiment of a pseudo network adapter during packet transmission; 55
  - ◆ Fig. 20 is a data flow diagram showing data flow in

an exemplary embodiment of a pseudo network adapter during packet receipt;

- ◆ Fig. 21 is a diagram showing the movement of encrypted and unencrypted data in an exemplary embodiment of a system including a pseudo network adapter;
- ◆ Fig. 22 is a diagram showing the movement of encrypted and unencrypted data in an exemplary embodiment of a system including a pseudo network adapter; and
- ◆ Fig. 23 is a flow chart showing steps initialization of an exemplary embodiment of a system including a pseudo network adapter.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Now with reference to Fig. 1 there is described for purposes of explanation, communications based on the Open Systems Interconnection (OSI) reference model. In Fig. 1 there is shown communications 12 between a first protocol stack 10 and a second protocol stack 14. The first protocol stack 10 and second protocol stack 14 are implementations of the seven protocol layers (Application layer, Presentation layer, Session layer, Transport layer, Network layer, Data link layer, and Physical layer) of the OSI reference model. A protocol stack implementation is typically in some combination of software and hardware. Descriptions of the specific services provided by each protocol layer in the OSI reference model are found in many text books, for example "Computer Networks", Second Edition, by Andrew S. Tannenbaum, published by Prentice-Hall, Englewood Cliffs, New Jersey, copyright 1988.

As shown in Fig. 1, data 11 to be transmitted from a sending process 13 to a receiving process 15 is passed down through the protocol stack 10 of the sending process to the physical layer 9 for transmission on the data path 7 to the receiving process 15. As the data 11 is passed down through the protocol stack 10, each protocol layer prepends a header (and possibly also appends a trailer) portion to convey information used by that protocol layer. For example, the data link layer 16 of the sending process wraps the information received from the network layer 17 in a data link header 18 and a data link layer trailer 20 before the message is passed to the physical layer 9 for transmission on the actual transmission path 7.

Fig. 2 shows the TCP/IP protocol stack. Some protocol layers in the TCP/IP protocol stack correspond with layers in the OSI protocol stack shown in Fig. 1. The detailed services and header formats of each layer in the TCP/IP protocol stack are described in many texts, for example "Internetworking with TCP/IP, Vol. 1: Principles, Protocols, and Architecture", Second Edi-



tion, by Douglas E. Comer, published by Prentice-Hall, Englewood Cliffs, New Jersey, copyright 1991. The Transport Control Protocol (TCP) 22 corresponds to the Transport layer in the OSI reference model. The TCP protocol 22 provides a connection-oriented, end to end transport service with guaranteed, in-sequence packet delivery. In this way the TCP protocol 22 provides a reliable, transport layer connection.

The IP protocol 26 corresponds to the Network layer of the OSI reference model. The IP protocol 26 provides no guarantee of packet delivery to the upper layers. The hardware link level and access protocols 32 correspond to the Data link and Physical layers of the OSI reference model.

The Address Resolution Protocol (ARP) 28 is used to map IP layer addresses (referred to as "IP addresses") to addresses used by the hardware link level and access protocols 32 (referred to as "physical addresses" or "MAC addresses"). The ARP protocol layer in each network station typically contains a table of mappings between IP addresses and physical addresses (referred to as the "ARP cache"). When a mapping between an IP address and the corresponding physical address is not known, the ARP protocol 28 issues a broadcast packet (an "ARP request" packet) on the local network. The ARP request indicates an IP address for which a physical address is being requested. The ARP protocols 28 in each station connected to the local network examine the ARP request, and if a station recognizes the IP address indicated by the ARP request, it issues a response (an "ARP response" or "ARP reply" packet) to the requesting station indicating the responder's physical address. The requesting ARP protocol reports the received physical address to the local IP layer which then uses it to send datagrams directly to the responding station. As an alternative to having each station respond only for its own IP address, an ARP server may be used to respond for a set of IP addresses it stores internally, thus potentially eliminating the requirement of a broadcast request. In that case, the ARP request can be sent directly to the ARP server for physical addresses corresponding to any IP address mappings stored within the ARP server.

At system start up, each station on a network must determine an IP address for each of its network interfaces before it can communicate using TCP/IP. For example, a station may need to contact a server to dynamically obtain an IP address for one or more of its network interfaces. The station may use what is referred to as the Dynamic Host Configuration Protocol (DHCP) to issue a request for an IP address to a DHCP server. For example, a DHCP module broadcasts a DHCP request packet at system start up requesting allocation of an IP address for an indicated network interface. Upon receiving the DHCP request packet, the DHCP server allocates an IP address to the requesting station for use with the indicated network interface. The

requesting station then stores the IP address in the response from the server as the IP address to associate with that network interface when communicating using TCP/IP.

Fig. 3 shows an example configuration of network nodes for which the presently disclosed system is applicable. In the example of Fig. 3, the tunnel server A is an initiator of the tunnel connection. As shown in Fig. 3, the term "tunnel relay" node is used to refer to a station which forwards data packets between transport layer connections (for example TCP connections).

For example, in the present system a tunnel relay may be dynamically configured to forward packets between transport layer connection 1 and transport layer connection 2. The tunnel relay replaces the header information of packets received over transport layer connection 1 with header information indicating transport layer connection 2. The tunnel relay can then forward the packet to a firewall, which may be conveniently programmed to pass packets received over transport layer connection 2 into a private network on the other side of the firewall. In the present system, the tunnel relay dynamically forms transport layer connections when a tunnel connection is established. Accordingly the tunnel relay is capable of performing dynamic load balancing or providing redundant service for fault tolerance over one or more tunnel servers at the time the tunnel connection is established.

Fig. 3 shows a Tunnel Server A 46 in a private network N1 48, physically connected with a first Firewall 50. The first Firewall 50 separates the private network N1 48 from a public network 52, for example the Internet. The first Firewall 50 is for example physically connected with a Tunnel Relay B 54, which in turn is virtually connected through the public network 52 with a Tunnel Relay C. The connection between Tunnel Relay B and Tunnel Relay C may for example span multiple intervening forwarding nodes such as routers or gateways through the public network 52.

The Tunnel Relay C is physically connected with a second Firewall 58, which separates the public network 52 from a private network N2 60. The second Firewall 58 is physically connected with a Tunnel Server D 62 on the private network N2 60. During operation of the elements shown in Fig. 3, the Tunnel Server D 62 provides routing of IP packets between the tunnel connection with Tunnel Server A 46 and other stations on the private network N2 60. In this way the Tunnel Server D 62 acts as a router between the tunnel connection and the private network N2 60.

During operation of the elements shown in Fig. 3, the present system establishes a tunnel connection between the private network N1 48 and the private network N2 60. The embodiment of Fig. 3 thus eliminates the need for a dedicated physical cable or line to provide secure communications between the private network 48 and the private network 60. The tunnel connection between Tunnel Server A 46 and Tunnel Server D 62 is

composed of reliable, pair-wise transport layer connections between Tunnel Server A 46 (node "A"), Tunnel Relay B 54 (node "B"), Tunnel Relay C 56 (node "C"), and Tunnel Server D 62 (node "D"). For example, such pair-wise connections may be individual transport layer connections between each node A and node B, node B and node C, and node C and node D. In an alternative embodiment, as will be described below, a tunnel connection may alternatively be formed between a stand-alone PC in a public network and a tunnel server within a private network.

Fig. 4 and Fig. 5 show an example embodiment of steps performed during establishment of the tunnel connection between Tunnel Server A 46 (node "A") and Tunnel Server D 62 (node "D") as shown in Fig. 3. Prior to the steps shown in Fig. 4, node A selects a tunnel path to reach node D. The tunnel path includes the tunnel end points and any intervening tunnel relays. The tunnel path is for example predetermined by a system administrator for node A. Each tunnel relay along the tunnel path is capable of finding a next node in the tunnel path, for example based on a provided next node name (or "next node arc"), using a predetermined naming convention and service, for example the Domain Name System (DNS) of the TCP/IP protocol suite.

During the steps shown in Fig. 4, each of the nodes A, B and C perform the following steps:

- resolve the node name of the next node in the tunnel path, for example as found in a tunnel relay frame;
- establish a reliable transport layer (TCP) connection to the next node in the tunnel path;
- forward the tunnel relay frame down the newly formed reliable transport layer connection to the next node in the tunnel path.

As shown for example in Fig. 4, at step 70 node A establishes a reliable transport layer connection with node B. At step 72 node A identifies the next downstream node to node B by sending node B a tunnel relay frame over the reliable transport layer connection between node A and node B. The tunnel relay frame contains a string buffer describing all the nodes along the tunnel path (see below description of an example tunnel relay frame format). At step 74, responsive to the tunnel relay frame from node A, node B searches the string buffer in the relay frame to determine if the string buffer includes node B's node name. If node B finds its node name in the string buffer, it looks at the next node name in the string buffer to find the node name of the next node in the tunnel path.

Node B establishes a reliable transport layer connection with the next node in the tunnel path, for example node C. Node B further forms an association between the reliable transport layer connection between

Node A and Node B, over which the relay frame was received, and the newly formed reliable transport layer connection between Node B and Node C, and as a result forwards subsequent packets received over the reliable transport layer connection with Node A onto the reliable transport layer connection with Node C, and vice versa. At step 76 node B forwards the tunnel relay frame on the newly formed reliable transport layer connection to node C.

At step 78, responsive to the relay frame forwarded from node B, node C determines that the next node in the tunnel path is the last node in the tunnel path, and accordingly is a tunnel server. Node C may actively determine whether alternative tunnel servers are available to form the tunnel connection. Node C may select one of the alternative available tunnel servers to form the tunnel connection in order to provide load balancing or fault tolerance. As a result node C may form a transport layer connections with one of several available tunnel servers, for example a tunnel server that is relatively underutilized at the time the tunnel connection is established. In the example embodiment, node C establishes a reliable transport layer connection with the next node along the tunnel path, in this case node D.

Node C further forms an association between the reliable transport layer connection between Node B and Node C, over which the relay frame was received, and the newly formed reliable transport layer connection between Node C and Node D, and as a result forwards subsequent packets received over the reliable transport layer connection with Node B to the reliable transport layer connection with Node D, and vice versa. At step 80 node C forwards the relay frame to node D on the newly formed reliable transport layer connection.

Fig. 5 shows an example of tunnel end point authentication and sharing of key exchange material provided by the present system. The present system supports passing authentication data and key exchange material through the reliable transport layer connections previously established on the tunnel path. The following are provided by use of a key exchange/authentication REQUEST frame and a key exchange/authentication RESPONSE frame:

- a) mutual authentication of both endpoints of the tunnel connection;
- b) establishment of shared session encryption keys and key lifetimes for encrypting/authenticating subsequent data sent through the tunnel connection;
- d) agreement on a shared set of cryptographic transforms to be applied to subsequent data; and
- e) exchange of any other connection-specific data between the tunnel endpoints, for example strength and type of cipher to be used, any compression of the data to be used, etc. This data can also be used

by clients of this protocol to qualify the nature of the authenticated connection.

At step 90 a key exchange/authentication request frame is forwarded over the reliable transport layer connections formed along the tunnel path from node A to node D. At step 92, a key exchange/authentication response frame is forwarded from node D back to node A through the reliable transport layer connections. The attributes exchanged using the steps shown in Fig. 5 may be used for the lifetime of the tunnel connection. In an alternative embodiment the steps shown in Fig. 5 are repeated as needed for the tunnel end points to exchange sufficient key exchange material to agree upon a set of session parameters for use during the tunnel connection such as cryptographic keys, key durations, and choice of encryption/decryption algorithms.

Further in the disclosed system, the names used for authentication and access control with regard to node A and node D need not be the network layer address or physical address of the nodes. For example, in an alternative embodiment where the initiating node sending the tunnel relay frame is a stand-alone PC located within a public network, the user's name may be used for authentication and/or access control purposes. This provides a significant improvement over existing systems which base authorization on predetermined IP addresses.

Fig. 6 shows the format of an example embodiment of a tunnel relay frame. The tunnel frame formats shown in Figs. 6, 7, 8 and 9 are encapsulated within the data portion of a transport layer (TCP) frame when transmitted. Alternatively, another equivalent, connection-oriented transport layer protocol having guaranteed, in-sequence frame delivery may be used. The example TCP frame format, including TCP header fields, is conventional and not shown.

The field 100 contains a length of the frame. The field 102 contains a type of the frame, for example a type of RELAY. The field 104 contains a tunnel protocol version number. The field 106 contains an index into a string buffer field 112 at which a name of the originating node is located, for example a DNS host name of the node initially issuing the relay frame (node A in Fig. 3). The fields following the origin index field 106 contain indexes into the string buffer 112 at which names of nodes along the tunnel path are located. For example each index may be the offset of a DNS host name within the string buffer 112. In this way the field 108 contains the index of the name of the first node in the tunnel path, for example node B (Fig. 3). The field 110 contains the index of the name of the second node in the tunnel path, etc. The field 112 contains a string of node names of nodes in the tunnel path.

During operation of the present system, the initiating node, for example node A as shown in Fig. 3, transmits a tunnel relay frame such as the tunnel relay frame shown in Fig. 6. Node A sends the tunnel relay frame to

the first station along the tunnel path, for example node B (Fig. 3), over a previously established reliable transport layer connection. Node B searches the string buffer in the tunnel relay frame to find its node name, for example its DNS host name. Node B finds its node name in the string buffer indexed by path index 0, and then uses the contents of path index 1 110 to determine the location within the string buffer 112 of the node name of the next node along the tunnel path. Node B uses this node name to establish a reliable transport layer connection with the next node along the tunnel path. Node B then forwards the relay frame to the next node. This process continues until the end node of the tunnel route, for example tunnel server D 62 (Fig. 3) is reached.

Fig. 7 shows the format of an example embodiment of a key exchange/key authentication request frame. The field 120 contains a length of the frame. The field 122 contains a type of the frame, for example a type of REQUEST indicating a key exchange/key authentication request frame. The field 124 contains a tunnel protocol version number. The field 126 contains an offset of the name of the entity initiating the tunnel connection, for example the name of a user on the node originally issuing the request frame. This name and key exchange material in the request frame are used by the receiving tunnel end point to authenticate the key exchange/authentication REQUEST. The name of the entity initiating the tunnel connection is also used to authorize any subsequent tunnel connection, based on predetermined security policies of the system. The field 128 contains an offset into the frame of the node name of the destination node, for example the end node of the tunnel shown as node D 62 in Fig. 3.

The field 130 contains an offset into the frame at which key exchange data as is stored, for example within the string buffer field 138. The key exchange data for example includes key exchange material used to determine a shared set of encryption parameters for the life of the tunnel connection such as cryptographic keys and any validity times associated with those keys. The key exchange data, as well as the field 132, further include information regarding any shared set of cryptographic transforms to be used and any other connection-specific parameters, such as strength and type of cipher to be used, type of compression of the data to be used, etc. The field 134 contains flags, for example indicating further information about the frame. The field 136 contains client data used in the tunnel end points to configure the local routing tables so that packets for nodes reachable through the virtual private network are sent through the pseudo network adapters. In an example embodiment, the string buffer 138 is encrypted using a public encryption key of the receiving tunnel end point.

During operation of the present system, one of the end nodes of the tunnel sends a key exchange/authentication REQUEST frame as shown in Fig. 7 to the other end node of the tunnel in order to perform key exchange and authentication as described in step 90 of Fig. 5.

Fig. 8 shows the format of an example embodiment of a key exchange/key authentication response frame, referred to as a connection RESPONSE frame. The field 150 contains a length of the frame. The field 152 contains a type of the frame, for example a type of connection RESPONSE indicating a key exchange/key authentication request frame. The field 154 contains a tunnel protocol version number.

The field 156 contains an offset into the frame at which key exchange data as is stored, for example within the string buffer field 163. The key exchange data for example includes key exchange material to be used for encryption/decryption over the life of the tunnel connection and any validity times associated with that key exchange material. The key exchange data, as well as the field 158, further includes information regarding any shared set of cryptographic transforms to be applied to subsequent data and any other connection-specific parameters, such as strength and type of cipher to be used, any compression of the data to be used, etc. The field 160 contains flags, for example indicating other information about the frame. The client data field 162 contains data used by the pseudo network adapters in the tunnel end points to configure the local routing tables so that packets for nodes in the virtual private network are sent through the pseudo network adapters. The string buffer includes key exchange material. The string buffer is for example encrypted using a public encryption key of the receiving tunnel end point, in this case the initiator of the tunnel connection.

During operation of the present system, one of the end nodes of the tunnel sends a key exchange/authentication RESPONSE frame as shown in Fig. 7 to the other end node of the tunnel in order to perform key exchange and authentication as described in step 92 of Fig. 5.

Fig. 9 shows the format of an example embodiment of an tunnel data frame used to communicate through a tunnel connection. Fig. 9 shows how an IP datagram may be encapsulated within a tunnel frame by the present system for secure communications through a virtual private network. The field 170 contains a length of the frame. The field 172 contains a type of the frame, for example a type of DATA indicating a tunnel data frame. The field 174 contains a tunnel protocol version number.

The fields 176, 178 and 182 contain information regarding the encapsulated datagram. The field 180 contains flags indicating information regarding the frame. The field 184 contains a value indicating the length of the optional padding 189 at the end of the frame. The frame format allows for optional padding in the event that the amount of data in the frame needs to be padded to an even block boundary for the purpose of being encrypted using a block cipher. The field 186 contains a value indicating the length of the digest field 187.

The data frame format includes a digital signature generated by the transmitting tunnel end point referred

to as a "digest". The value of the digest ensures data integrity, for example by detecting invalid frames and replays of previously transmitted valid frames. The digest is the output of a conventional keyed cryptographic hash function applied to both the encapsulated datagram 190 and a monotonically increasing sequence number. The resulting hash output is passed as the value of the digest field 187. The sequence number is not included in the data frame. In the example embodiment, the sequence number is a counter maintained by the transmitter (for example node A in Fig. 3) of all data frames sent to the receiving node (for example node D in Fig. 3) since establishment of the tunnel connection.

In order to determine if the data frame is invalid or a duplicate, the receiving node decrypts the encapsulated datagram 190, and applies the keyed cryptographic hash function (agreed to by the tunnel end nodes during the steps shown in Fig. 5) to both the decrypted encapsulated datagram and the value of a counter indicating the number of data frames received from the transmitter since establishment of the tunnel connection. For example the keyed hash function is applied to the datagram concatenated to the counter value. If the resulting hash output matches the value of the digest field 187, then the encapsulated datagram 190 was received correctly and is not a duplicate. If the hash output does not match the value of the digest field 187, then the integrity check fails, and the tunnel connection is closed. The field 188 contains an encrypted network layer datagram, for example an encrypted IP datagram.

The encapsulated datagram may be encrypted using various encryption techniques. An example embodiment of the present system advantageously encrypts the datagram 190 using either a stream cipher or cipher block chaining encryption over all data transmitted during the life of the tunnel connection. This is enabled by the reliable nature of the transport layer connections within the tunnel connection. The specific type of encryption and any connection specific symmetric encryption keys used is determined using the steps shown in Fig. 5. The fields in the tunnel data frame other than the encapsulated datagram 188 are referred to as the tunnel data frame header fields.

Fig. 10 is a block diagram showing an example embodiment of a "close connection" frame. The field 190 contains the length of the frame. The field 191 contains a frame type, for example having a value equal to CLOSE. Field 192 contains a value equal to the current protocol version number of the tunnel protocol. The field 193 contains a status code indicating the reason the tunnel connection is being closed.

During operation of the present system, when end point of a tunnel connection determines that the tunnel connection should be closed, a close connection frame as shown in Fig. 10 is transmitted to the other end point of the tunnel connection. When a close connection close frame is received, the receiver closes the tunnel

connection and no further data will be transmitted or received through the tunnel connection.

Fig. 11 is a state diagram showing an example embodiment of forming a tunnel connection in a node initiating a tunnel connection. In Fig. 11, Fig. 12, and Fig. 13, states are indicated by ovals and actions or events are indicated by rectangles. For example the tunnel server node A as shown in Fig. 3 may act as a tunnel connection initiator when establishing a tunnel connection with the tunnel server node D. Similarly the client system 247 in Fig. 14 may act as a tunnel connection initiator when establishing a tunnel connection with the tunnel server. The tunnel initiator begins in an idle state 194. Responsive to an input from a user indicating that a tunnel connection should be established, the tunnel initiator transitions from the idle state 194 to a TCP Open state 195. In the TCP Open state 195, the tunnel initiator establishes a reliable transport layer connection with a first node along the tunnel path. For example, the tunnel initiator opens a socket interface associated with a TCP connection to the first node along the tunnel path. In Fig. 3 node A opens a socket interface associated with a TCP connection with node B.

Following establishment of the reliable transport layer connection in the TCP Open state 195, the tunnel initiator enters a Send Relay state 197. In the Send Relay state 197, the tunnel initiator transmits a relay frame at 198 over the reliable transport layer connection. Following transmission of the relay frame, the tunnel initiator enters the connect state 199. If during transmission of the relay frame there is a transmission error, the tunnel initiator enters the Network Error state 215 followed by the Dying state 208. In the Dying state 208, the tunnel initiator disconnects the reliable transport layer connection formed in the TCP Open state 195, for example by disconnecting a TCP connection with Node B. Following the disconnection at 209, the tunnel initiator enters the Dead state 210. The tunnel initiator subsequently transitions back to the Idle state 194 at a point in time predetermined by system security configuration parameters.

In the Connect state 199, the tunnel initiator sends a key exchange/authentication REQUEST frame at 200 to the tunnel server. Following transmission of the key exchange/authentication REQUEST frame 200, the tunnel initiator enters the Response Wait state 201. The tunnel initiator remains in the Response Wait state 201 until it receives a key exchange/authentication RESPONSE frame 202 from the tunnel server. After the key exchange/authentication RESPONSE frame is received at 202, the tunnel initiator enters the Authorized state 203, in which it may send or receive tunnel data frames. Upon receipt of a CLOSE connection frame at 216 in the Authorized state 203, the tunnel initiator transitions to the Dying state 208.

Upon expiration of a session encryption key at 211, the tunnel initiator enters the Reconnect state 212, and sends a CLOSE connection frame at 213 and discon-

nects the TCP connection with the first node along the tunnel path at 214. Subsequently the tunnel initiator enters the TCP Open state 195.

If during the authorized state 203, a local user issues an End Session command at 204, or there is a detection of an authentication or cryptography error in a received data frame at 205, the tunnel initiator enters the Close state 206. During the Close state 206 the tunnel initiator sends a CLOSE connection frame at 207 to the tunnel server. The tunnel initiator then enters the Dying state at 208.

Figure 12 is a state diagram showing the states within an example embodiment of a tunnel server, for example node D in Fig. 3 or tunnel server 253 in Fig. 14. The tunnel server begins in an Accept Wait state 217. In the Accept Wait state 217, the tunnel server receives a request for a reliable transport layer connection, for example a TCP connection request 218 from the last node in the tunnel path prior to the tunnel server, for example Node C in Fig. 3. In response to a TCP connection request 218 the tunnel server accepts the request and establishes a socket interface associated with the resulting TCP connection with Node C.

Upon establishment of the TCP connection with the last node in the tunnel path prior to the tunnel server, the tunnel server enters the Receive Relay state 219. In the Receive Relay state 219, the tunnel server waits to receive a relay frame at 220, at which time the tunnel server enters the Connect Wait state 221. If there is some sort of network error 234 during receipt of the relay frame at 219, the tunnel server enters the Dying state 230. During the Dying state 230 the tunnel server disconnects at 231 the transport layer connection with the last node in the tunnel path prior to the tunnel server. After disconnecting the connection, the tunnel server enters the Dead state 232.

In the Connect Wait state 221, the tunnel server waits for receipt of a key exchange/authentication REQUEST frame at 222. Following receipt of the key exchange/authentication REQUEST frame at 222, the tunnel server determines whether the requested tunnel connection is authorized at step 223. The determination of whether the tunnel connection is authorized is based on a name of the tunnel initiator, and the key exchange material within the key exchange/authentication REQUEST frame.

If the requested tunnel connection is authorized the tunnel server sends a key exchange/authentication RESPONSE frame at 224 back to the tunnel initiator. If the requested tunnel connection is not authorized, the tunnel server enters the Close state 228, in which it sends a close connection frame at 229 to the tunnel client. Following transmission of the CLOSE connection frame at 229, the tunnel server enters the Dying state 230.

If the requested tunnel connection is determined to be authorized at step 223, the tunnel server enters the Authorized state 225. In the Authorized state, the tunnel

server transmits and receives tunnel data frames between itself and the tunnel initiator. If during the Authorized state 225, the tunnel server receives a CLOSE connection frame at 233, the tunnel server transitions to the Dying state 230. If during the authorized state 225, the tunnel server receives an end session command from a user at 226, then the tunnel server transitions to the Close state 228, and transmits a close connection frame at 229 to the tunnel initiator. If the tunnel server in the Authorized state 225 detects an integrity failure in a received packet, the tunnel server transitions to the Close state 228. In the close state 228 the tunnel server sends a CLOSE connection frame at 229 and subsequently enters the Dying state 230.

Fig. 13 is a state diagram showing an example embodiment of a state machine within a tunnel relay node. The tunnel relay node begins in an Accept Wait state 235. When a request is received to form a reliable transport layer connection at 236, a reliable transport layer connection is accepted with the requesting node. For example, a TCP connection is accepted between the relay node and the preceding node in the tunnel path.

The relay node then transitions to the Receive Relay state 237. During the Receive Relay state 237, the relay node receives a relay frame at 238. Following receipt of the relay frame at 238, the relay node determines what forwarding address should be used to forward frames received from the TCP connection established responsive to the TCP connect event 236. If the next node in the tunnel path is a tunnel server, the forwarding address may be selected at 239 so as to choose an underutilized tunnel server from a group of available tunnel servers or to choose an operational server where others are not operational.

Following determination of the forwarding address or addresses in step 239, the relay node enters the Forward Connect state 240. In the Forward Connect state 240, the relay node establishes a reliable transport layer connection with the node or nodes indicated by the forwarding address or addresses determined in step 239.

Following establishment of the new connection at event 241, the tunnel relay enters the Forward state 242. During the Forward state 242, the relay node forwards all frames between the connection established at 236 and those connections established at 241. Upon detection of a network error or receipt of a frame indicating a closure of the tunnel connection at 243, the tunnel relay enters the Dying state 244. Following the Dying state 244, the relay node disconnects any connections established at event 241. The relay node then enters the Dead state 246.

Fig. 14 shows an example embodiment of a virtual private network 249 formed by a pseudo network adapter 248 and a tunnel connection between a tunnel client 247 and a tunnel server 253 across a public network 251. The tunnel server 253 and tunnel client 247 are for example network stations including a CPU or

microprocessor, memory, and various I/O devices. The tunnel server 253 is shown physically connected to a private LAN 256 including a Network Node 1 257 and a Network Node 2 258, through a physical network adapter 254. The tunnel server 253 is further shown physically connected with a firewall 252 which separates the private LAN 256 from the public network 251. The firewall 252 is physically connected with the public network 251. The tunnel server 253 is further shown including a pseudo network adapter 255. The client system 247 is shown including a physical network adapter 250 physically connected to the public network 251.

During operation of the elements shown in Fig. 14, nodes within the virtual private network 249 appear to the tunnel client 247 as if they were physically connected to the client system through the pseudo network adapter 248. Data transmissions between the tunnel client and any nodes that appear to be within the virtual private network are passed through the pseudo network adapter 248. Data transmissions between the tunnel client 247 and the tunnel server 253 are physically accomplished using a tunnel connection between the tunnel client 247 and the tunnel server 253.

Fig. 15 shows elements in an example embodiment of a pseudo network adapter such as the pseudo network adapter 248 in Fig. 14. In an example embodiment the elements shown in Fig. 15 are implemented as software executing on the tunnel client 247 as shown in Fig. 14. In Fig. 15 there is shown a pseudo network adapter 259 including a virtual adapter driver interface 263, an encapsulation engine 264, an encryption engine 265, a decapsulation engine 268, and a decryption engine 266. Further shown in the pseudo network adapter 259 are an ARP server emulator 270 and a Dynamic Host Configuration Protocol (DHCP) server emulator.

The pseudo network adapter 259 is shown interfaced to a TCP/IP protocol stack 260, through the virtual adapter driver interface 260. The TCP/IP protocol stack 260 is shown interfaced to other services in an operating system 261, as well as a physical network adapter's driver 262. The physical network adapter's driver 262 is for example a device driver which controls the operation of a physical network adapter such as physical network adapter 250 as shown in Fig. 14.

During operation of the elements shown in Fig. 15, the pseudo network adapter 259 registers with the network layer in the TCP/IP stack 260 that it is able to reach the IP addresses of nodes within the virtual private network 249 as shown in Fig. 14. For example, the pseudo network adapter on the client system registers that it can reach the pseudo network adapter on the server. Subsequently, a message from the tunnel client addressed to a node reachable through the virtual private network will be passed by the TCP/IP stack to the pseudo network adapter 259. The pseudo network adapter 259 then encrypts the message, and encapsulates the message into a tunnel data frame. The pseudo network adapter 259 then passes the tunnel data frame

back to the TCP/IP protocol stack 260 to be sent through to the physical network adapter in the tunnel server. The tunnel server passes the received data frame to the pseudo network adapter in the server, which de-encapsulates and decrypts the message.

Fig. 16 shows a more detailed example embodiment of a pseudo network adapter 280. The pseudo network adapter 280 includes a virtual network adapter driver interface 288. The transmit path 290 includes an encryption engine 292, and an encapsulation engine 294. The encapsulation engine 294 is interfaced with a TCP/IP transmit interface 312 within a TCP/IP protocol stack, for example a socket interface associated with the first relay node in the tunnel path, or with the remote tunnel end point if the tunnel path includes no relays.

In the example embodiment of Fig. 16, the pseudo network adapter 280 appears to the TCP/IP protocol stack 282 as an Ethernet adapter. Accordingly, ethernet packets 286 for a destination addresses understood by the TCP/IP protocol stack to be reachable through the virtual private network are passed from the TCP/IP protocol stack 282 to the virtual network adapter interface 288 and through the transmit path 290. Similarly, ethernet packets 284 received through the pseudo network adapter 280 are passed from the receive path 296 to the virtual network adapter interface 288 and on to the TCP/IP protocol stack 282.

Further shown in the pseudo network adapter 280 of Fig. 16 is a receive path 296 having a decryption engine 298 interfaced to the virtual network adapter interface 288 and a decapsulation engine 300. The decapsulation engine 300 in turn is interfaced to a TCP/IP receive function 314 in the TCP/IP protocol stack 282, for example a socket interface associated with the first relay in the tunnel path, or with the remote tunnel end point if the tunnel path includes no relays. The pseudo network adapter 280 further includes an ARP server emulator 304 and a DHCP server emulator 306. ARP and DHCP request packets 302 are passed to the ARP server emulator 304 and DHCP server emulator 306 respectively. When a received packet is passed from the receive path 296 to the TCP/IP stack 282, a receive event must be indicated to the TCP/IP stack 282, for example through an interface such the Network Device Interface Specification (NDIS), defined by Microsoft™ Corporation.

Also in Fig. 16 is shown is an operating system 310 coupled with the TCP/IP protocol stack 282. The TCP/IP protocol stack 282 is generally considered to be a component part of the operating system. The operating system 310 in Fig. 16 is accordingly the remaining operating system functions and procedures outside the TCP/IP protocol stack 282. A physical network adapter 308 is further shown operated by the TCP/IP protocol stack 282.

During operation of the elements shown in Fig. 16, a user passes data for transmission to the TCP/IP protocol stack 282, and indicates the IP address of the

node to which the message is to be transmitted, for example through a socket interface to the TCP layer. The TCP/IP protocol stack 282 then determines whether the destination node is reachable through the virtual private network. If the message is for a node that is reachable through the virtual private network, the TCP/IP protocol stack 282 an ethernet packet 286 corresponding to the message to the pseudo network adapter 280. The pseudo network adapter 280 then passes the ethernet packet 286 through the transmit path, in which the ethernet packet is encrypted and encapsulated into a tunnel data frame. The tunnel data frame is passed back into the TCP/IP protocol stack 282 through the TCP/IP transmit function 312 to be transmitted to the tunnel server through the tunnel connection. In an example embodiment, a digest value is calculated for the tunnel data frame before encryption within the transmit path within the pseudo network adapter.

Further during operation of the elements shown in Fig. 16, when the TCP/IP protocol stack 282 receives a packet from the remote endpoint of the TCP/IP tunnel connection, for example the tunnel server, the packet is passed to the pseudo network adapter 280 responsive to a TCP receive event. The pseudo network adapter 280 then decapsulates the packet by removing the tunnel header. The pseudo network adapter further decrypts the decapsulated data and passes it back to the TCP/IP protocol stack 282. The data passed from the pseudo network adapter 280 appears to the TCP/IP protocol stack 282 as an ethernet packet received from an actual physical device, and is the data it contains is passed on to the appropriate user by the TCP/IP protocol stack 282 based on information in the ethernet packet header provided by the pseudo network adapter.

Fig. 17 is a flow chart showing steps performed by an example embodiment of a pseudo network adapter during packet transmission, such as in the transmit path 290 of Fig. 14. The TCP/IP protocol stack determines that the destination node of a packet to be transmitted is reachable through the virtual LAN based on the destination IP address of the packet and a network layer routing table. At step 320 the packet is passed to the pseudo network adapter from the TCP/IP protocol stack. As a result, a send routine in the pseudo adapter is triggered for example in the virtual network adapter interface 288 of Fig. 16.

At step 322 the pseudo network adapter send routine processes the Ethernet header of the packet provided by the TCP/IP stack, and removes it. At step 324, the send routine determines whether the packet is an ARP request packet. If the packet is an ARP request packet for an IP address of a node on the virtual LAN, such as the pseudo network adapter of the tunnel server, then step 324 is followed by step 326. Otherwise, step 324 is followed by step 330.

At step 326, the ARP server emulator in the pseudo network adapter generates an ARP reply packet. For example, if the ARP request were for a physical address

corresponding to the IP address of the pseudo network adapter on the tunnel server, the ARP reply would indicate a predetermined, reserved physical address to be associated with that IP address. At step 328 the pseudo network adapter passes the ARP response to the virtual network adapter interface. The virtual network adapter interface then indicates a received packet to the TCP/IP protocol stack, for example using an NDIS interface. The TCP/IP protocol stack then processes the ARP response as if it had been received over an actual physical network.

At step 330 the send routine determines whether the packet is a DHCP request packet requesting an IP address for the pseudo network adapter. If so, then step 330 is followed by step 332. Otherwise, step 330 is followed by step 334.

At step 334, the DHCP server emulator in the pseudo network adapter generates a DHCP response. The format of DHCP is generally described in the DHCP RFC. At step 328 the pseudo network adapter passes the DHCP response to the virtual network adapter interface, for example indicating an IP address received from the tunnel server in the client data field of the key exchange/authentication RESPONSE frame. The virtual network adapter interface then indicates a received packet to the TCP/IP protocol stack. The TCP/IP protocol stack then processes the DHCP response as if it had been received over an actual physical network.

At step 334 the pseudo network adapter encrypts the message using an encryption engine such that only the receiver is capable of decrypting and reading the message. At step 336 the pseudo network adapter encapsulates the encrypted message into a tunnel data frame. At step 338 the pseudo network adapter transmits the tunnel data frame through the tunnel connection using the TCP/IP protocol stack.

Fig. 18 is a flow chart showing steps performed by an example embodiment of a pseudo network adapter during packet receipt, such as in the receive path 296 of Fig. 14.

At step 350, the pseudo network adapter is notified that a packet has been received over the tunnel connection. At step 352 the pseudo network adapter decapsulates the received message by removing the header fields of the tunnel data frame. At step 354 the pseudo network adapter decrypts the decapsulated datagram from the tunnel data frame. At step 356, in an example embodiment, the pseudo network adapter forms an Ethernet packet from the decapsulated message. At step 358 the pseudo network adapter indicates that an Ethernet packet has been received to the TCP/IP protocol stack through the virtual network adapter interface. This causes the TCP/IP protocol stack to behave as if it had received an Ethernet packet from an actual Ethernet adapter.

Fig. 19 shows the data flow within the transmit path in an example embodiment of a pseudo network adapter. At step 1 370, an application submits data to be

transmitted to the TCP protocol layer 372 within the TCP/IP protocol stack. The application uses a conventional socket interface to the TCP protocol layer 372 to pass the data, and indicates the destination IP address the data is to be transmitted to. The TCP protocol layer 372 then passes the data to the IP protocol layer 374 within the TCP/IP protocol stack. At step 2 376, the TCP/IP protocol stack refers to the routing table 378 to determine which network interface should be used to reach the destination IP address.

Because in the example the destination IP address is of a node reachable through the virtual private network, the IP layer 374 determines from the routing table 378 that the destination IP address is reachable through pseudo network adapter. Accordingly at step 3 380 the TCP/IP protocol stack passes a packet containing the data to the pseudo network adapter 382.

At step 4 384, the pseudo network adapter 382 encrypts the data packets and encapsulates them into tunnel data frames.

The pseudo network adapter 382 then passes the tunnel data frames packets back to the TCP protocol layer 372 within the TCP/IP protocol stack through a conventional socket interface to the tunnel connection with the first node in the tunnel path.

The TCP protocol layer 372 then forms a TCP layer packet for each tunnel data frame, having the tunnel data frame as its data. The TCP frames are passed to the IP layer 374. At step 5 386 the routing table 378 is again searched, and this time the destination IP address is the IP address associated with the physical network adapter on the tunnel server, and accordingly is determined to be reachable over the physical network adapter 390. Accordingly at step 6 388 the device driver 390 for the physical network adapter is called to pass the packets to the physical network adapter. At step 7 392 the physical network adapter transmits the data onto the physical network 394.

Fig. 20 is a data flow diagram showing data flow in an example embodiment of packet receipt involving a pseudo network adapter. At step 1 410 data arrives over the physical network 412 and is received by the physical network adapter and passed to the physical network driver 414. The physical network driver 414 passes the data at step 2 418 through the IP layer 420 and TCP layer 422 to the pseudo network adapter 426 at step 3 424, for example through a conventional socket interface. At step 4 428 the pseudo network adapter 426 decrypts and decapsulates the received data and passes it back to the IP layer of the TCP/IP protocol stack, for example through the TDI (Transport Layer Dependent Interface API) of the TCP/IP stack. The data is then passed through the TCP/IP protocol stack and to the user associated with the destination IP address in the decapsulated datagrams at step 5 430.

Fig. 21 shows data flow in an example embodiment of packet transmission involving a pseudo network adapter. Fig. 21 shows an example embodiment for use



on a Microsoft™ Windows 95™ PC platform. In Fig. 21 a user application 450 passes unencrypted data to an interface into the TCP layer of the TCP/IP protocol, for example the WinSock API 452. The user indicates a destination IP address associated with a node reachable through a virtual private network accessible through the pseudo network adapter.

The TCP layer 454 passes the data to the IP layer 456, which in turn passes the data to the Network Device Interface Specification Media Access Control (NDIS MAC) interface 458. The pseudo network adapter 459 has previously registered with the routing layer (IP) that it is able to reach a gateway address associated with the destination IP address for the user data. Accordingly the IP layer uses the NDIS MAC layer interface to invoke the virtual device driver interface 460 to the pseudo network adapter 459. The pseudo network adapter 459 includes a virtual device driver interface 460, an ARP server emulator 462, and a DHCP server emulator 464.

In the example embodiment of Fig. 19, the pseudo network adapter 459 passes the data to a tunnel application program 466. The tunnel application program 466 encrypts the IP packet received from the IP layer and encapsulates it into a tunnel data frame. The tunnel application then passes the tunnel data frame including the encrypted data to the WinSock interface 452, indicating a destination IP address of the remote tunnel end point. The tunnel data frame is then passed through the TCP layer 454, IP layer 456, NDIS MAC layer interface 458, and physical layer 468, and transmitted on the network 470. Since the resulting packets do not contain a destination IP address which the pseudo network adapter has registered to convey, these packets will not be diverted to the pseudo network adapter.

Fig. 22 is a data flow diagram showing data flow in an example embodiment of packet transmission involving a pseudo network adapter. The embodiment shown in Fig. 22 is for use on a UNIX platform. In Fig. 20 a user application 472 passes unencrypted data to a socket interface to the TCP/IP protocol stack in the UNIX socket layer 474, indicating a destination IP address of a node reachable through the virtual private network.

The UNIX socket layer 474 passes the data through the TCP layer 476 and the IP layer 478. The pseudo network adapter 480 has previously registered with the routing layer (IP) that it is able to reach a gateway associated with the destination IP address for the user data. Accordingly the IP layer 478 invokes the virtual device driver interface 482 to the pseudo network adapter 480. The IP layer 478 passes the data to the pseudo network adapter 480. The pseudo network adapter 480 includes a virtual device driver interface 482, and a DHCP server emulator 484.

In the example embodiment of Fig. 22, the pseudo network adapter 480 passes IP datagrams to be transmitted to a UNIX Daemon 486 associated with the tunnel connection. The UNIX Daemon 486 encrypts the IP

packet(s) received from the IP layer 478 and encapsulates them into tunnel data frames. The UNIX Daemon 486 then passes the tunnel data frames to the UNIX socket layer 474, through a socket associated with the tunnel connection. The tunnel data frames are then processed by the TCP layer 476, IP layer 478, data link layer 488, and physical layer 490 to be transmitted on the network 492. Since the resulting packets are not addressed to an IP address which the pseudo network adapter 480 has registered to convey, the packets will not be diverted to the pseudo network adapter 480.

Fig. 23 is a flow chart showing steps to initialize a example embodiment of a virtual private network. The steps shown in Fig. 23 are performed for example in the tunnel client 247 as shown in Fig. 14. At step 500 a tunnel application program executing in the tunnel client sends a tunnel relay frame to the tunnel server. At step 502 the tunnel application program sends a tunnel key exchange/authentication REQUEST frame to the tunnel server. The tunnel application in the tunnel server ignores the contents of the client data field in the tunnel key exchange/authentication REQUEST frame. The tunnel application in the tunnel server fills in the client data field in the tunnel key exchange/authentication RESPONSE frame with Dynamic Host Configuration Protocol (DHCP) information, for example including the following information in standard DHCP format:

- 1) IP Address for tunnel client Pseudo Network Adapter
- 2) IP Address for tunnel server Pseudo Network Adapter
- 3) Routes to nodes on the private network physically connected to the tunnel server which are to be reachable over the tunnel connection.

At step 504 the tunnel application receives a tunnel key exchange/authentication RESPONSE frame from the tunnel server. The client data field 508 in the tunnel connection response is made available to the pseudo network adapter in the tunnel client. The tunnel application in the tunnel client tells the TCP/IP stack that the pseudo network adapter in the tunnel client is active. The pseudo network adapter in the tunnel client is active and ready to be initialized at step 510.

The tunnel client system is configured such that it must obtain an IP address for the tunnel client pseudo network adapter dynamically. Therefore the TCP/IP stack in the tunnel client broadcasts a DHCP request packet through the pseudo network adapter. Accordingly, at step 512 the pseudo network adapter in the client receives a conventional DHCP request packet from the TCP/IP stack requesting a dynamically allocated IP address to associate with the pseudo network adapter. The pseudo network adapter passes the DHCP request packet to the DHCP server emulator within the pseudo network adapter, which forms a DHCP response based on the client data 508 received from the tunnel applica-

tion. The DHCP response includes the IP address for the client pseudo adapter provided by the tunnel server in the client data. At step 514 the pseudo network adapter passes the DHCP response to the TCP/IP stack.

At step 520, the tunnel application modifies the routing tables within the tunnel client TCP/IP stack to indicate that the routes to the nodes attached to the private network to which the tunnel server is attached all are reachable only through the pseudo network adapter in the tunnel server. The IP address of the pseudo network adapter in the tunnel server provided in the client data is in this way specified as a gateway to the nodes on the private network to which the tunnel server is attached. In this way those remote nodes are viewed by the TCP/IP stack as being reachable via the virtual private network through the client pseudo network adapter.

At step 516 the pseudo network adapter in the tunnel client receives an ARP request for a physical address associated with the IP address of the pseudo network adapter in the tunnel server. The pseudo network adapter passes the ARP request to the ARP server emulator, which forms an ARP reply indicating a reserved physical address to be associated with the IP address of the pseudo network adapter in the tunnel server. At step 518 the pseudo network adapter passes the ARP response to the TCP/IP stack in the tunnel client. In response to the ARP response, the TCP/IP stack determines that packets addressed to any node on the virtual private network must be initially transmitted through the pseudo network adapter.

In an example embodiment the present system reserves two physical addresses to be associated with the pseudo network adapter in the client and the pseudo network adapter in the server respectively. These reserved physical addresses are used in responses to ARP requests passed through the pseudo network adapter for physical addresses corresponding to the IP addresses for the pseudo network adapter in the client and the pseudo network adapter in the server respectively. The reserved physical addresses should have a high likelihood of not being used in any actual network interface.

While the invention has been described with reference to specific example embodiments, the description is not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments, as well as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to this description. Specifically, while various embodiments have been described using the TCP/IP protocol stack, the invention may advantageously be applied where other communications protocols are used. Also, while various flow charts have shown steps performed in an example order, various implementations may use altered orders of step in order to apply the invention. And further, while certain specific software and/or hardware platforms

have been used in the description, the invention may be applied on other platforms with similar advantage. It is therefore contemplated that the appended claims will cover any such modifications or embodiments which fall within the scope of the invention.

## Claims

1. A pseudo network adapter providing a virtual private network, comprising:

an interface for capturing packets from a local communications protocol stack for transmission on said virtual private network, said interface appearing to said local communications protocol stack as a network adapter device driver for a network adapter connected to said virtual private network;

a first server emulator, providing a first reply packet responsive to a first request packet captured by said interface for capturing packets from said local communications protocol stack for transmission on said virtual private network, said first request packet requesting a network layer address for said pseudo network adapter, said first reply indicating a network layer address for said pseudo network adapter; and a second server emulator, providing a second reply packet responsive to a second request packet captured by said interface for capturing packets from said local communications protocol stack for transmission on said virtual private network, said second request packet requesting a physical address corresponding to a network layer address of a second pseudo network adapter, said second pseudo network adapter located on a remote server node, said second reply indicating a predetermined, reserved physical address.

2. The pseudo network adapter of claim 1, further comprising a means for indicating to said local communications protocol stack that said predetermined, reserved physical address is reachable through said pseudo network adapter, wherein said means for indicating modifies a data structure in said local communications protocol stack indicating which nodes or networks are reachable through each network interface of the local system.

3. The pseudo network adapter of claim 1, further comprising a means for indicating to said local communications protocol stack that one or more nodes on a remote private network connected to said remote server node are reachable through a gateway node equal to said second pseudo network adapter on said remote server node.

- 4. The pseudo network adapter of claim 1, further comprising:

a transmit path for processing data packets captured by said interface for capturing packets from said local communications protocol stack for transmission on said virtual private network; an encryption engine, within said transmit path, for encrypting said data packets; an encapsulation engine, within said transmit path, for encapsulating said encrypted data packets into tunnel data frames; and a means for passing said tunnel data frames back to said local communications protocol stack for transmission to a physical network adapter on said remote server node.

- 5. The pseudo network adapter of claim 4, wherein said transmit path further includes means for storing a digest value in a digest field in each of said tunnel data frames, said digest value equal to an output of a keyed hash function applied to said data packet encapsulated within said tunnel data frame concatenated with a counter value equal to a total number of tunnel data frames previously transmitted to said remote server node.

- 6. The pseudo network adapter of claim 4, wherein said transmit path further includes means for processing an Ethernet header in each one of said captured data packets, said processing of said Ethernet header including removing said Ethernet header.

- 7. The pseudo network adapter of claim 1, further comprising:

an interface into a transport layer of said local communications protocol stack for capturing received data packets from said remote server node.

- 8. The pseudo network adapter of claim 7, further comprising:

a receive path for processing received data packets captured by said interface into said transport layer of said local communications protocol stack for capturing received data packets from said remote server node; an decapsulation engine, within said receive path, for decapsulating said received data packets by removing a tunnel frame header; an decryption engine, within said receive path, for decrypting said received data packets; and a means for passing said received data packets back to said local communications protocol stack for delivery to a user.

- 9. A method for providing a pseudo network adapter for a virtual private network, comprising the steps of:

capturing packets from a local communications protocol stack for transmission on said virtual private network, said capturing through an interface appearing to said local communications stack as a network adapter device driver for a network adapter connected to said virtual private network; issuing a first reply packet responsive to a first request packet captured by said interface for capturing packets from said local communications protocol stack for transmission on said virtual private network, said first request packet requesting a network layer address for said pseudo network adapter, said first reply indicating a network layer address for said pseudo network adapter; and issuing a second reply packet responsive to a second request packet captured by said interface for capturing packets from said local communications protocol stack for transmission on said virtual private network, said second request packet requesting a physical address corresponding to a network layer address of a second pseudo network adapter, said second pseudo network adapter located on a remote server node, said ARP Reply indicating a predetermined, reserved physical address.

- 10. The method of claim 9, further comprising indicating to said local communications protocol stack that said predetermined, reserved physical address is reachable through said pseudo network adapter, wherein said step of indicating to said local communications protocol stack modifies a data structure in said local communications protocol stack indicating which nodes or networks are reachable through each network interface of the local system.

- 11. The method of claim 9, further comprising indicating to said local communications protocol stack that one or more nodes on a remote private network connected to said remote server node are reachable through a gateway node equal to said second pseudo network adapter on said remote server node, wherein said step of indicating to said local communications protocol stack that one or more nodes on said remote private network connected to said remote server node are reachable through a gateway node equal to said second pseudo network adapter on said remote server node modifies a network layer routing table in said local communications protocol stack.

- 12. The method of claim 9, further comprising:

processing data packets captured by said interface for capturing packets from said local communications protocol stack for transmission on said virtual private network in a transmit data path;

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encrypting said data packets in an encryption engine, within said transmit path;  
 encapsulating said encrypted data packets into tunnel data frames by an encapsulation engine, within said transmit path; and  
 passing said tunnel data frames back to said local communications protocol stack for transmission to a physical network adapter on said remote server node, wherein said transmit path further includes storing a digest value in a digest field in each of said tunnel data frames, said digest value equal to an output of a keyed hash function applied to said data packet encapsulated within said tunnel data frame concatenated with a counter value equal to a total number of tunnel data frames previously transmitted to said remote server node.

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13. The method of claim 12, wherein said transmit path further includes processing an Ethernet header in each one of said captured data packets, said processing of said Ethernet header including removing said Ethernet header.

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14. The method of claim 9, further comprising capturing received data packets from said remote server node through an interface into a transport layer of said local communications protocol stack, further comprising:

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processing received data packets captured by said interface into said transport layer of said local communications protocol stack for capturing received data packets from said remote server node in a receive path;  
 decapsulating said received data packets by removing a tunnel frame header in a decapsulation engine, within said receive path;  
 decrypting said received data packets in a decryption engine within said receive path; and  
 passing said received data frames packets back to said local communications protocol stack for delivery to a user.

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15. The method of claim 9, wherein said network layer address for said pseudo network adapter and said predetermined, reserved physical address is communicated to said pseudo network adapter from said remote server node as client data in a connection response frame.

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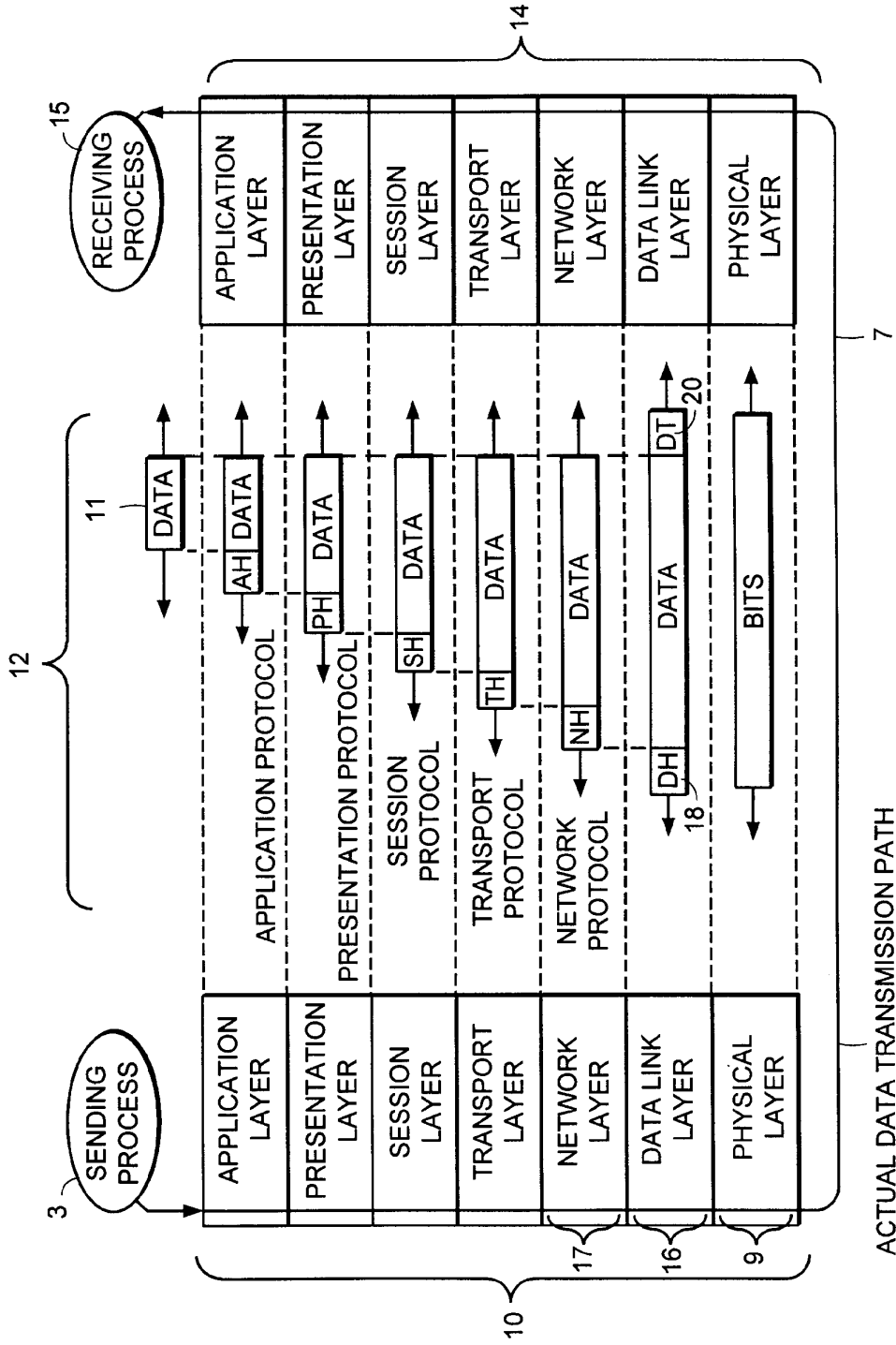


FIG. 1

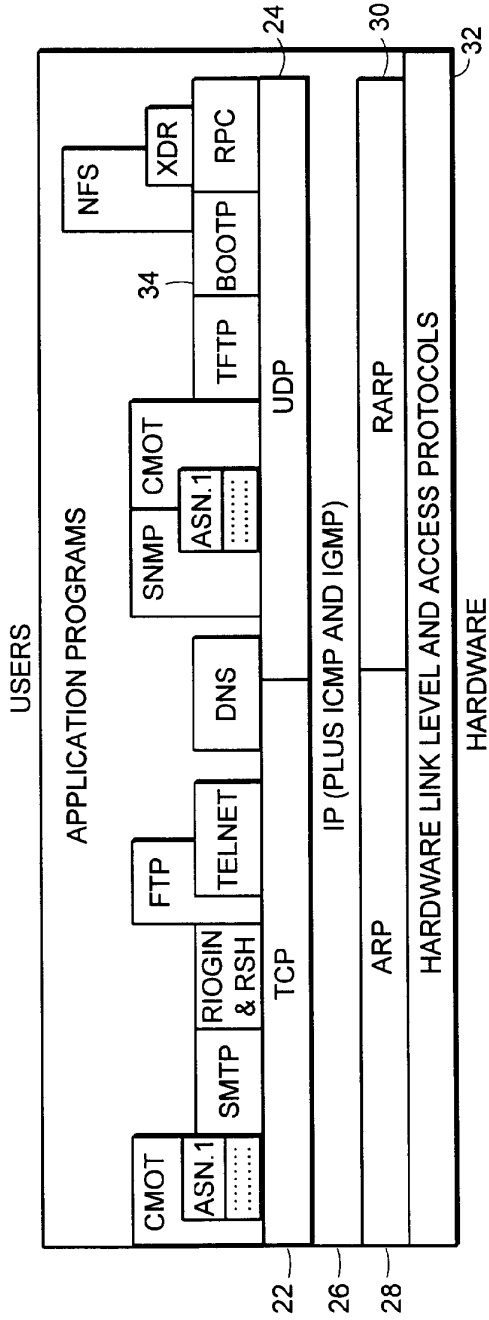


FIG. 2

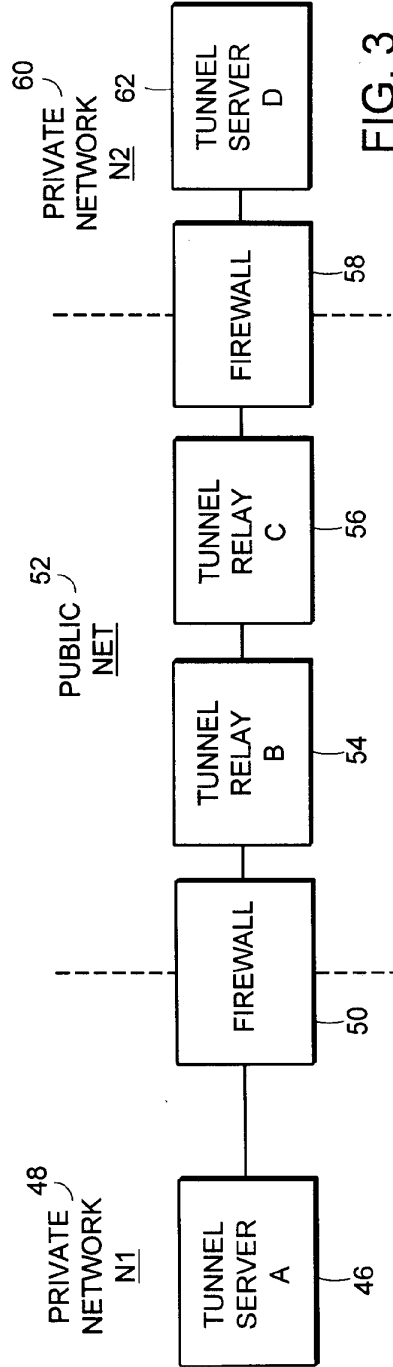


FIG. 3

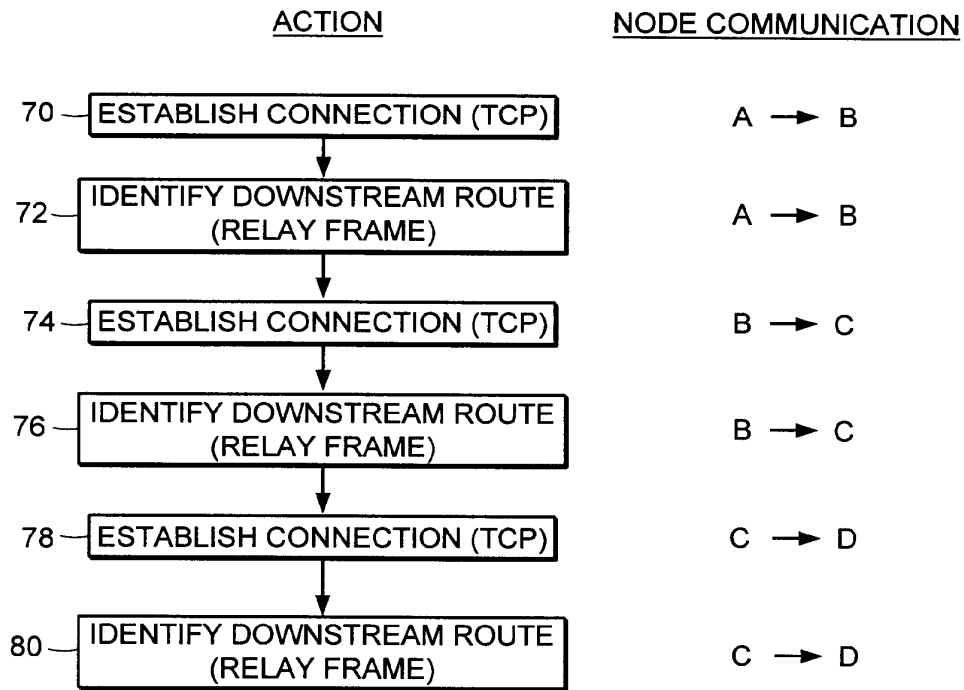


FIG. 4

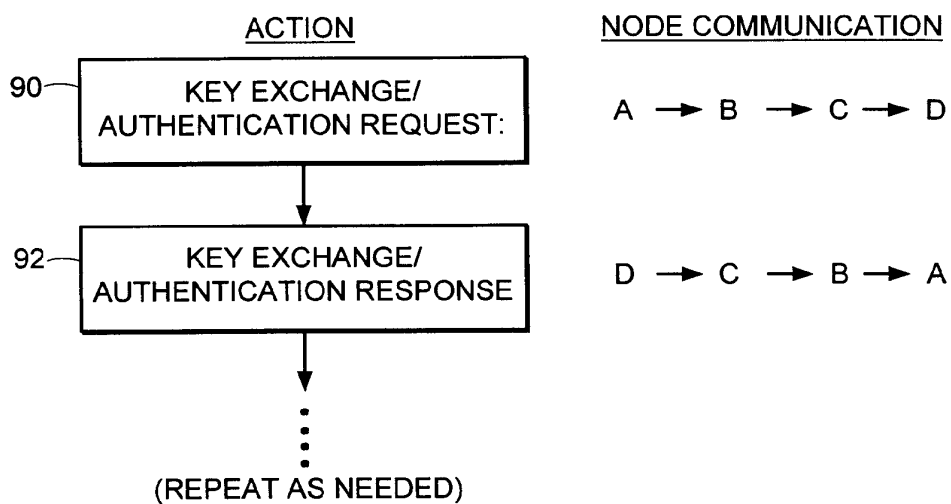


FIG. 5

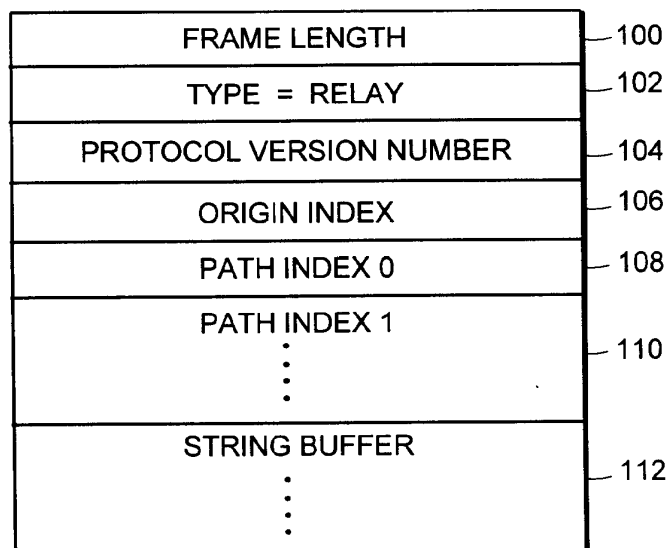


FIG. 6



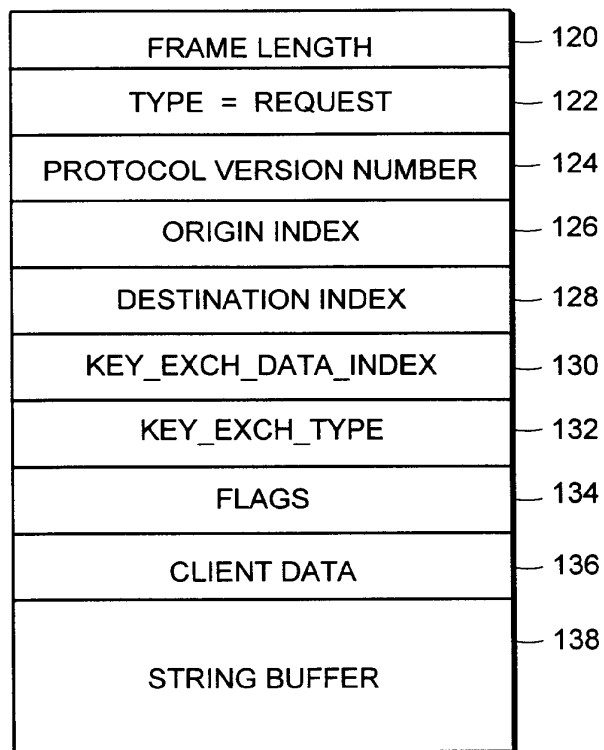


FIG. 7

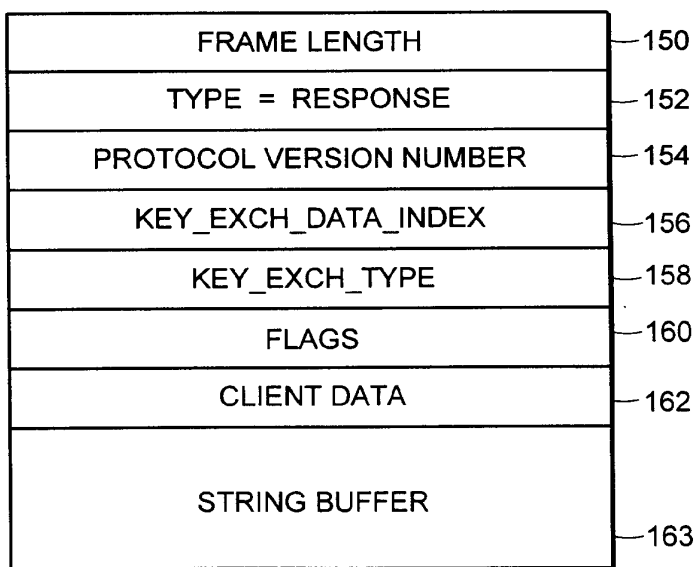


FIG. 8

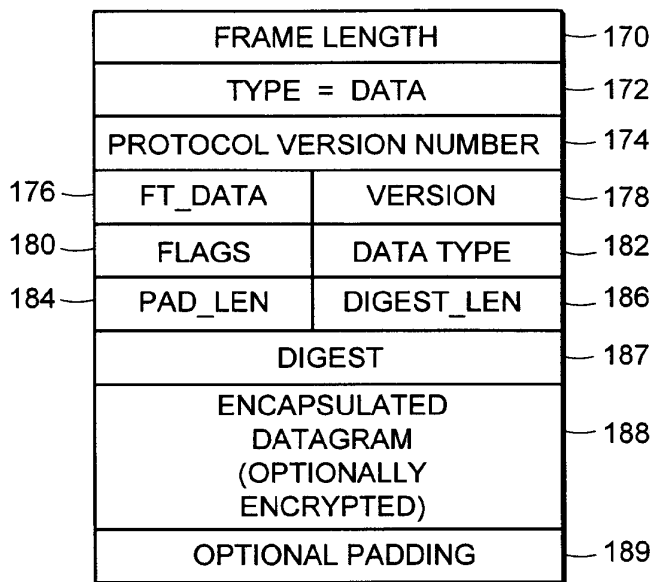


FIG. 9

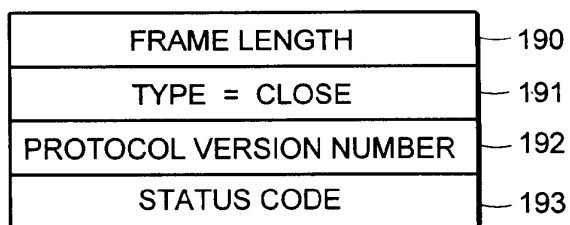


FIG. 10

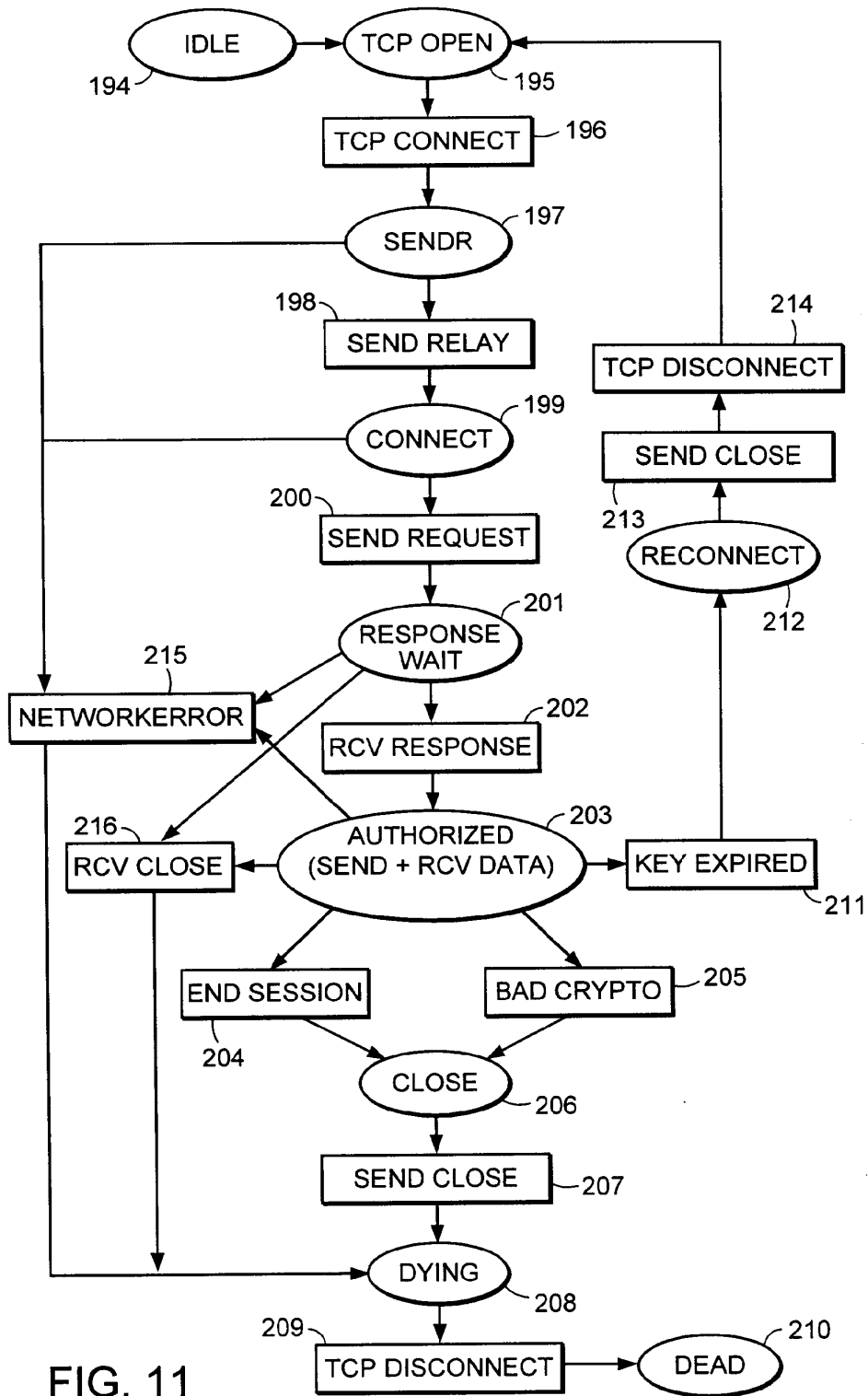


FIG. 11

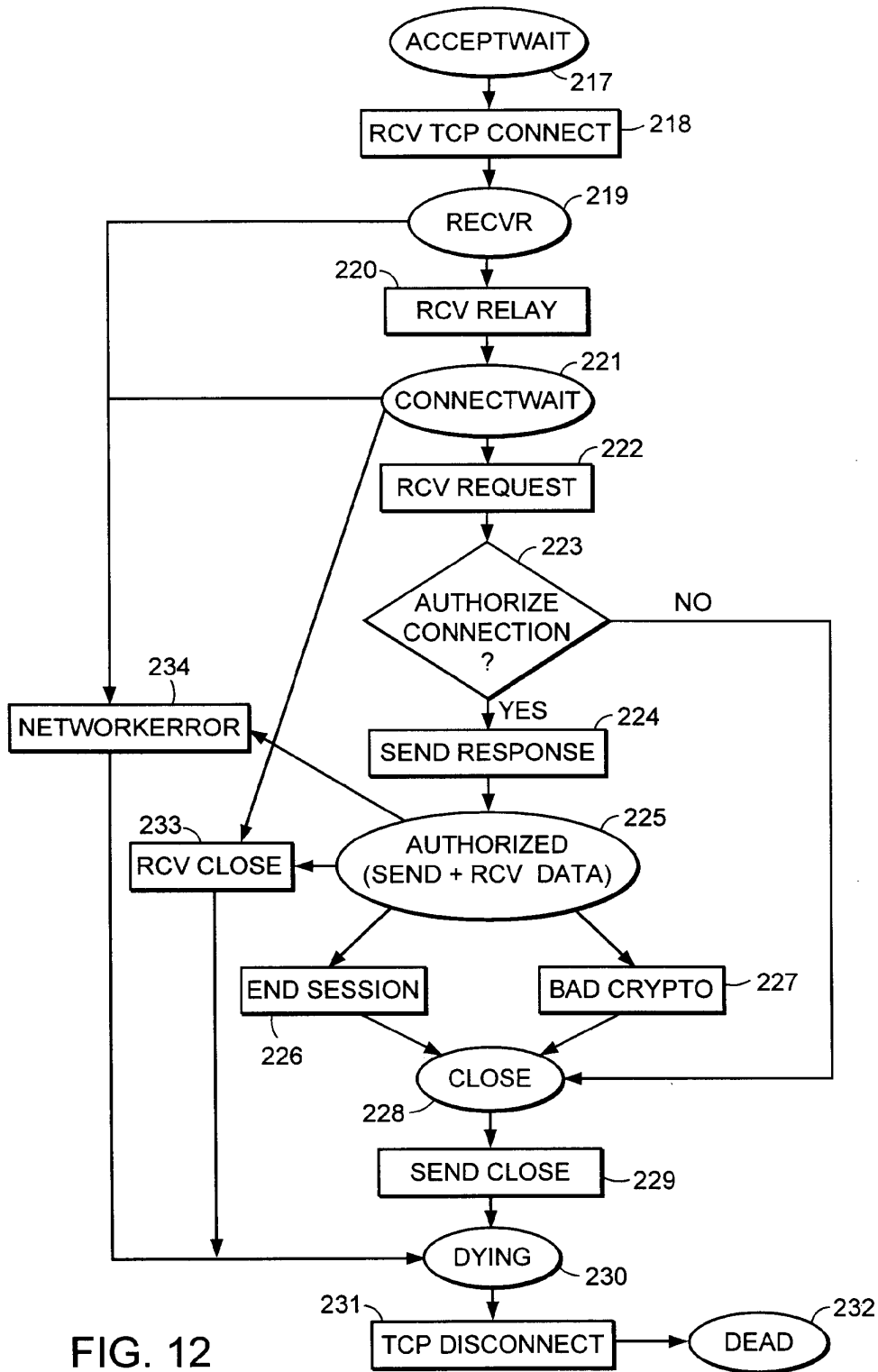


FIG. 12

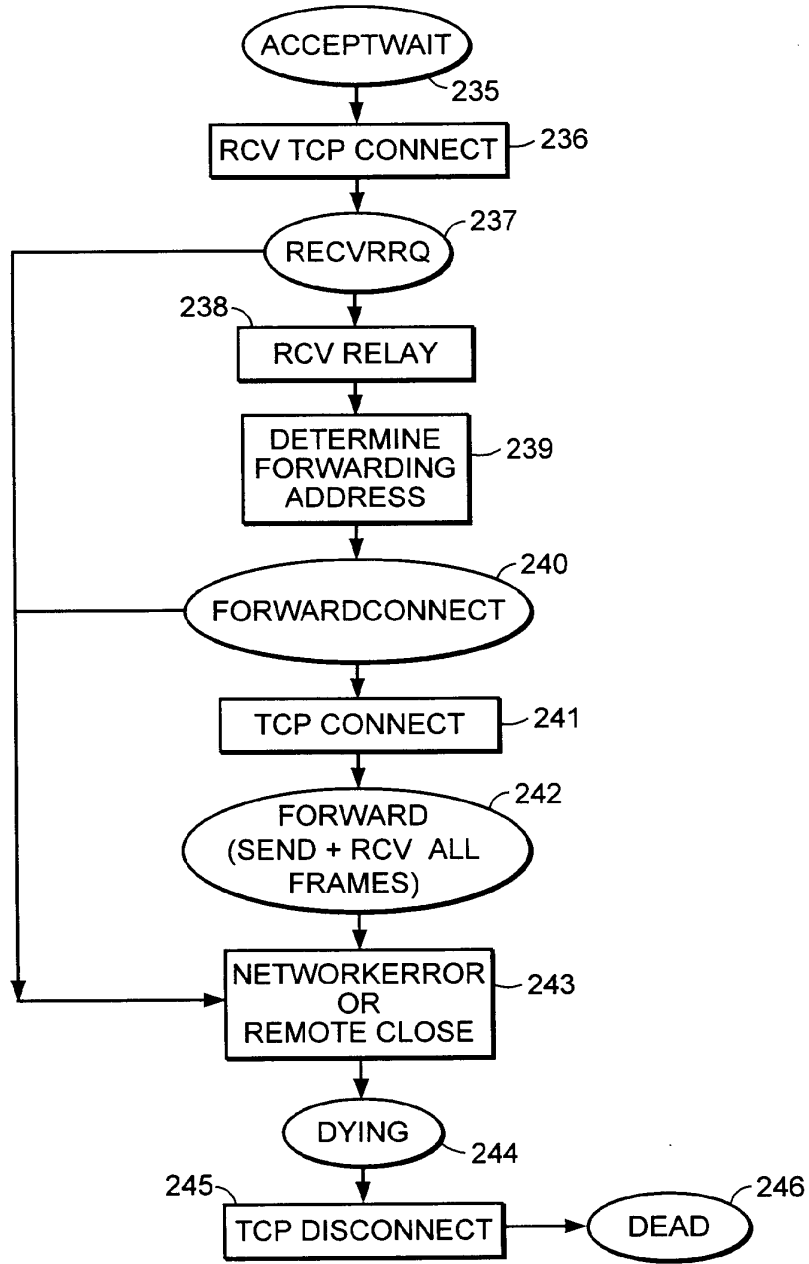


FIG. 13

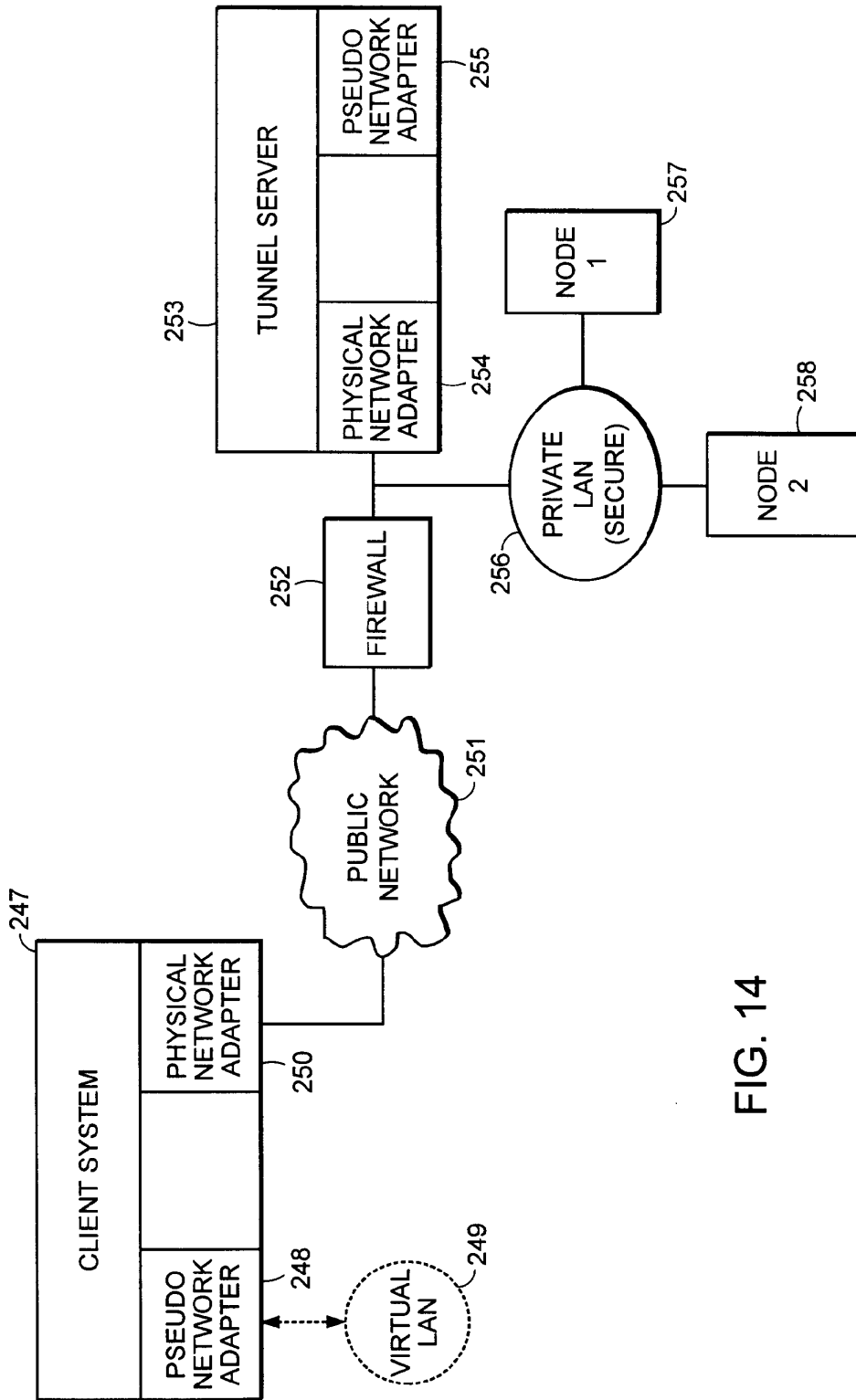


FIG. 14

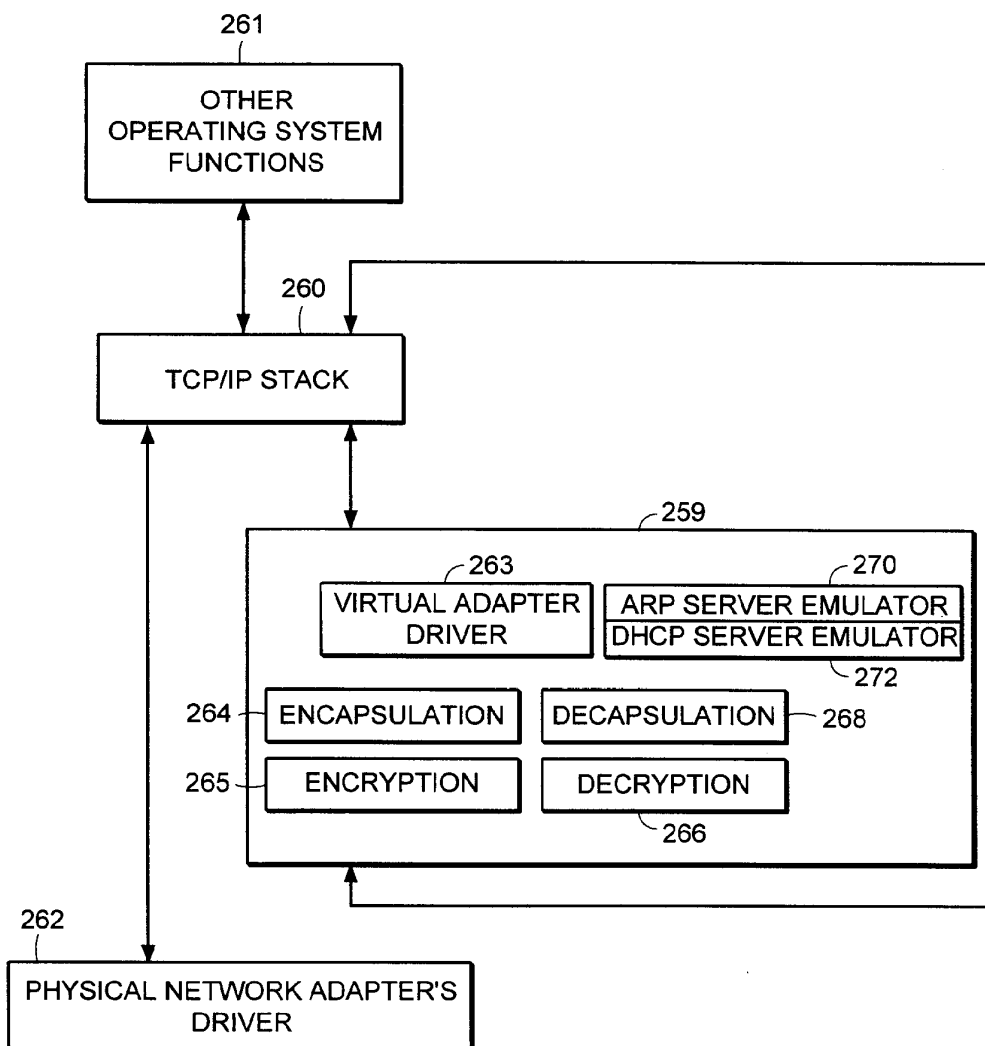


FIG. 15

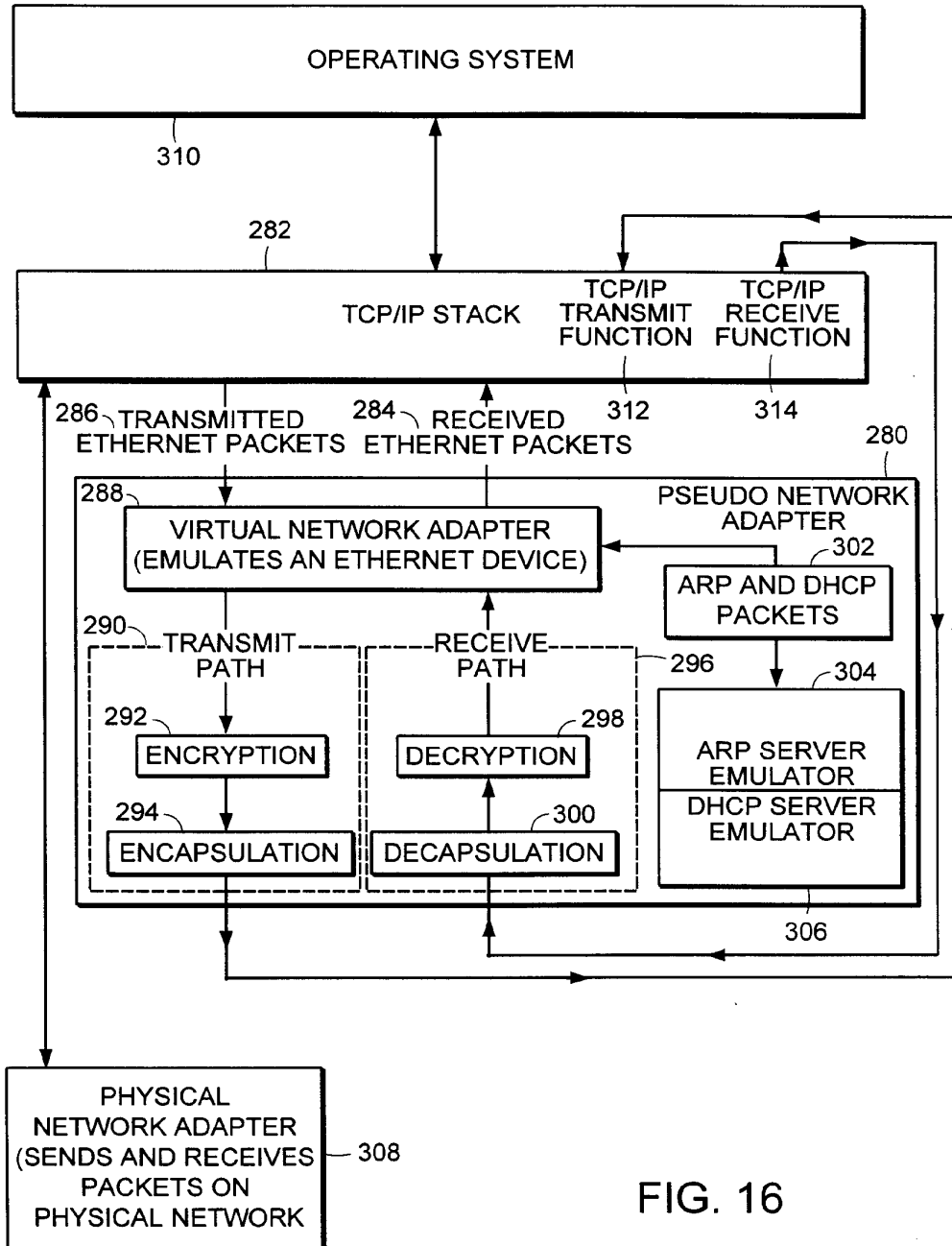


FIG. 16



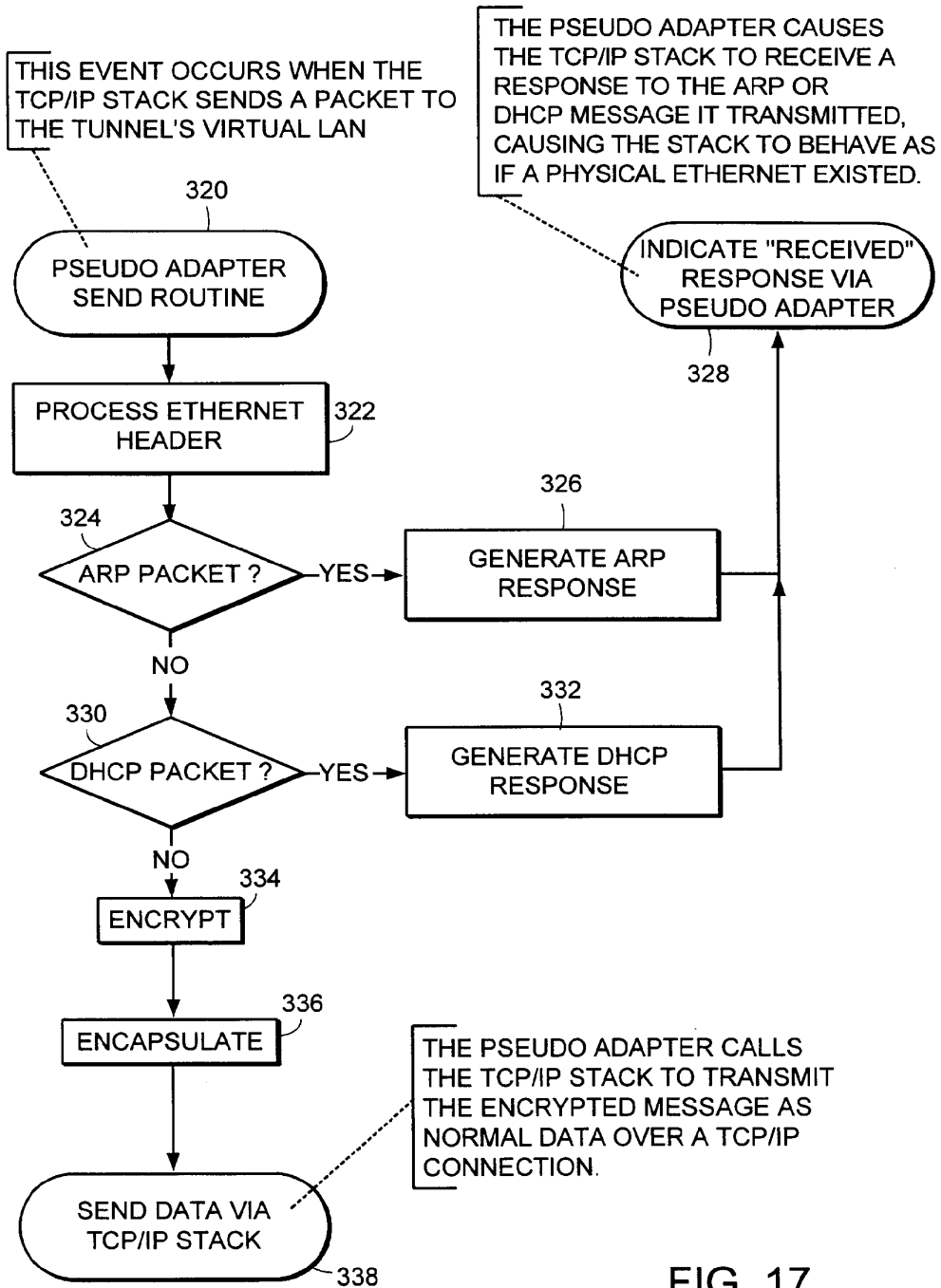


FIG. 17

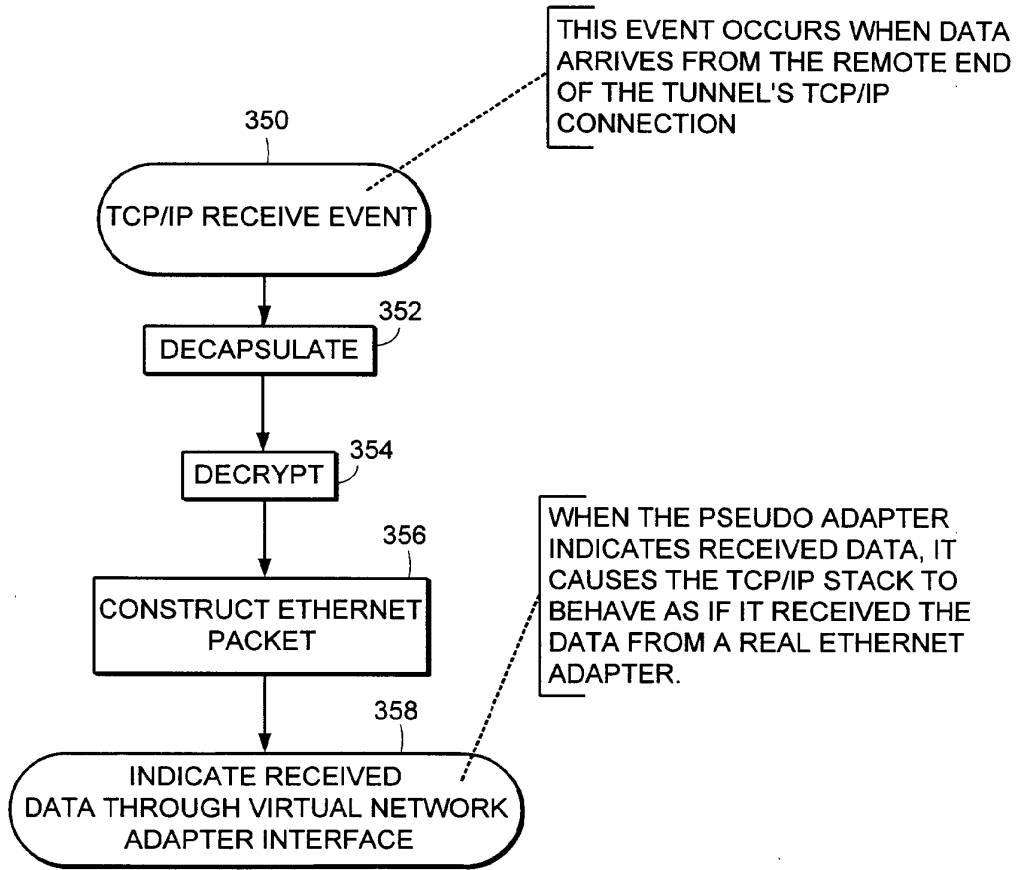


FIG. 18

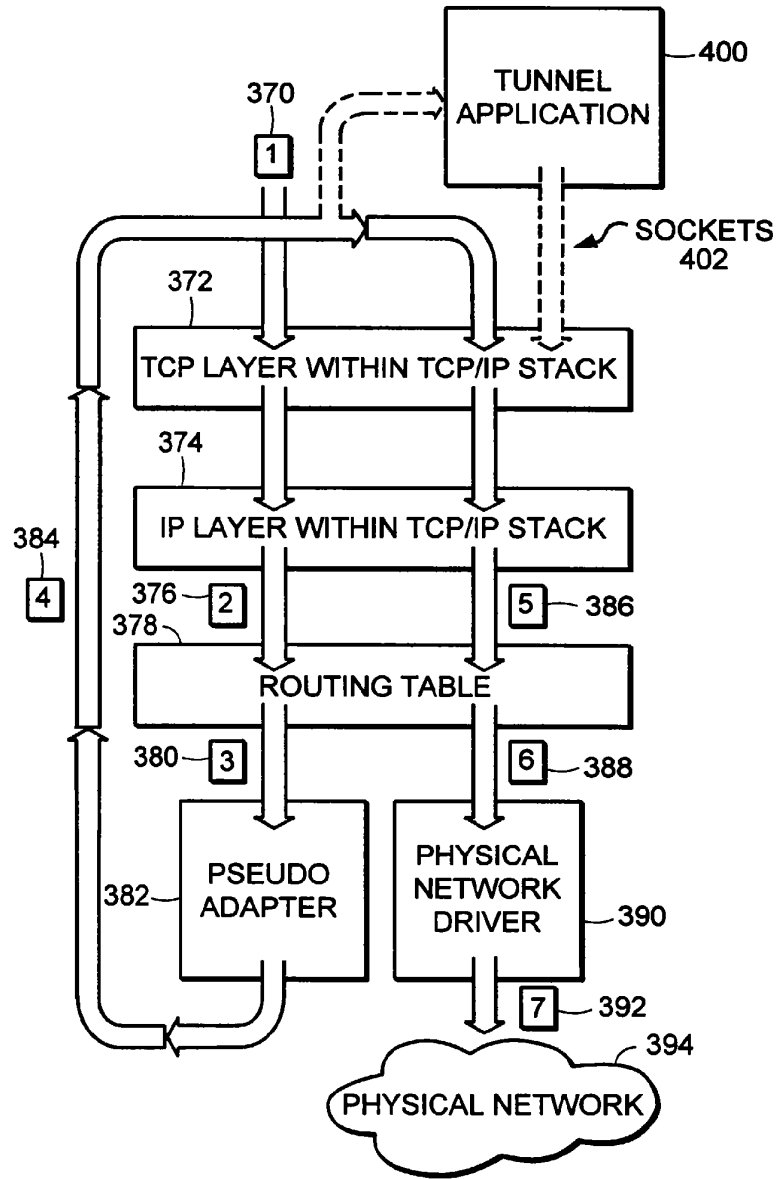


FIG. 19

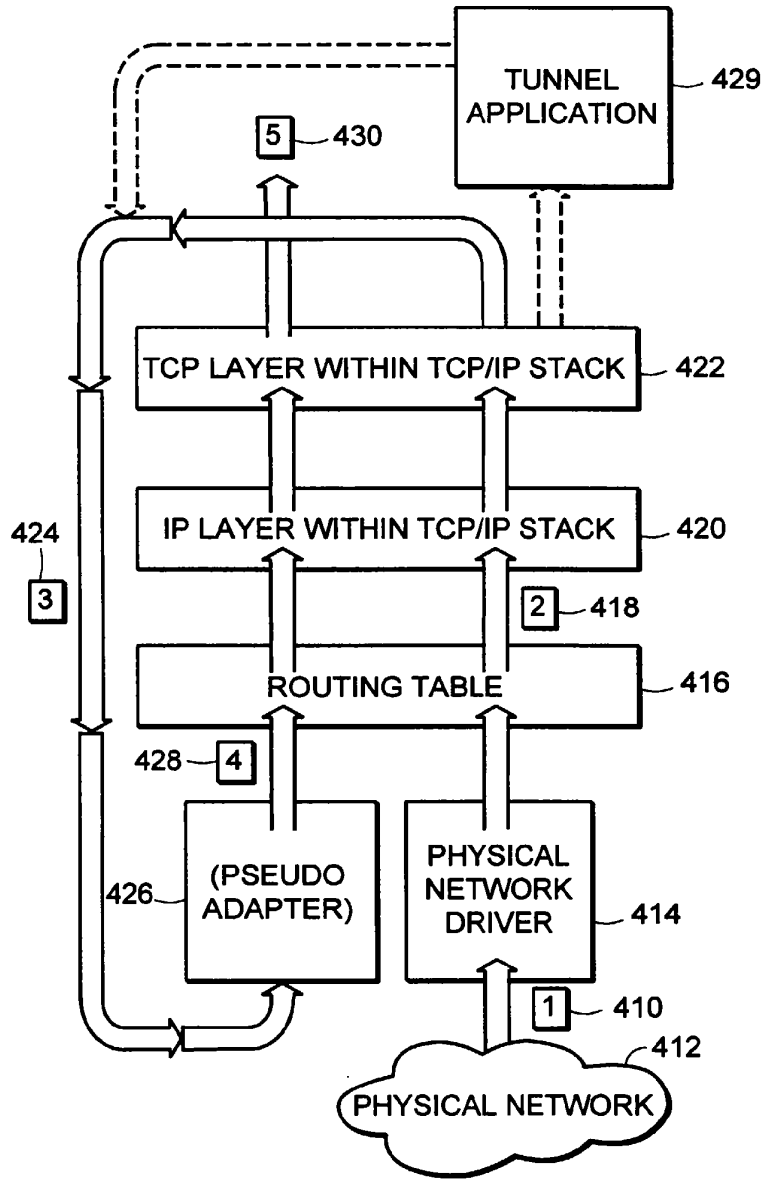


FIG. 20

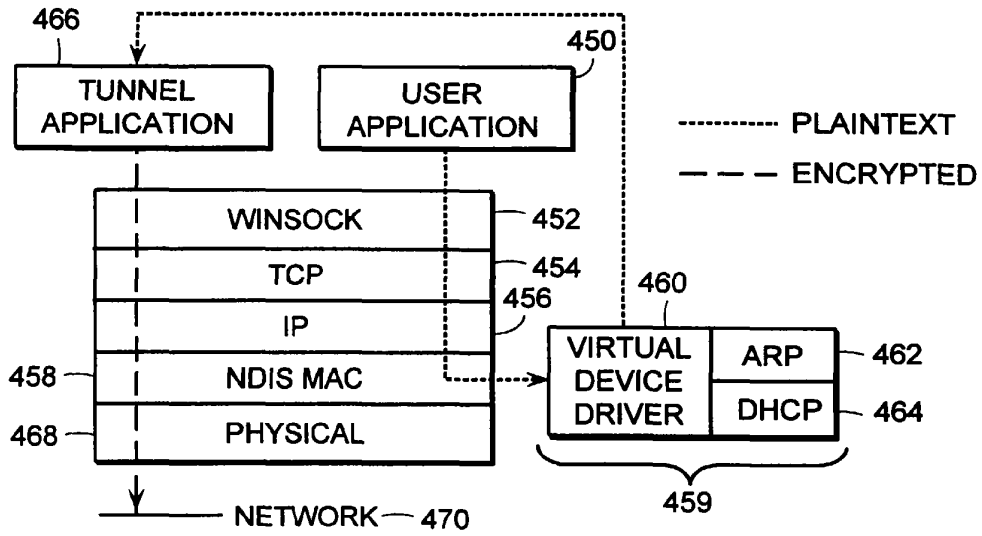


FIG. 21

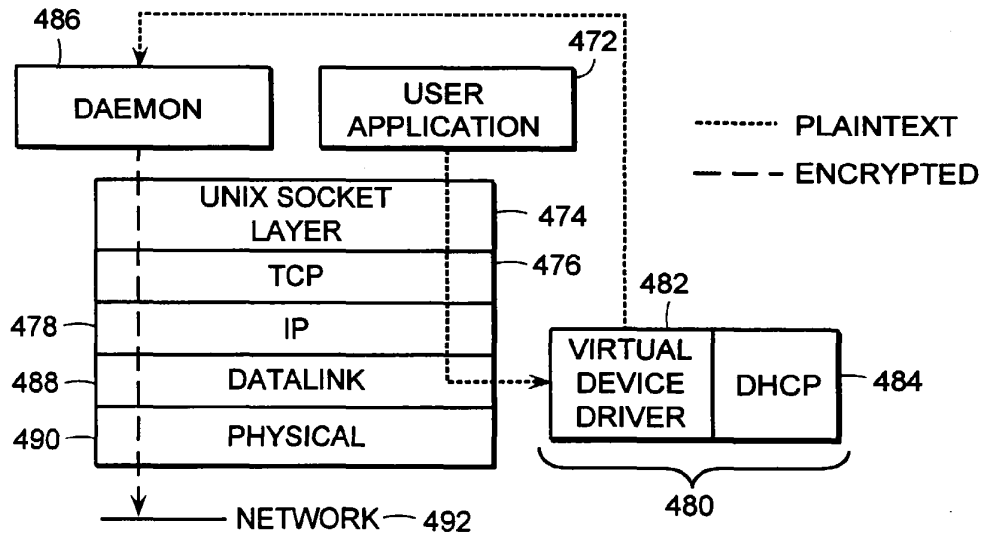


FIG. 22

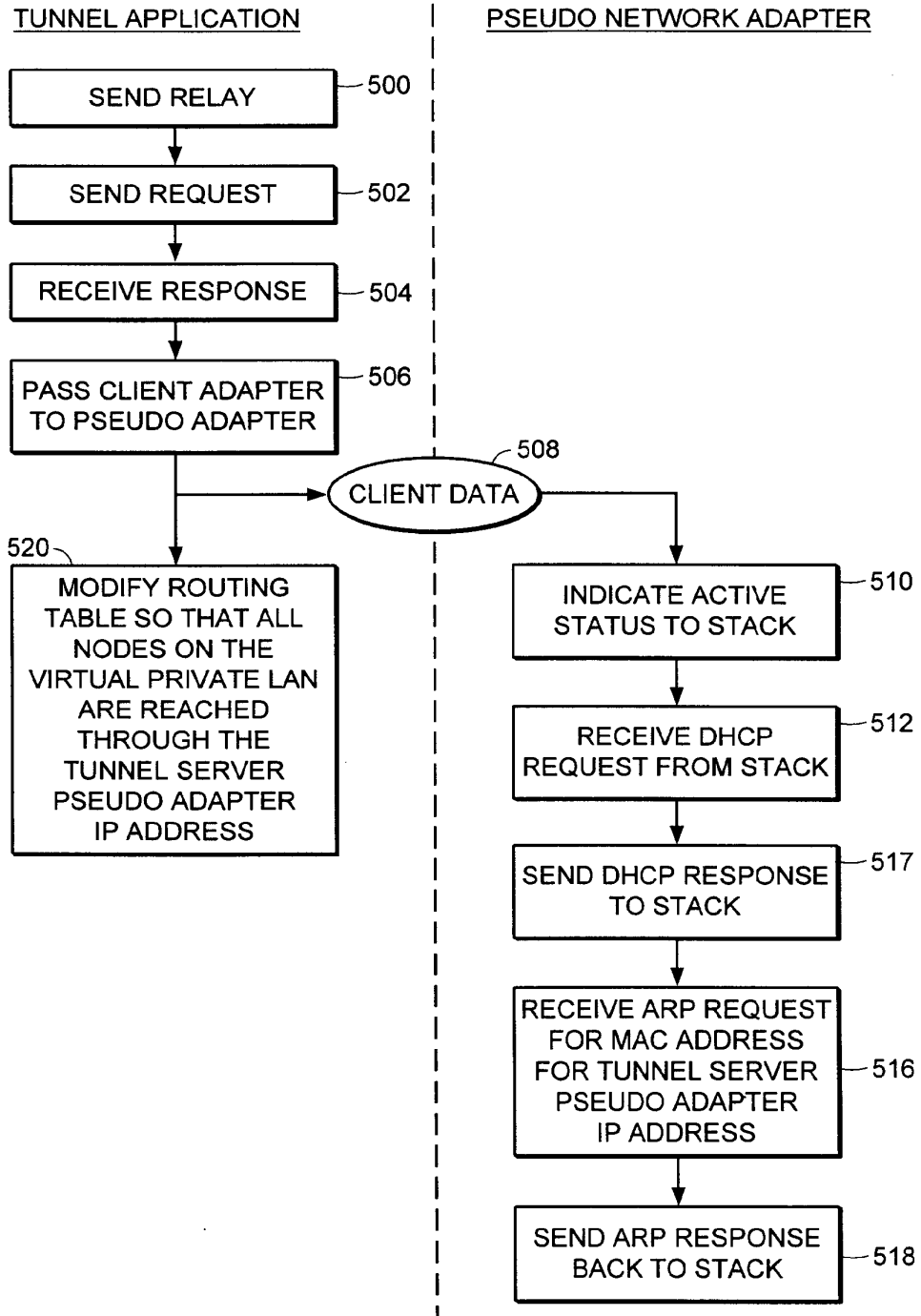


FIG. 23



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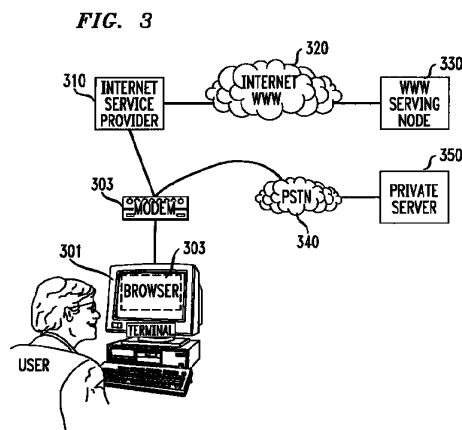
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(54) **System and method for automated network reconfiguration**

(57) A method is disclosed for providing an enhanced level of security for sensitive or proprietary information associated with information transactions in a public network, such as the Internet. In carrying out that method, an on-line information transaction is bifurcated between a generalized information access portion of such a transaction and an exchange of sensitive user information. With such a bifurcation, the generalized information access portion of the transaction, which generally would constitute the more substantial (in terms of network resources) portion of the transaction, would be handled via a non-secure network, usually a public network such as the Internet. The portion of the transaction involving sensitive user information, on the other hand, would be handled by a separate secure connection, such as a private network, or intranetwork. An important characteristic of this bifurcation arrangement is the provision of a means for automated reconfiguration of a user terminal as between accessing the generalized information via the non-secure network and access to the secure communications network for the exchange of sensitive user information. Such an automated reconfiguration will be carried out without the necessity for any action on the part of the user, and indeed will be largely invisible to the user.



**Description**

**FIELD OF THE INVENTION**

5 This invention is related to the field of data communications, and more particularly to a method and means for establishing an automatic reconfiguration of a user terminal among alternative tasks.

**BACKGROUND OF THE INVENTION**

10 With the increasing popularity of personal computers over the last several years has come a striking growth in transaction-oriented computer-to-computer communications (as opposed to bulk-data transfers among such computers). For convenience herein such transaction-oriented computer-to-computer communications will be described by the shorthand term "information transaction". That growth in the use of computers for such information transactions has unquestionably been fueled by the existence of an international infrastructure for implementing such data commu-  
15 nications, known as the Internet. And, driven by the burgeoning demand for such information transaction services, the Internet has itself experienced explosive growth in the amount of traffic handled.

At least partly in response to that demand, a new level of accessibility to various information sources has recently been introduced to the Internet, known as the World Wide Web ("WWW"). The WWW allows a user to access a uni-  
20 verse of information which combines text, audio, graphics and animation within a hypermedia document. Links are contained within a WWW document which allow simple and rapid access to related documents. Using a system known as the HyperText Markup Language ("HTML"), pages of information in the WWW contain pointers to other pages, those pointers typically being a key word (commonly known as a hyperlink word). When a user selects one of those key words, a hyperlink is created to another information layer (which may be in the same, or a different information server), where typically additional detail related to that key word will be found.

25 In order to facilitate implementation of the WWW on the Internet, new software tools have been developed for user terminals, usually known as Web Browsers, which provide a user with a graphical user interface means for accessing information on the Web, and navigating among information layers therein. A commonly used such Web Browser is that provided by Netscape.

The substantial growth in the use of computer networks, and particularly the WWW, for such information transac-  
30 tions, has predictably led to significant commercialization of this communications medium. For example, with the WWW, a user is not only able to access numerous information sources, some public and some commercial, but is also able to access "catalogs" of merchandise, where individual items from such a catalog can be identified and ordered, and is able to carry out a number of banking and other financial transactions. As will be obvious, such commercial transactions will typically involve sensitive and proprietary information, such as credit card numbers and financial information of a user.  
35 Thus, with the growth of commercial activity in the Internet, has also come a heightened concern with security.

It is well known that there are persons with a high level of skill in the computer arts, commonly known as "hackers", who have both the ability and the will to intercept communications via the Internet. Such persons are thereby able to gain unauthorized access to various sensitive user information, potentially compromising or misappropriating such information.

40 The vulnerability of such sensitive user information to misuse when so transmitted via the Internet is a phenomena which has only recently received wide public attention. Unless such security concerns can be quickly addressed and alleviated, the commercial development of this new communications medium may be slowed or even stalled altogether.

**SUMMARY OF THE INVENTION**

45 Accordingly, it is an object of the invention to provide an acceptable level of security for sensitive or proprietary information associated with information transactions in a public network, such as the Internet. That object is realized through an arrangement whereby an on-line information transaction is bifurcated between a generalized information access portion of such a transaction and an exchange of sensitive user information. With such a bifurcation, the generalized  
50 information access portion of the transaction, which generally would constitute the more substantial (in terms of network resources) portion of the transaction would be handled via a non-secure network, usually a public network such as the Internet. The portion of the transaction involving sensitive user information, on the other hand, would be handled by a separate secure connection, such as a private network, or intranetwork. An important characteristic of this bifurcation arrangement is the provision of a means for automated reconfiguration of a user terminal as between accessing  
55 the generalized information via the non-secure network and access to the secure communications network for the exchange of sensitive user information. Such an automated reconfiguration will be carried out without the necessity for any action on the part of the user, and indeed will be largely invisible to the user. In a further embodiment of the invention, a transfer of data is provided from a public to a private network, wherein data selected by a user from a public net-



work site may be arranged and displayed at a user terminal and, subject to further user selection/confirmation activity, thereafter transferred to a private network.

#### BRIEF DESCRIPTION OF THE DRAWINGS

5

Figure 1 depicts an illustrative case of information transactions carried out via a public network such as the Internet.

Figure 2 shows the architecture of a browser as would typically be applied for accessing a hypermedia web page.

Figure 3 illustrates the primary elements of the reconfigurable dual-path method of the invention.

Figure 4 depicts in flow chart form the basic jump capability of the methodology of the invention.

10

Figures 5A & 5B (generally designated collectively herein as "Figure 5") depict in flow chart form the "shopping cart" capability of the methodology of the invention.

Figure 6A & 6B (generally designated collectively herein as "Figure 6") depict in flow chart form the stored configuration capability of the methodology of the invention.

15

Figure 7A & 7B (generally designated collectively herein as "Figure 7") depict in flow chart form the off-line form capability of the methodology of the invention.

#### DETAILED DESCRIPTION

For clarity of explanation, the illustrative embodiment of the present invention is presented as comprising individual functional blocks. The functions these blocks represent may be provided through the use of either shared or dedicated hardware, including, but not limited to, hardware capable of executing software.

Figure 1 depicts an illustrative case of information transactions carried out via the Internet. As seen in the figure, an exemplary user obtains access to the Internet by first connecting, via a Terminal 110 having an associated Browser 111, to an Internet Service Provider 112 selected by the user. That connection between the user and the Internet Service Provider will typically be made via the Public Switched Telephone Network (PSTN) from a modem associated with the user's Terminal to a network node in the Internet maintained by the selected Internet Service Provider.

Once the user has obtained access to the selected Internet Service Provider, an address is provided for connection to another user or other termination site and such a connection is made via the Internet to that destination location. As can be seen from the figure, communication via the Internet may be either user-to-user, as from Terminal 110 to Terminal 130, or from a user to a node representing an information source accessed via the Internet, such as Public Site 120.

It will of course be understood that the Internet provides service to a large number of users and includes a large number of such Public Sites, but the illustration provides the essential idea of the communication paths established for such Internet communication. It will also be understood that a number of service classifications are supported by the Internet, with the World Wide Web service, which represents a preferred embodiment for the public network aspect of the method of the invention, being one of the currently most heavily trafficked of such services.

The Web Browser, such as depicted at 111, can be seen as a software application operating in conjunction with a user terminal (such as Terminal 110) which provides an interface between such a user terminal and the particular functionality of the WWW information site. The architecture of such a browser is generally described in terms of three main components, as illustrated in Figure 2. At the top level is the Browser 201, which enables the acquisition of information pages from a WWW server (beginning, in all cases, with the "home page" for that server), for display at a display device associated with the terminal. The Browser also provides the necessary interface for the terminal with the HTML functionality used by the server to provide access to other linked information layers.

The second level of the browser architecture is the TCP/IP Stack 202, which handles the communications protocols used for connecting the terminal to the WWW server. The bottom level of this architecture is the Dialer 203, which typically handles the function of providing dialing and setup digits to a modem, as illustrated at 204, such a modem generally being a part of the terminal. Normally, upon receiving dialing and other setup information from the dialer, the modem would cause a connection to be made via the PSTN to the Internet Service Provider selected for that terminal.

After a connection is established in this manner to the Internet Service Provider, an address would be provided for the WWW information node sought to be contacted, a connection to that node made through the Internet, and the home page for that node caused to be displayed at the terminal's display device. A user would then select a key word in that home page, typically by clicking on the word with a mouse or similar device, and, upon transmission of that selection signal to the WWW server, a hyperlink would be created to the linked information layer and the open page of that layer would be caused to be displayed at the user terminal.

As explained above, serious questions have been raised in respect to the security of communications via the public Internet. (Note, that the discussion herein is focused on the Internet, and particularly the WWW functionality of the Internet, as a preferred embodiment of such public data communication networks generally, but the methodology of the invention will be applicable to any such network.) To address this problem, the methodology of the invention begins with a bifurcation of the information transaction between a user and the selected information transaction provider into a por-

tion related to sensitive or proprietary user information, and other information comprising that transaction. With such a bifurcation, it becomes possible to provide substantial security for that proprietary information by use of an alternative communications path for that separated portion of the transaction via a private network, or intranetwork -- *i.e.*, a connection between a user's terminal and a secure serving node on that private network. It is anticipated that a coordination means will be established in respect to the management of information among the public and private network elements of the bifurcated information transaction.

In its basic form, this methodology may be carried out by the user terminal initiating a call via the Internet to a selected WWW node, and upon establishing connection to that node, proceeding with the desired information transaction up to the point where an exchange of sensitive or proprietary information were required. At that point the user terminal would be instructed by the WWW server to terminate that connection (*i.e.*, hangup) and to place a new call to an identified private network server for the necessary exchange of sensitive information.

However, in order to accomplish such a dual-path transaction, it is necessary that the browser at the user terminal be reconfigured to provide the dialing, authorization (*i.e.*, login and password), and other needed information for accessing the alternative private network, in order to implement the proprietary portion of the transaction. It will also usually be the case that, upon completion of that private-network transaction, the original dialer, stack and browser configurations will need to be restored, in order for the terminal to retain its normal Internet access functionality. Such a reconfiguration and subsequent restoral of the necessary parameters in the browser, stack and dialer is likely to be well beyond the capabilities of the average user.

Accordingly, as a further embodiment of the inventive methodology, an automated browser reconfiguration means is provided which interoperates with the browser. This browser reconfiguration means is described in detail hereafter and will be referred to as the "Bridging Software".

Figure 3 provides an illustration of the primary elements of the reconfigurable dual-path method of the invention. As seen in the figure, a first path comparable to the Internet link shown in Figure 1, between User Terminal 301 and WWW Serving Node 330 (via Browser 302, Modem 303, Internet Service Provider 310, and Internet 320) is provided. However, an alternative path is now provided from the output of Modem 303 to Private Server 350. That path is illustrated as being via the PSTN, which is generally regarded as being highly secure, but an alternative dedicated or other more-secure path between the User Terminal 301 and the Private Server 350 could as well be provided. In keeping with the discussion above, Browser 302 shown in Figure 3 would also include the Bridging Software installed as a helper application for implementing the automatic reconfiguration of the Browser.

In the operation of this system, a user would normally make an initial connection to an Internet application, such as the application represented by WWW Serving Node 330, which, *e.g.*, might be a shopping application, a financial transaction, or the provision of an enrollment form for off-line preparation. After conducting all, or some portion of an information transaction short of an exchange of sensitive or proprietary information, including a capture by the user's terminal of needed information from the public site, a user provides a signal indicative of an end to that portion of that transaction. During the course of the public portion of the information transaction, specially configured files are sent from the WWW serving node to the Bridging Software associated with Browser 302. Such files contain instructions for the Bridging Software to store information-like products -- *e.g.*, for selected items from a catalog, forms for enrollment, or non-secure portions of a financial transaction, and reconfiguration information for dialing and logging into the private portion of the transaction. The Bridging Software then hangs up the Internet connection, edits the user terminal's browser, stack and dialer files to reconfigure the terminal to connect to the private server. Prior to automatic redialing of the new private site for the user, the Bridging Software may be instructed by the application operating at WWW Server Node 330 to display items chosen for purchase, or to display a form for the end-user to complete off-line before dialing the private application. Upon connecting to the private application and completing the transaction as to the user sensitive information in a private environment, the Bridging Software then restores the end-user software to the dialing and authorization parameters required to dial to the public Internet.

A particularly advantageous application of the automated reconfiguration and information transfer methodology of the Bridging Software is that it adds value to certain WWW servers which do not possess the Common Gateway Interface ("CGI") capability -- *i.e.*, a provision of specialized functions on the server beyond just displaying HTML files, and are accordingly unable to accomplish any transactional processing in respect to items selected by a user. In effect, such a non-CGI server, on its own, can only serve as a "billboard" for the items represented in its database.

However, with the collection and redelivery process of the Bridging Software, a data capture and processing mechanism can be implemented for servers operating in a non-CGI environment -- such servers being incapable of more than the simple delivery of static data packets corresponding to available items. The data set enabled by the Bridging Software is a mechanism for augmenting such limited server capabilities by defining a flexible mechanism for the receipt, display, and delivery of arbitrary data from one site to another.

In such a scenario, the Bridging Software receives a "shopping cart" item list from the host as a data-set defined with a static MIME data packet associated with the Bridging Software. This information comprising the data-set may be updated, displayed to the user in a "read-only" fashion, or presented to the user for order selection.

During the process of interacting with the WWW server, a user may trigger HTML links resulting in additional MIME packets for the Bridging Software being delivered to the client. These packets allow items to be added and/or removed from the specified data set or presented to the user for local confirmation. The user will interact with a pop-up screen provided by the Bridging Software which presents the items available with product information, such as part number, description, unit cost, etc. The user identifies those items which are to be placed into the "shopping cart" and the quantity of items desired. Upon completion of the form, the Bridging Software stores the order in a format suitable for subsequent delivery to the private server site.

An additional feature provided by the methodology of the Bridging Software is an automated mechanism for providing compatibility with user terminals not previously having the Bridging Software included with the terminal's browser. To that end, the Bridging Software located at an accessed public network site initially checks to see if the browser counterpart for that software is loaded at the calling user terminal. If yes, the heretofore described processes of the Bridging Software go forward. If not however, a request is sent through the public host to download the Bridging Software to the calling terminal. After such a download, a helper application loads the Bridging Software to the terminal's browser.

### I. Illustrative Embodiments

A variety of browser reconfiguration applications are supported by the automated browser reconfiguration means of the invention. Four essentially diverse capabilities of this invention, which support such applications, are described hereafter as illustrative embodiments of the invention.

#### A. Basic Jump Capabilities

In this configuration, which is illustrated in flow chart form in Figure 4, an end-user is connected to a chosen WWW serving node (where a desired information product is made available) via a modem and an Internet browser associated with the user's terminal (Step 401 of Figure 4). After conducting an information transaction with the selected WWW serving node for some interval (determined in relation to the specific application accessed), the user clicks on a hyper-text link, or picture, to begin an automated process which will cause that public session to be terminated and a new connection established to an alternate private data network (Step 402).

In response to that user action, a data message containing parameter reconfiguration instructions is passed from the WWW server application to the Bridging Software at the user's terminal (Step 403). Upon receiving such instructions, the Bridging Software edits the user's on-line communications software parameters, reconfiguring that software to dial the alternate data network (Step 404). This reconfiguration is fully automatic and transparent to the user, and includes parameters such as modem dial number, login, password, and TCP/IP addresses. At that point, the Bridging Software causes the modem to disconnect the current data network connection, shutting down the browser, and to then dial the alternate private data network (Step 405).

With the establishment of a connection to the private server on the alternate data network, the user interacts with the alternate data network application as appropriate (Step 406), and after an interval completes his activity with the alternate data network and provides an indication of such completion (Step 407). A data message containing parameter reconfiguration instructions is then passed from the alternate data network application to the Bridging Software (Step 408).

At that point, the Bridging Software again edits the user's on-line communications software parameters, reconfiguring them to dial the original public data network, or another preselected network (Step 409). As with the first reconfiguration, this configuration is automatic and includes parameters such as modem dial number, login, password, and TCP/IP addresses. The Bridging Software automatically causes the current private data network to be disconnected by the modem (Step 410), and if appropriate, causes the original public data network to be redialed (Step 411). When such a reconnection to the public data network is established, the end-user would then continue his application in the public data network.

#### B. "Shopping Cart" Capability

With this configuration, illustrated in flow chart form in Figure 5, a user begins by establishing a connection to a WWW application (assuming for the moment that the application is non-CGI enabled) at a serving node for that application, using the Internet browser and modem associated with the user's terminal (Step 501 of Figure 5). Upon finding an item in that application to be saved, or remembered for later consideration, or purchase, the user clicks on a hyper-text link, or picture, representing that item (Step 502). That application then sends a data message to the Bridging Software containing information about the items selected (Step 503) and such information is stored by the Bridging Software.

ware in the "shopping cart" file in the user's terminal (**Step 504**). Such selection download and storage steps (*i.e.*, steps 502, 503 & 504) are repeated for as many items as the user chooses to select. At any point after the Bridging Software has received the first set of item selection information, the user can instruct the Bridging Software to cause those selected items about which such information has been received to be displayed locally (at the user's terminal), where the user may review or edit (including deletion if desired) the collection of items theretofore selected. The application may also control display characteristics such as color and font for such locally displayed items. Note that in the case of a CGI-enabled application, the application itself will keep track of the items selected by the user and only download the totality of the selected items at the end of the selection process, and accordingly, the described local display option will not be applicable to such a CGI-enabled application.

At the point of completion of his "shopping", the user clicks on a hyper-text link or picture to "check out" (**Step 505**), which will begin a process of causing a jump to an alternate data network for the completion of sensitive portions of the transaction. To that end, a data message containing parameter reconfiguration instructions is passed from the WWW application to the Bridging Software (**Step 506**). It is to be noted that, as a security measure, information such as the new dial number, IP address, home page, configuration data (*e.g.*, login, password, DNS address) may be passed over the public network in encrypted form.

Upon receiving such reconfiguration instructions, the Bridging Software edits the user's on-line communications software parameters, reconfiguring that software to dial the alternate data network (**Step 507**). This reconfiguration is fully automatic and transparent to the user, and includes parameters such as modem dial number, login, password, and TCP/IP addresses. At that point, the Bridging Software causes the modem to disconnect the current data network connection, shutting down the browser, and to then dial the alternate data network (**Step 508**).

The Bridging Software passes the stored "shopping cart" data captured from the WWW application to the alternate network application (**Step 509**), where that data may be displayed for the user, permitting the user to confirm and/or modify the data (**Step 510**). The user interacts with the alternate data network application as appropriate, and after an interval completes his activity with the alternate data network (**Step 511**) and thus, by providing an appropriate completion signal to the application, completing the private portion of the information transaction (**Step 512**). A data message containing parameter reconfiguration instructions is then passed from the alternate data network application to the Bridging Software (**Step 513**).

The Bridging Software, at this point, again edits the user's on-line communications software parameters, reconfiguring them to dial the original (or another pre-defined) data network (**Step 514**). As with the first reconfiguration, this configuration is automatic and includes parameters such as modem dial number, login, password, and TCP/IP addresses. The Bridging Software automatically causes the current private data network to be disconnected by the modem (**Step 515**), and if appropriate, causes the original public data network to be redialed (**Step 516**). When such a reconnection is established to the point in the public data network where the user had left off to handle the secured aspects of his information transaction, the user would then continue his application in the public data network.

### C. Stored Configuration Capabilities

For this configuration, depicted in flow chart form in Figure 6, an end-user is connected to a chosen WWW serving node (where a desired information product is made available) via a modem and an Internet browser associated with the user's terminal (**Step 601** of Figure 6). The user selects a hypertext link or picture associated with the WWW application by clicking on such link or picture (**Step 602**). A data message containing parameter reconfiguration instructions and an application icon (related to the selected hypertext link or picture) is passed from the WWW application to the Bridging Software (**Step 603**).

The Bridging Software creates an icon for display at the user's terminal, and saves a Bridging Software configuration file that is associated with that icon (**Step 604**). Such Bridging Software actions are automatic and multiple selections may be captured in this manner. At this point the user may continue the on-line session, or, if all desired selections have been made, a signal is provided from the user that the session should be discontinued (**Step 605**). The Bridging Software then automatically disconnects the current data network connection (**Step 606**).

After disconnecting from the WWW application, and following an interval determined by the user, a new application is selected by the user by clicking on the appropriate new icon displayed at the user's terminal (**Step 607**). The Bridging Software receives the reconfiguration instructions from the file associated with the selected icon (**Step 608**).

The Bridging Software edits the user's on-line communications software parameters, reconfiguring that software to dial the alternate data network (**Step 609**). The Bridging Software then automatically starts the user's Internet browser software and causes the alternate network application to be dialed by the modem associated with that terminal (**Step 610**). Upon establishing a connection to the alternate network, the user interacts with that application and completes the transaction to the user's satisfaction (**Step 611**). After a signal is sent to the alternate network indicating such completion of the user's activity (**Step 612**), a data message containing parameter reconfiguration instructions is passed from the alternate data network application to the Bridging Software (**Step 613**). That Software then causes the user's

terminal configuration parameters to be reset (**Step 614**) and the alternate data network to be automatically disconnected (**Step 615**).

#### D. Off-Line Form Capability

5

In this configuration, depicted in flow chart form in Figure 7, an end-user is connected to a chosen WWW serving node (where a desired information product is made available) via a modem and an Internet browser associated with the user's terminal (**Step 701** of Figure 7). The user selects a hypertext link or picture associated with an off-line form application -- an exemplary such form being an HTML-based form -- by clicking on such link or picture (**Step 702**). A data message containing parameter reconfiguration instructions for the Bridging Software, the selected off-line-form application, and an optional icon (related to the selected hypertext link or picture) is passed from the WWW application to the Bridging Software (**Step 703**). Note that the selected off-line form may be for either single or multiple use.

10

In the case of a delayed or multiple use of the selected form, the Bridging Software may create an icon for display at the user's terminal, and will save a Bridging Software configuration file that is associated with that icon (**Step 704**). The form in question is also saved on the user's terminal. Such Bridging Software actions are automatic. At this point the user may continue the on-line session, or, if all desired selections have been made, a signal is provided from the user that the session should be discontinued (**Step 705**). The Bridging Software then automatically disconnects the current data network connection (**Step 706**).

15

After disconnecting from the WWW application, two cases are to be considered as to the further processing of the selected form: (1) an immediate single use of the form and (2) either a delayed or multiple use of the form. In the first case, the Bridging Software edits the user's on-line communications software parameters, reconfiguring that software to dial the alternate data network. The Bridging Software then automatically starts the user's Internet browser software which is caused to display the off-line form. The user then completes the off-line form and chooses a "Submit Form" button displayed at his terminal.

20

25

In the second case, the Bridging Software will have created an icon for display at the user's terminal and saved a Bridging Software configuration file associated with that icon. Following an interval determined by the user, the off-line-form application is started by the user by clicking on the new form icon displayed at the user's terminal (**Step 707**). The Bridging Software receives the reconfiguration instructions from the file associated with the selected icon (**Step 708**).

30

The Bridging Software edits the user's on-line communications software parameters, reconfiguring that software to dial the alternate data network (**Step 709**). The Bridging Software then automatically starts the user's Internet browser software which is caused to display the off-line form (**Step 710**). The user then completes the off-line form and chooses a "Submit Form" button displayed at his terminal (**Step 711**).

35

In either the first or second case, following activation of the "Submit Form" button, the alternate network application is then caused to be dialed by the Bridging Software. Upon establishing a connection to the alternate network, the form data is passed to the alternate network (**Step 712**). The user then interacts with that application and completes the application (**Step 713**). After a signal is sent to the alternate network indicating such completion of the user's activity (**Step 714**), a data message containing parameter reconfiguration instructions is passed from the alternate data network application to the Bridging Software (**Step 715**). That Software then causes the user's terminal configuration parameters to be reset (**Step 716**) and the alternate data network to be automatically disconnected (**Step 717**).

40

#### CONCLUSION

A system and method has been described for the automatic switching of an information transaction between two or more alternate networks. This functionality, which incorporates a reconfiguration means designated herein as the Bridging Software, supports the movement of application specific data from one on-line environment to another. Among potential applications of this process for passing data between different environments are: selected items for purchase ("shopping cart"), captured data from forms, and other server captured data such as web pages visited.

45

The Bridging Software reconfiguration means is intended to work with various Web Browser software implementations, including the Netscape Personal Edition (NPE) Software for Windows 3.1 and 3.11, and which represents a working embodiment for the invention. The Bridging Software installs itself as a helper application within the browser application and utilizes a special MIME type configuration file to pass reconfiguration and "shopping cart" information from the server to the client software.

50

When an application requires a user to re-connect to a private application, a reconfiguration file is passed to the Bridging Software helper application via a CGI script or simple hyper-text link. The helper application disconnects the current data connection, reconfigures the dial parameters (dial #, login password, DNS address, and home page) and initiates the dial program so the end-user can access the private application.

55

When the end-user connects to the private application, the Bridging Software reconfiguration means provides the new "private server" application with data collected from the "public server", and the application resumes in a private,

secure environment.

The Bridging Software allows both short term and long term storage of dial configurations. Configurations passed to the Bridging Software can be designated as single use configurations and discarded after the application has terminated, or saved and displayed to the end-user as a dial choice by the Bridging Software.

Although the present embodiment of the invention has been described in detail, it should be understood that various changes, alterations and substitutions can be made therein without departing from the spirit and scope of the invention as defined by the appended claims. In particular, it is noted that, while the invention has been primarily described in terms of a preferred embodiment based on an automatic reconfiguration between a public and a private data network, any the methodology of the invention will be equally applicable to any set of alternate networks.

**Claims**

1. A method for managing a transaction via a communications path between a terminal device and a serving node in a data network, said method comprising the steps of:

establishing an initial communications path via a first connection between said terminal device and a serving node in a first data network;  
 receiving information from said serving node in said first data network for effecting a reconfiguration of said communications path for said transaction from said first connection in said first data network to a second connection in a second data network; and  
 automatically connecting said terminal device to a serving node in said second data network via said second connection.

2. A method for managing a transaction via a communications path between a terminal device and a serving node in a data network, said method comprising the steps of:

establishing an initial communications path via a first connection between said terminal device and a serving node in a first data network;  
 selecting at least one information item from a data base of said information items provided at said serving node in said first data network;  
 causing said selected information items to be downloaded to said terminal device via said first connection;  
 receiving information from said serving node in said first data network for effecting a reconfiguration of said communications path for said transaction from said first connection in said first data network to a second connection in a second data network; and  
 automatically connecting said terminal device to a serving node in said second data network via said second connection.

3. A method for managing a transaction via a communications path between a terminal device and a serving node in a data network, said method comprising the steps of:

establishing an initial communications path via a first connection between said terminal device and a serving node in a first data network;  
 identifying at least one data network application from a data base of said data network applications provided at said serving node in said first data network;  
 receiving information from said serving node in said first data network for reconfiguring said terminal device for implementation of a communication path via an alternate connection between said terminal device and at least one of said identified data network applications in a second data network; and  
 in response to a selection signal from a user, automatically connecting said terminal device to a selected one of said identified data network applications via said alternate connection.

4. A method for managing a transaction via a communications path between a terminal device and a serving node in a data network, said method comprising the steps of:

establishing an initial communications path via a first connection between said terminal device and a serving node in a first data network;  
 selecting an off-line form application from a data base provided at said serving node in said first data network;  
 receiving information from said serving node in said first data network for reconfiguring said terminal device for implementation of a communication path via a second connection between said terminal device and said

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selected off-line form application in a second data network; and  
in response to, a selection signal from a user, automatically connecting said terminal device to said selected off-line form application.

- 5 5. The method for managing a transaction of Claim 1 or 2 including the further step of recognizing a signal to reconfigure said communications path from said first connection to said second connection.
6. The method for managing a transaction of Claim 3 wherein said selected data network application is operated at a serving node in said second data network.
- 10 7. The method for managing a transaction of Claim 4 wherein said selected off-line form application is operated at a serving node in said second data network.
8. The method for managing a transaction of one of the Claims 1, 2, 6 or 7 wherein said serving nodes in said first and said second data networks are manifested in a common node.
- 15 9. The method for managing a transaction of Claim 1 or 2 wherein said step of receiving information includes the further step of effecting said reconfiguration of said communications path.
- 20 10. The method for managing a transaction of Claim 1 or 2 wherein said step of automatically connecting includes the step of automatically disconnecting said first connection prior to implementation of said second connection.
11. The method for managing a transaction of Claim 1 or 2 including the further steps of:
- 25 automatically disconnecting said second connection in response to a user signal; and  
reconfiguring said terminal device to enable, in response to user instruction, an implementation of a connection via an identified data network.
- 30 12. The method for managing a transaction of Claim 11 wherein said step of automatically reconfiguring said terminal device includes the step of effecting said implementation of said connection via said identified data network.
13. The method for managing a transaction of Claim 2 wherein said step of causing said selected information items to be downloaded includes the further step of causing said selected information items to be displayed at said terminal device.
- 35 14. The method for managing a transaction of Claim 13 wherein said displayed selected items can be edited by a user at said terminal device.
15. The method for managing a transaction of Claim 13 wherein display characteristics for said displayed selected items can be controlled at said terminal device.
- 40 16. The method for managing a transaction of Claim 2 wherein said step of automatically connecting includes the step of uploading said selected information items from said terminal device to said service provider via said second connection.
- 45 17. The method for managing a transaction of Claim 3 including the further steps of:
- automatically disconnecting said alternate connection in response to a user signal; and  
reconfiguring said terminal device to enable implementation of a pre-selected connection between said terminal device and an identified data network.
- 50 18. The method for managing a transaction of Claim 17 wherein said step of automatically reconfiguring said terminal device includes the further step of effecting said implementation of said pre-selected connection.
- 55 19. The method for managing a transaction of Claim 4 including the further step of downloading from said serving node in said first data network to said terminal device of an off-line form related to said off-line form application.
20. The method for managing a transaction of Claim 4 including the further step of uploading said downloaded off-line

form from said terminal device to said selected off-line form application, after processing by a user.

21. The method for managing a transaction of Claim 4 including the further steps of:

5 automatically disconnecting said connection to said selected off-line form application in response to a user signal; and  
reconfiguring said terminal device to enable implementation of a pre-selected connection between said terminal device and an identified data network.

10 22. The method for managing a transaction of Claim 21 wherein said step of automatically reconfiguring said terminal device includes the further step of effecting said implementation of said pre-selected connection.

15 23. A method for managing connections between a terminal device and at least one information source/processor wherein at least two of said connections are implemented via separate communications networks, comprising the steps of:

recognizing a signal for connection to an information source/processor via a communications network other than a communications network for which a predetermined connection is configured;  
causing said terminal device to implement a connection to said information source/processor via said other communications network; and  
20 upon termination of said information source/processor connection via said other communications network, automatically reconfiguring a connection criteria in said terminal device to enable said terminal device to implement, in response to user instruction, a connection via an alternative one of said communications networks.

25 24. The method for managing connections of Claim 23 wherein said recognizing step occurs at a point when said terminal device is connected to a given source/processor.

30 25. The method for managing connections of Claim 23 wherein information items may be selected by a user at said terminal device from said given source/processor, and including the further step of causing said selected information items to be downloaded from said source/processor to said terminal device.

35 26. The method for managing connections of Claim 25 wherein said step of effecting connection includes the further step of uploading said selected information items from said terminal device to said other information source/processor.

40 27. The method for managing connections of Claim 26 wherein said selected information items are processed by said user at said terminal device prior to uploading to said other information source/processor.

45 28. The method for managing connections of Claim 24 including the further step of causing said given source/processor to download to said terminal device configuration data for enabling said step of effecting connection to said other information source/processor.

50 29. The method for managing connections of Claim 24 including the further step of causing said other source/processor to download to said terminal device configuration data for enabling said step of automatically restoring a prior connection criteria in said terminal device.

55 30. A method for enhancing security of certain data in an on-line information transaction comprising the steps of:

bifurcating said information transaction into a first portion comprising said certain data and a remaining portion, wherein said remaining portion is carried out via a public on-line communications connection between a terminal device and a public information server;  
causing said first portion to be carried out via a secure private on-line communications connection between said terminal device and a private information server; and  
automatically reconfiguring network access means in said terminal device to switch between said public connection and said private connection.



FIG. 1

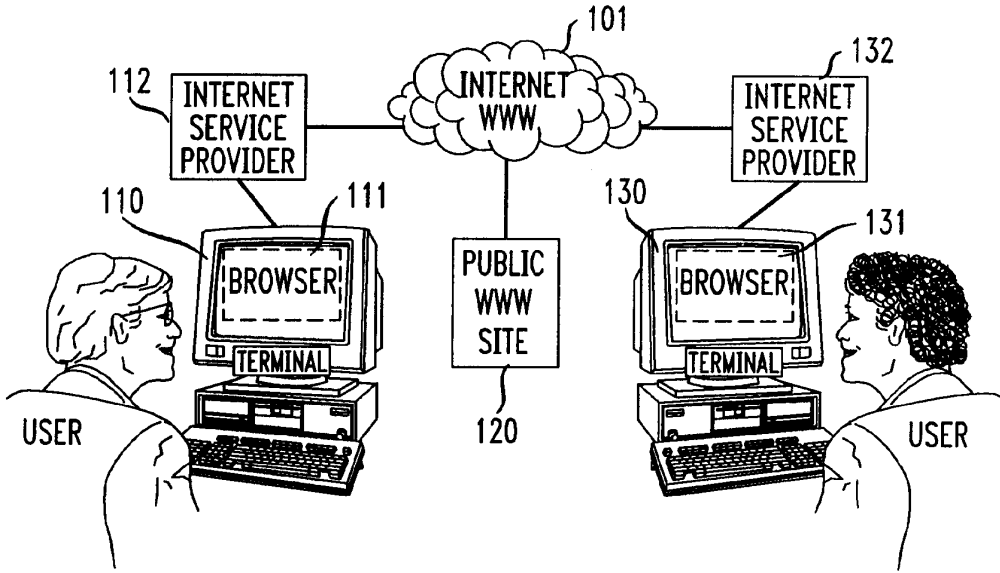


FIG. 2

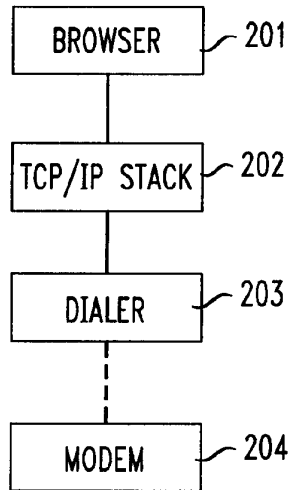


FIG. 3

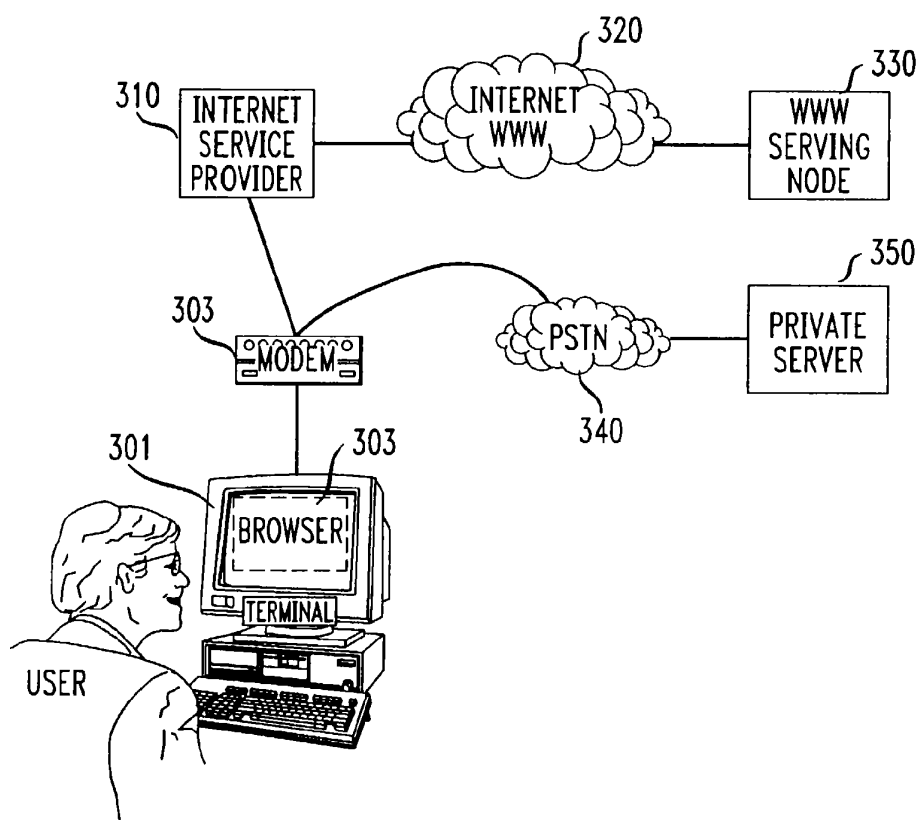


FIG. 4

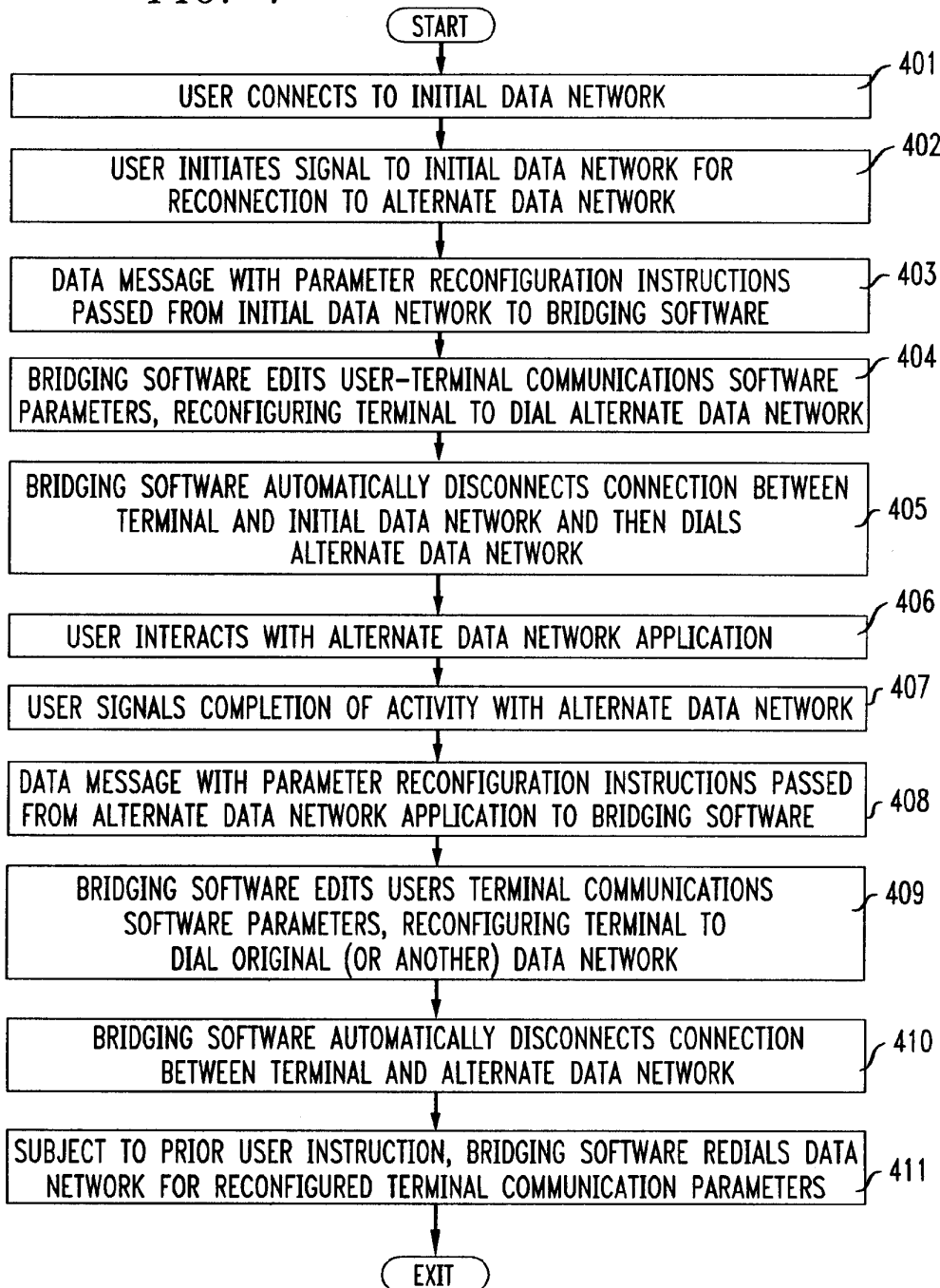


FIG. 5A

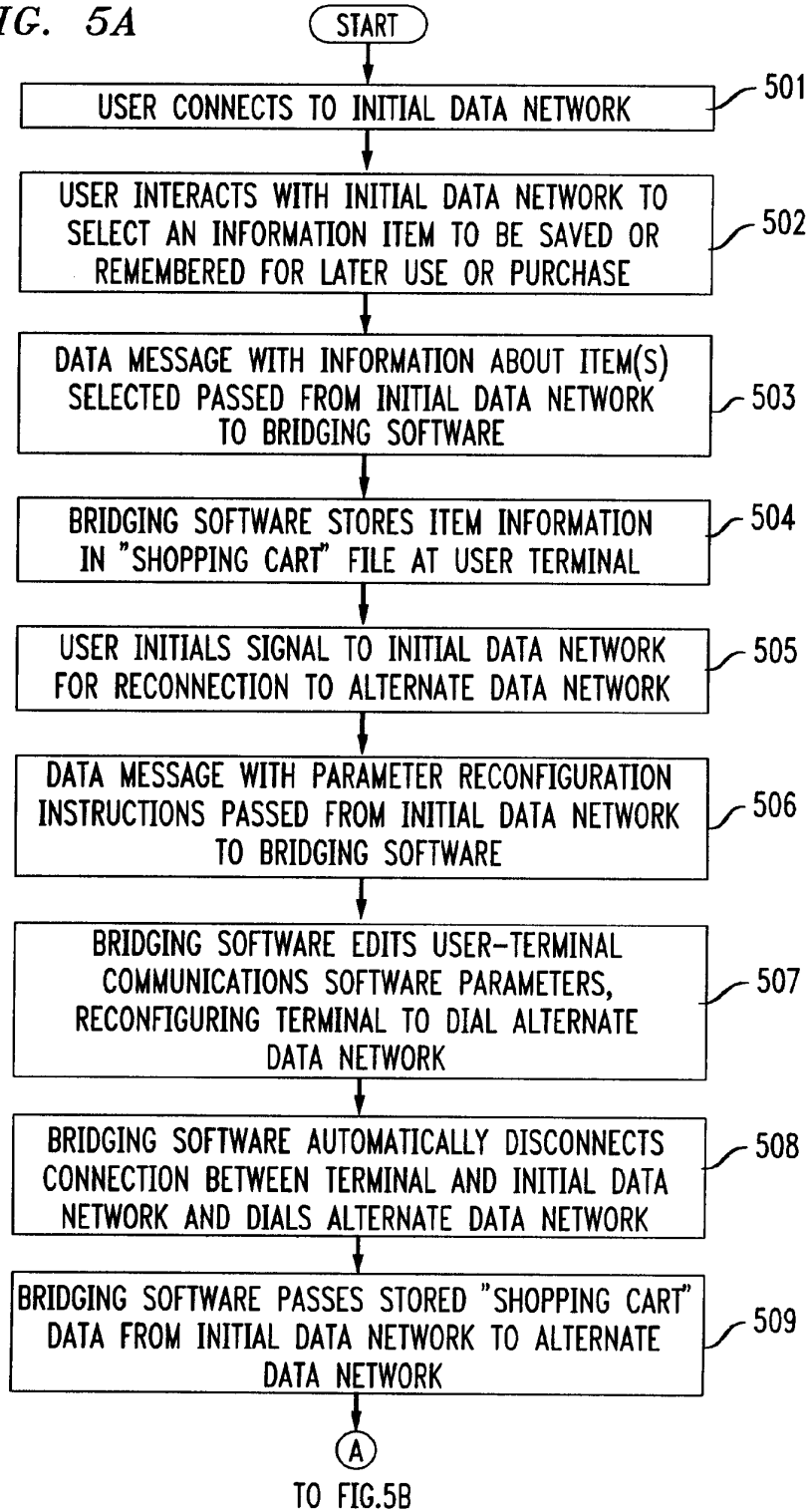


FIG. 5B

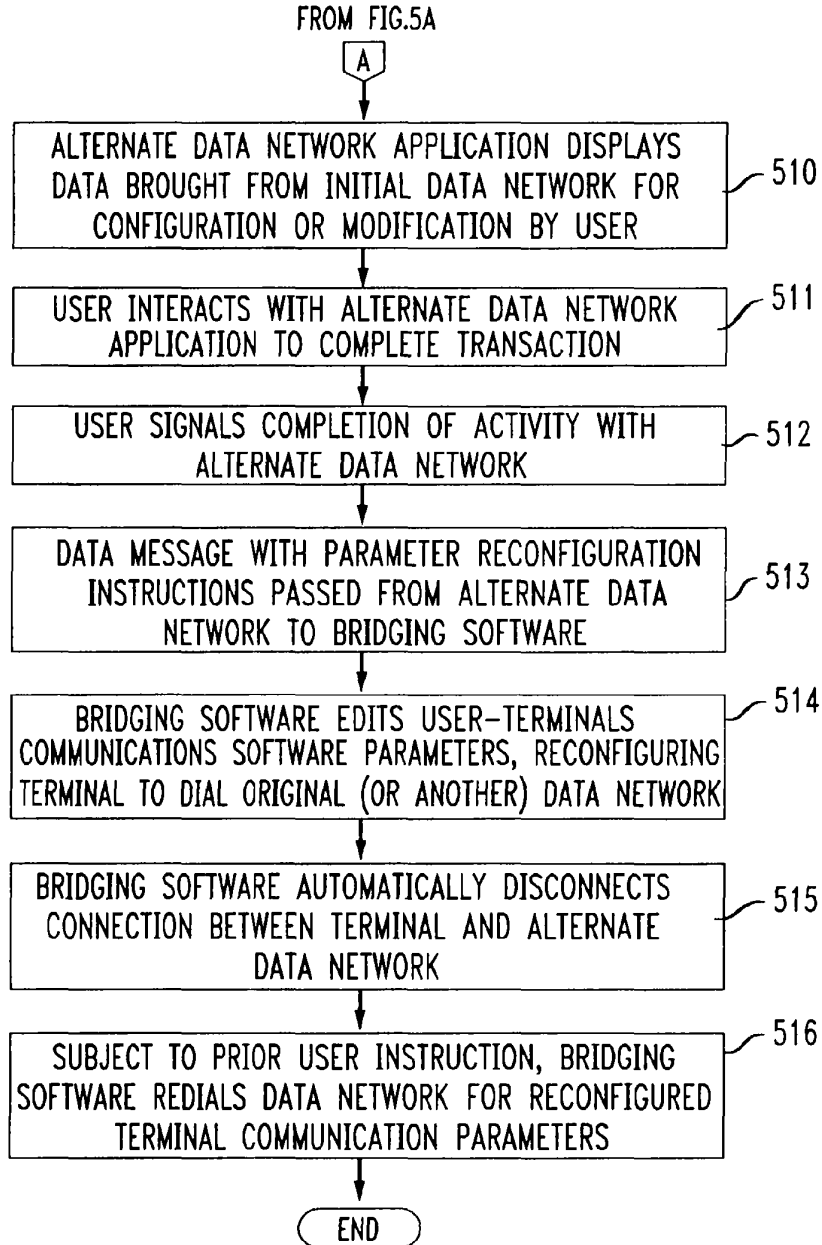


FIG. 6A

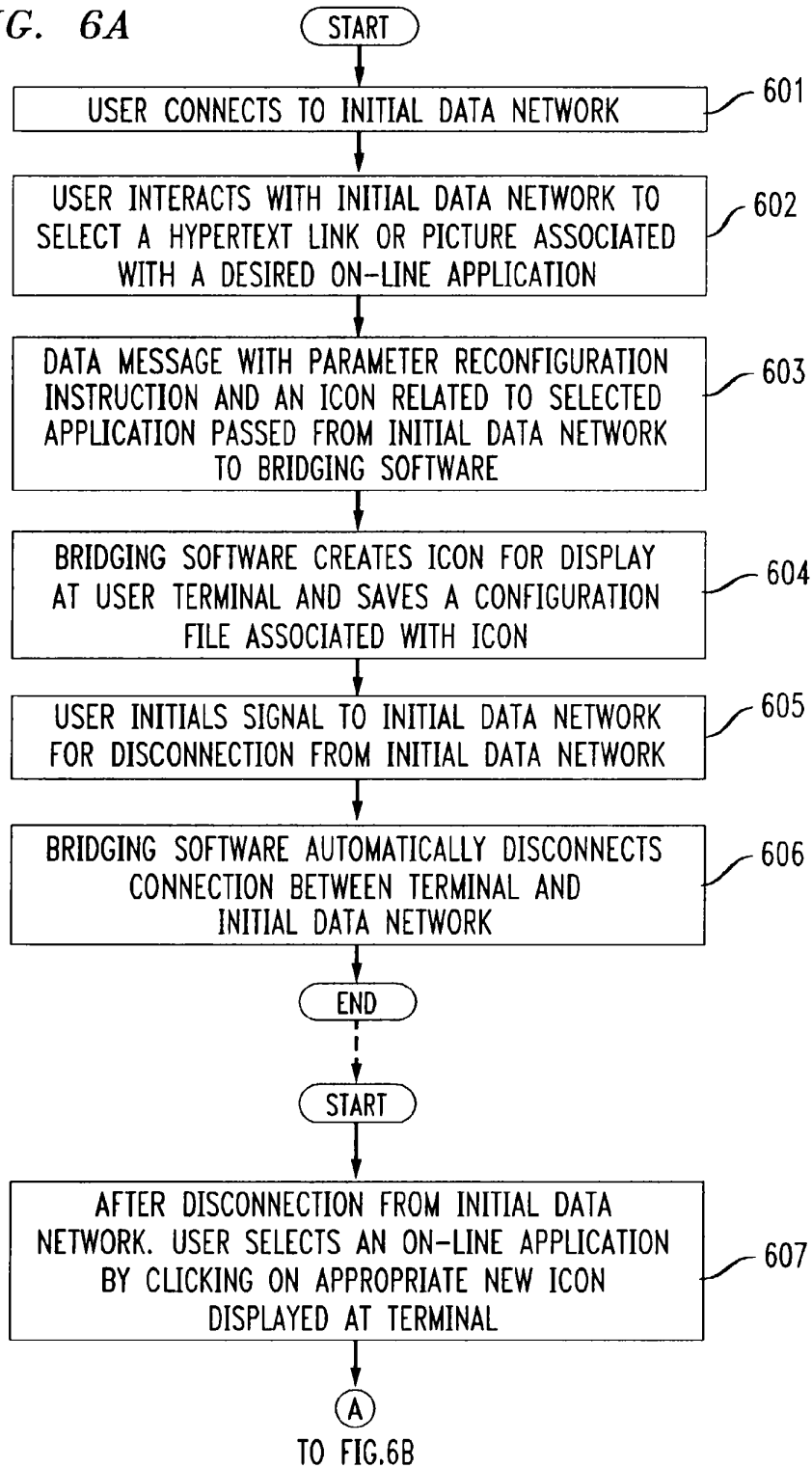


FIG. 6B

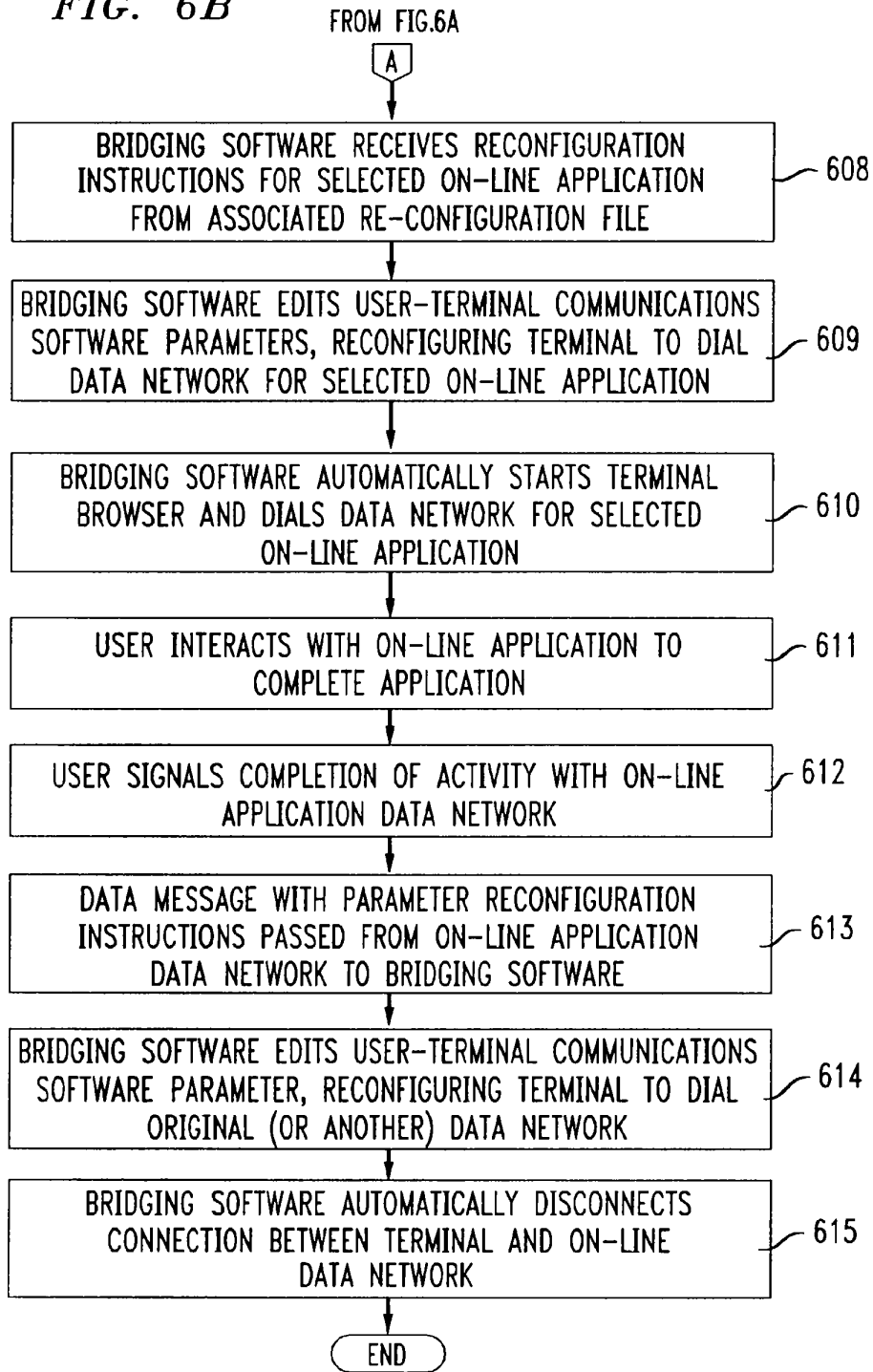


FIG. 7A

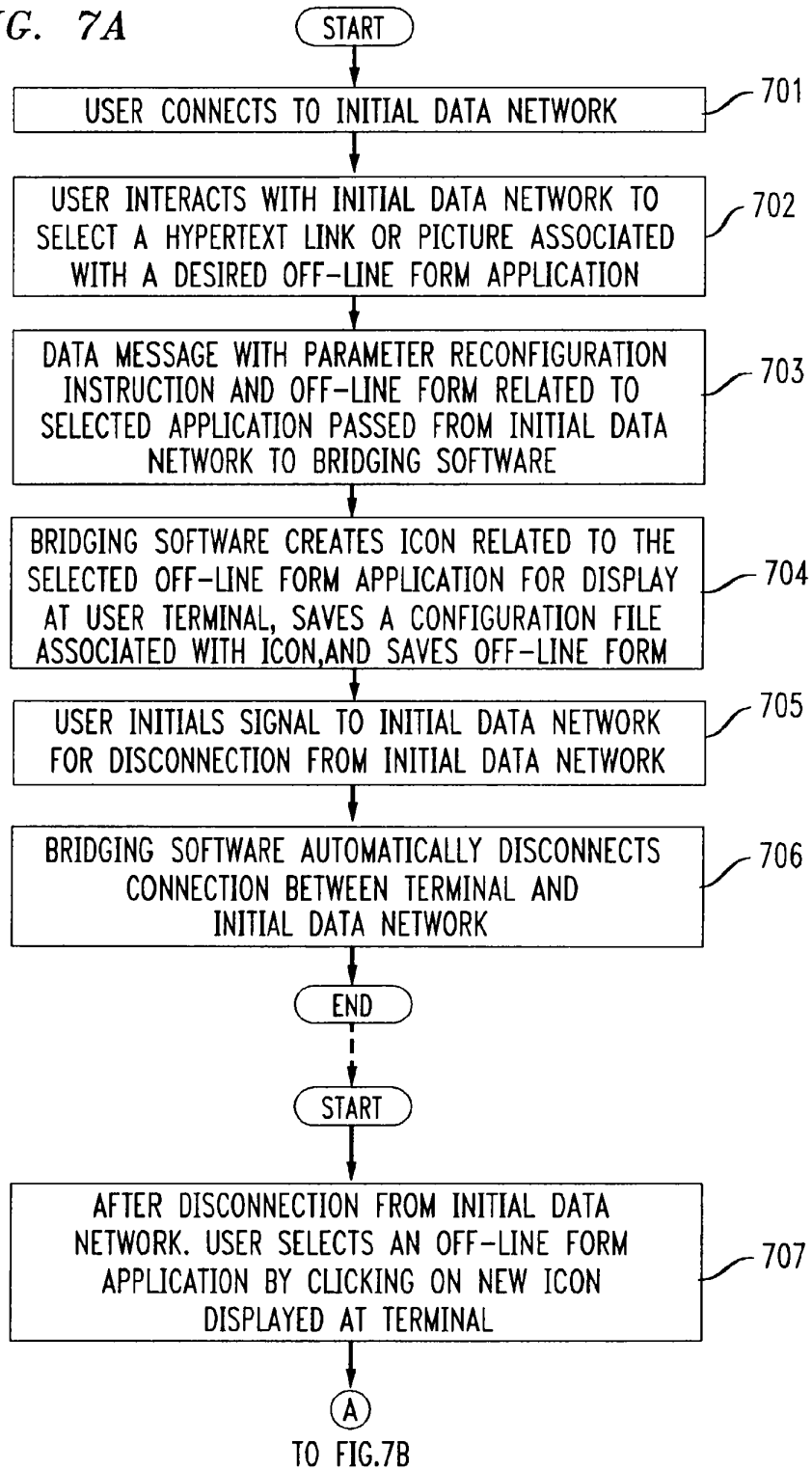
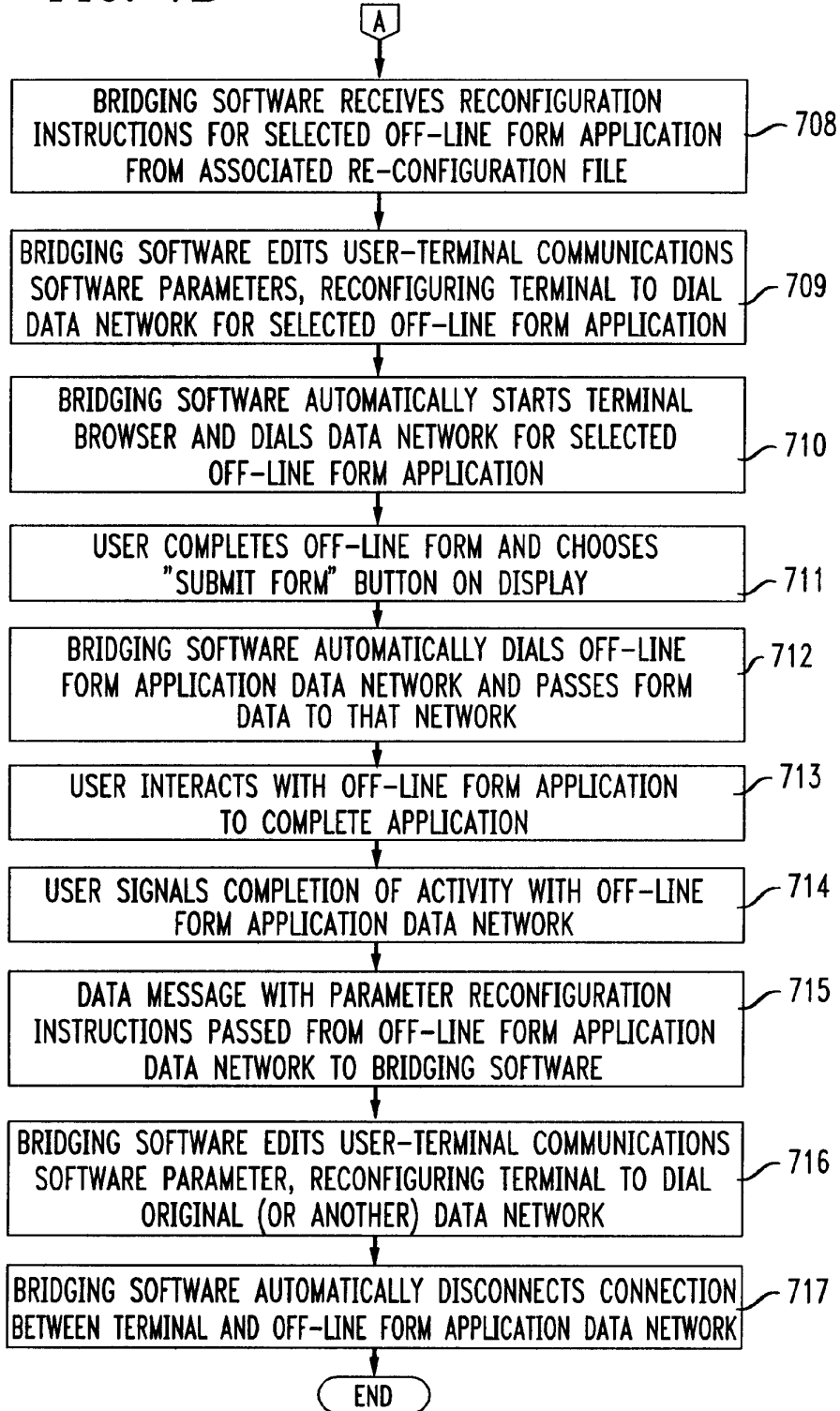




FIG. 7B

FROM FIG.7A



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(51) INT CL<sup>6</sup>

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(52) UK CL (Edition P )

**H4P PPEB  
U1S S2124 S2209**

(56) Documents Cited

**WO 97/26735 A1 WO 97/26734 A1 WO 97/26731 A1  
WO 97/23972 A1 WO 97/13340 A1**

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**UK CL (Edition P ) H4P PDCSA PDCSC PPEB  
INT CL<sup>6</sup> H04L 9/00 9/32 29/06 29/08  
Online: WPI, INSPEC**

(54) **Virtual Private Network for encrypted firewall**

(57) A system (10) for regulating the flow of messages through a firewall (18) having a network protocol stack, wherein the network protocol stack includes an Internet Protocol (IP) layer where if the message is not encrypted, it passes the unencrypted message up the network protocol stack to an application level proxy (50), and if the message is encrypted, it decrypts the message and passes the decrypted message up the network protocol stack to the application level proxy. The step of decrypting the message includes the step of executing a process at the IP layer to decrypt the message.

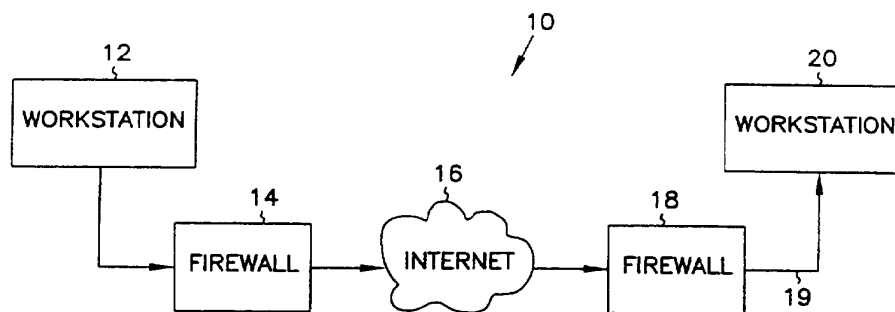


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

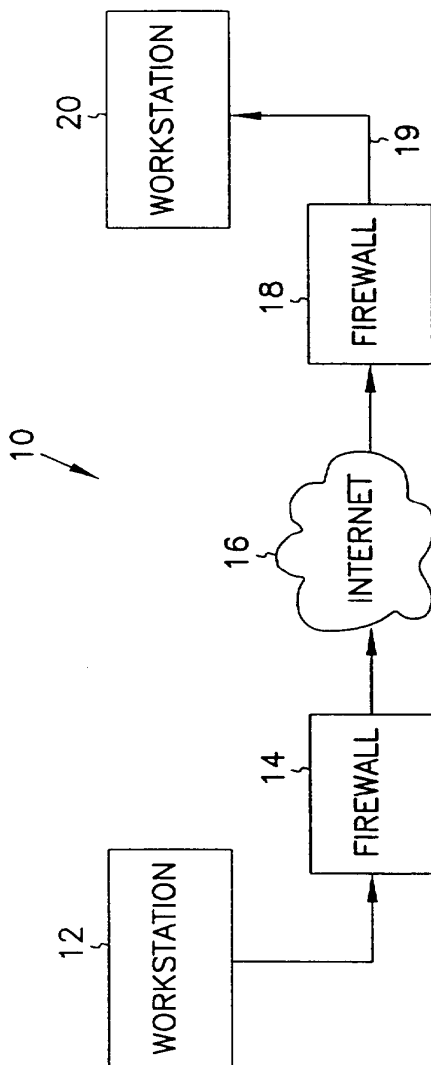


FIG. 1

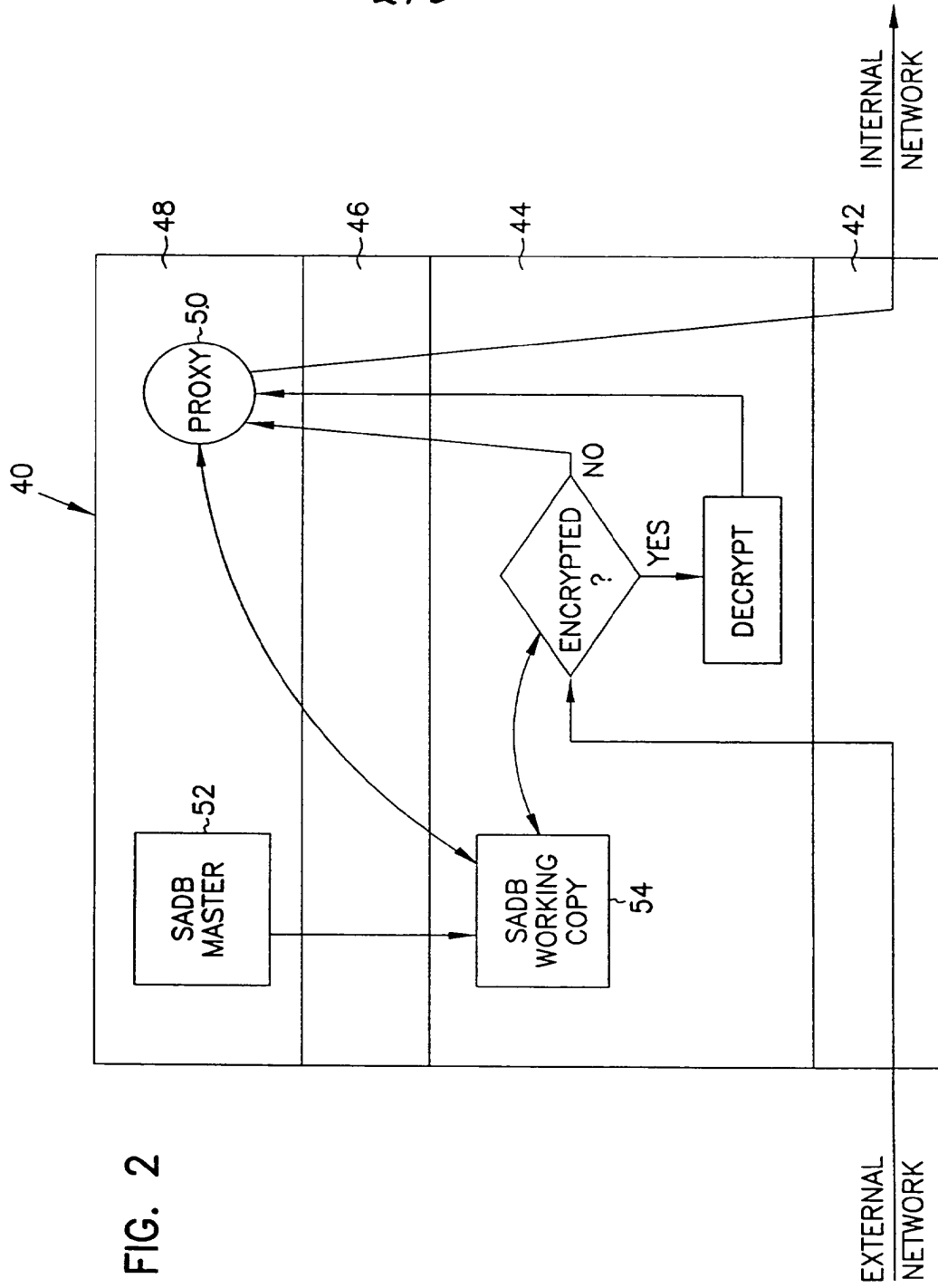


FIG. 2

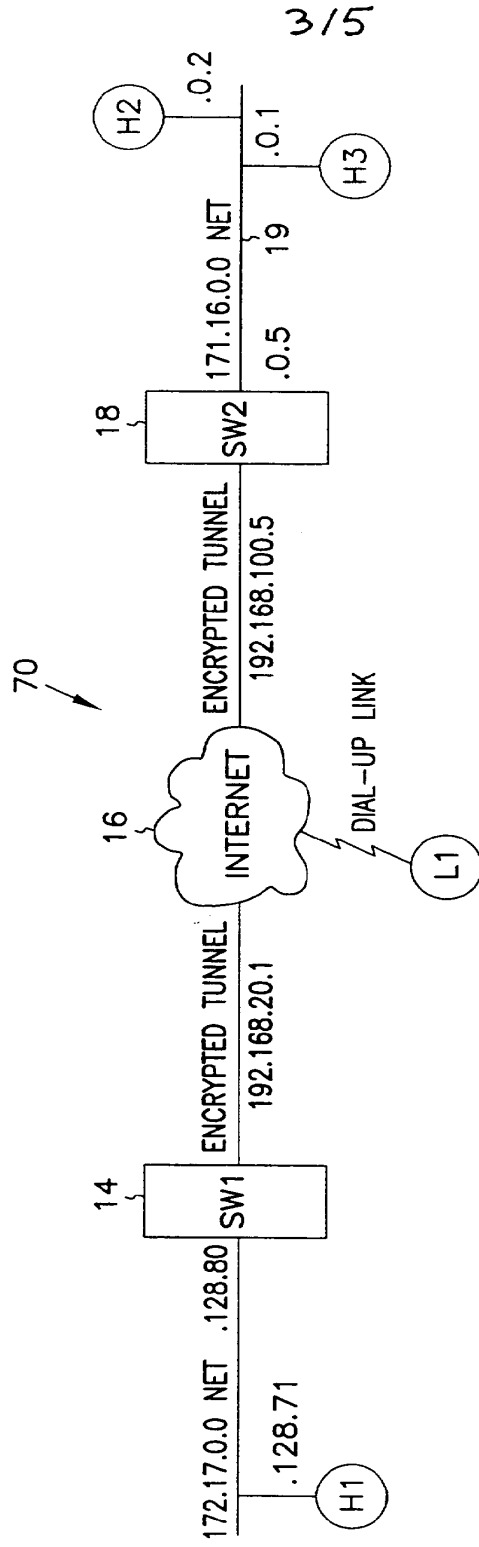


FIG. 3

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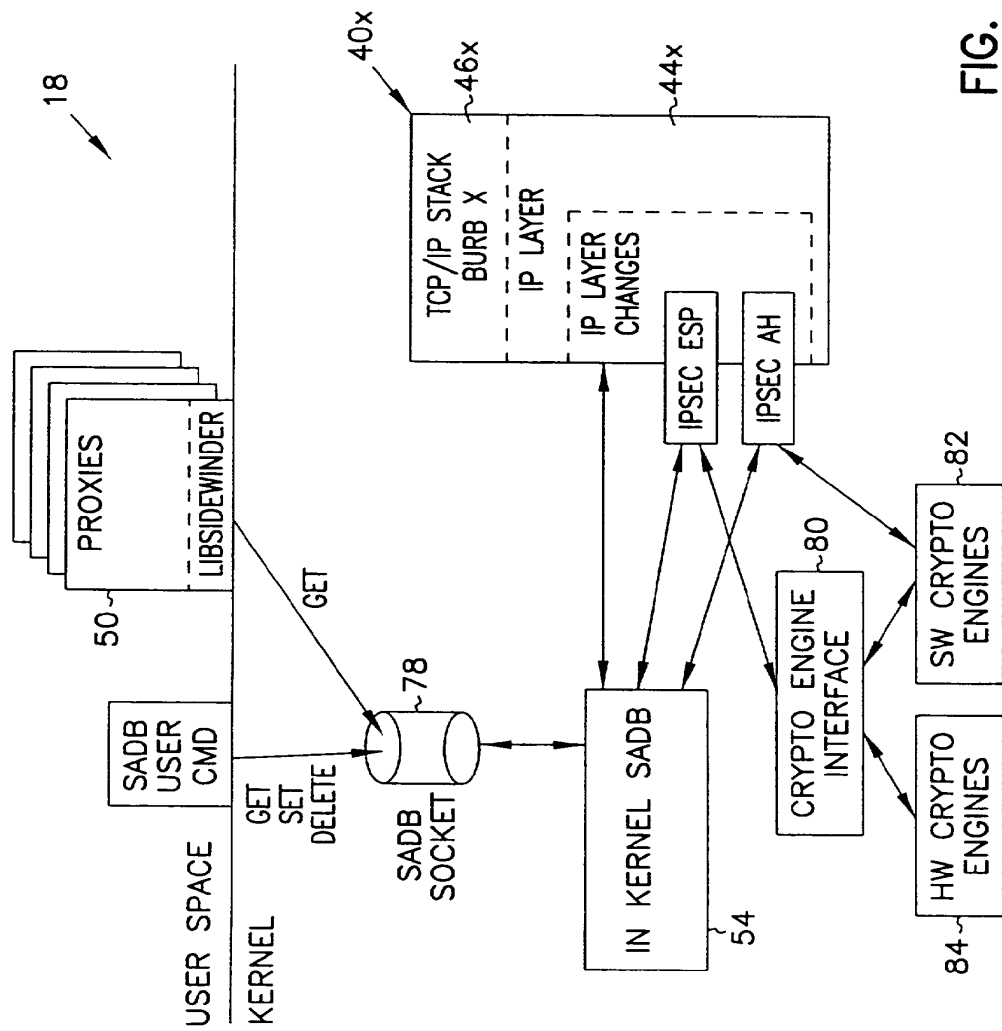


FIG. 4

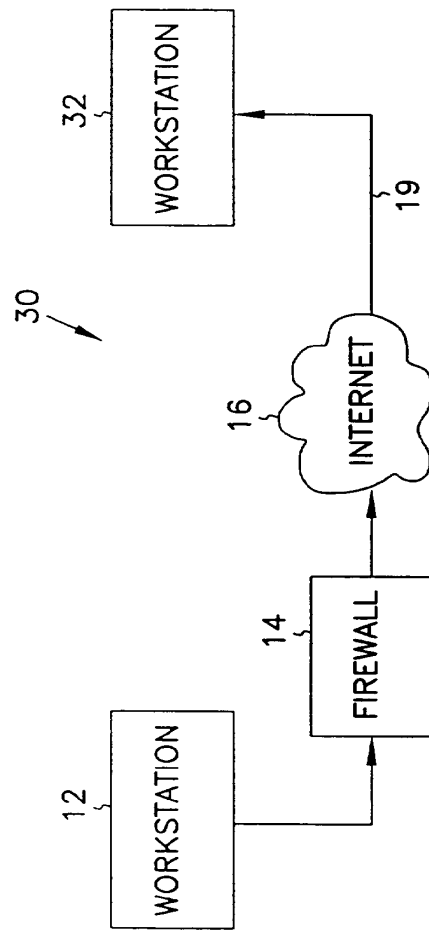


FIG. 5

## VIRTUAL PRIVATE NETWORK ON APPLICATION GATEWAY

5 Background of the InventionField of the Invention

The present invention pertains generally to network communications, and in particular to a system and method for securely transferring information between firewalls over an unprotected network.

10 Background Information

Firewalls have become an increasingly important part of network design. Firewalls provide protection of valuable resources on a private network while allowing communication and access with systems located on an unprotected network such as the Internet. In addition, they operate to block attacks on a private network arriving from the unprotected network by providing a single connection with limited services. A well designed firewall limits the security problems of an Internet connection to a single firewall computer system. This allows an organization to focus their network security efforts on the definition of the security policy enforced by the firewall. An example of a firewall is given in 20 "SYSTEM AND METHOD FOR PROVIDING SECURE INTERNETWORK SERVICES" by Boebert et al. (PCT Published Application No. WO 96/13113, published on May 2, 1996), the description of which is hereby incorporated by reference. Another description of a firewall is provided by Dan Thomsen in "Type Enforcement: the new security model", *Proceedings: Multimedia: Full-* 25 *Service Impact on Business, Education, and the Home*, SPIE Vol. 2617, p. 143, August 1996. Yet another such system is described in "SYSTEM AND METHOD FOR ACHIEVING NETWORK SEPARATION" by Gooderum et al. (PCT Published Application No. WO 97/29413, published on August 14, 1997), the description of which is hereby incorporated by reference. All the above 30 systems are examples of application level gateways. Application level gateways use proxies or other such mechanisms operating at the application layer to process traffic through the firewall. As such, they can review not only the



message traffic but also message content. In addition, they provide authentication and identification services, access control and auditing.

Data to be transferred on unprotected networks like the Internet is susceptible to electronic eavesdropping and accidental (or deliberate) corruption.

5 Although a firewall can protect data within a private network from attacks launched from the unprotected network, even that data is vulnerable to both eavesdropping and corruption when transferred from the private network to an external machine. To address this danger, the Internet Engineering Task Force (IETF) developed a standard for protecting data transferred between firewalls  
10 over an unprotected network. The Internet Protocol Security (IPSEC) standard calls for encrypting data before it leaves the first firewall, and then decrypting the data when it is received by the second firewall. The decrypted data is then delivered to its destination, usually a user workstation connected to the second firewall. For this reason IPSEC encryption is sometimes called *firewall-to-*  
15 *firewall encryption* (FFE) and the connection between a workstation connected to the first firewall and a client or server connected to the second firewall is termed a *virtual private network*, or VPN.

The two main components of IPSEC security are data encryption and sender authentication. Data encryption increases the cost and time required for  
20 the eavesdropping party to read the transmitted data. Sender authentication ensures that the destination system can verify whether or not the encrypted data was actually sent from the workstation that it was supposed to be sent from. The IPSEC standard defines an encapsulated payload (ESP) as the mechanism used to transfer encrypted data. The standard defines an authentication header (AH)  
25 as the mechanism for establishing the sending workstation's identity.

Through the proper use of encryption, the problems of eavesdropping and corruption can be avoided; in effect, a protected connection is established from the internal network connected to one firewall through to an internal network connected to the second firewall. In addition, IPSEC can be used to provide a  
30 protected connection to an external computing system such as a portable personal computer.

IPSEC encryption and decryption work within the IP layer of the network protocol stack. This means that all communication between two IP addresses will be protected because all interfirewall communication must go through the IP layer. Such an approach is preferable over encryption and decryption at higher  
5 levels in the network protocol stack since when encryption is performed at layers higher than the IP layer more work is required to ensure that all supported communication is properly protected. In addition, since IPSEC encryption is handled below the Transport layer, IPSEC can encrypt data sent by any application. IPSEC therefore becomes a transparent add-on to such protocols as  
10 TCP and UDP.

Since, however, IPSEC decryption occurs at the IP layer, it can be difficult to port IPSEC to an application level gateway while still maintaining control at the proxy over authentication, message content, access control and auditing. Although the IPSEC specification in RFC 1825 suggests the use of a  
15 mandatory access control mechanism in a multi-level secure (MLS) network to compare a security level associated with the message with the security level of the receiving process, such an approach provides only limited utility in an application level gateway environment. In fact, implementations on application level gateways to date have simply relied on the fact that the message was  
20 IPSEC-encrypted as assurance that the message is legitimate and have simply decoded and forwarded the message to its destination. This creates, however, a potential chink in the firewall by assuming that the encrypted communication has access to all services.

What is needed is a method of handling IPSEC messages within an  
25 application level gateway which overcomes the above deficiencies. The method should allow control over access by an IPSEC connection to individual services within the internal network.

#### Summary of the Invention

The present invention is a system and method for regulating the flow of  
30 messages through a firewall having a network protocol stack, wherein the network protocol stack includes an Internet Protocol (IP) layer, the method

comprising the steps of determining, at the IP layer, if a message is encrypted, if the message is not encrypted, passing the unencrypted message up the network protocol stack to an application level proxy, and if the message is encrypted, decrypting the message and passing the decrypted message up the network  
5 protocol stack to the application level proxy, wherein the step of decrypting the message includes the step of executing a procedure at the IP layer to decrypt the message.

According to another aspect of the present invention, a system and method is described for authenticating the sender of a message within a  
10 computer system having a network protocol stack, wherein the network protocol stack includes an Internet Protocol (IP) layer, the method comprising the steps of determining, at the IP layer, if the message is encrypted, if the message is encrypted, decrypting the message, wherein the step of decrypting the message includes the step of executing a procedure at the IP layer to decrypt the message,  
15 passing the decrypted message up the network protocol stack to an application level proxy, determining an authentication protocol appropriate for the message, and executing the authentication protocol to authenticate the sender of the message.

#### Brief Description of the Drawings

20 In the following detailed description of example embodiments of the invention, reference is made to the accompanying drawings which form a part hereof, and which is shown by way of illustration only, specific embodiments in which the invention may be practiced. It is to be understood that other embodiments may be utilized and structural changes may be made without  
25 departing from the scope of the present invention.

In the drawings, where like numerals refer to like components throughout the several views:

Figure 1 is a functional block diagram of an application level gateway-  
30 implemented firewall-to-firewall encryption scheme according to the present invention;

Figure 2 is a block diagram showing access control checking of both encrypted and unencrypted messages in network protocol stack according to the present invention;

Figure 3 is a block diagram of a representative application level gateway-  
5 implemented firewall-to-firewall encryption scheme;

Figure 4 is a block diagram of one embodiment of a network-separated protocol stack implementing IPSEC according to the present invention; and

Figure 5 is a functional block diagram of a firewall-to-workstation encryption scheme according to the present invention.

10

#### Description of the Preferred Embodiments

In the following detailed description of the preferred embodiment, references made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific preferred embodiments in which  
15 the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural, logical, physical, architectural, and electrical changes may be made without departing from the spirit and scope of the present invention. The following detailed  
20 description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims and their equivalents.

A system 10 which can be used for firewall-to-firewall encryption (FFE) is shown in Figure 1. In Figure 1, system 10 includes a workstation 12 communicating through a firewall 14 to an unprotected network 16 such as the  
25 Internet. System 10 also includes a workstation 20 communicating through a firewall 18 to unprotected network 16. In one embodiment, firewall 18 is an application level gateway.

As noted above, IPSEC encryption and decryption work within the IP  
30 layer of the network protocol stack. This means that all communications between two IP addresses will be protected because all interfirewall communication must pass through the IP layer. IPSEC takes the standard

Internet packet and converts it into a carrier packet. The carrier packet is designed to do two things: to conceal the contents of the original packet (encryption) and to provide a mechanism by which the receiving firewall can verify the source of the packet (authentication). In one embodiment of the present invention, each IPSEC carrier packet includes both an authentication header used to authenticate the sending machine and an encapsulated payload containing encrypted data. The authentication header and the encapsulated payload features of IPSEC can, however, be used independently. As required in RFC 1825, DES-CBC is provided for use in encrypting the encapsulated payload while the authentication header uses keyed MD5.

To use IPSEC, you must create a *security association* (SA) for each destination IP address. In one embodiment, each SA contains the following information:

- Security Parameters Index (SPI) - The index used to find a SA on receipt of an IPSEC datagram.
- Destination IP address - The address used to find the SA and trigger use of IPSEC processing on output.
- The peer SPI - The SPI value to put on a IPSEC datagram on output.
- The peer IP address - The destination IP address to be put into the packet header if IPSEC Tunnel mode is used.
- The Encryption Security Payload (ESP) algorithm to be used.
- The ESP key to used for decryption of input datagrams.
- The ESP key to used for encryption of output datagrams.
- The authentication (AH) algorithm to be used.
- The AH key to be used for validation of input packets.
- The AH key to be used for generation of the authentication data for output datagrams.

The combination of a given Security Parameter Index and Destination IP address uniquely identifies a particular "Security Association." In one

embodiment, the sending firewall uses the sending userid and Destination Address to select an appropriate Security Association (and hence SPI value). The receiving firewall uses the combination of SPI value and Source address to obtain the appropriate Security Association.

5           A security association is normally one-way. An authenticated communications session between two firewalls will normally have two Security Parameter Indexes in use (one in each direction). The combination of a particular Security Parameter Index and a particular Destination Address uniquely identifies the Security Association.

10           More information on the specifics of an IPSEC FFE implementation can be obtained from the standards developed by the IPSEC work group and documented in *Security Architecture for IP* (RFC 1825) and in RFC's 1826-1829.

          When a datagram is received from unprotected network 16 or is to be  
15 transmitted to a destination across unprotected network 16, the firewall must be able to determine the algorithms, keys, etc. that must be used to process the datagram correctly. In one embodiment, this information is obtained via a security association lookup. In one such embodiment, the lookup routine is passed several arguments: the source IP address if the datagram is being received  
20 from network 16 or the destination IP address if the datagram is to be transmitted across network 16, the SPI, and a flag that is used to indicate whether the lookup is being done to receive or transmit a datagram.

          When an IPSEC datagram is received by firewall 18 from unprotected network 16, the SPI and source IP address are determined by looking in the  
25 datagram. In one embodiment a Security Association Database (SADB) stored within firewall 18 is searched for the entry with a matching SPI. In one such embodiment, security associations can be set up based on network address as well as a more granular host address. This allows the network administrator to create a security association between two firewalls with only a couple of lines in  
30 a configuration file on each machine. For such embodiments, the entry in the Security Association Database that has both the matching SPI and the longest

address match is selected as the SA entry. In another such embodiment, each SA has a prefix length value associated with the address. An address match on a SA entry means that the addresses match for the number of bits specified by the prefix length value.

5           There are two exceptions to this search process. First, when an SA entry is set marked as being dynamic it implies that the user of this SA may not have a fixed IP address. In this case the match is fully determined by the SPI value. Thus it is necessary that the SPI values for such SA entries be unique in the SADB. The second exception is for SA entries marked as tunnel mode entries.  
10   In this case it is normally the case that the sending entity will hide its source address so that all that is visible on the public wire is the destination address. In this case, like in the case where the SA entries are for dynamic IP addresses, the search is done exclusively on the basis of the SPI.

          When transmitting a datagram across unprotected network 16 the SADB  
15   is searched using only the destination address as an input. In this case the entry which has the longest address match is selected and returned to the calling routine.

          In one embodiment, if firewall 18 receives datagrams which are identified as either an IP\_PROTO\_IPSEC\_ESP or IP\_PROTO\_IPSEC\_AH  
20   protocol datagram, there must be a corresponding SA in the SADB or else firewall 18 will drop the packet and an audit message will be generated. Such an occurrence might indicate a possible attack or it might simply be a symptom of an erroneous key entry in the Security Association Database.

          In a system such as system 10, application level gateway firewall 18 acts  
25   as a buffer between unprotected network 16 and workstations such as workstation 20. Messages coming from unprotected network 16 are reviewed and a determination is made as to whether execution of an authentication and identification protocol is warranted. In contrast to previous systems, system 10  
30   also performs this same determination on IPSEC-encrypted messages. If desired, the same authentication and identification can be made on messages to be transferred from workstation 20 to unprotected network 16. Figure 2

illustrates one way of authenticating both encrypted and unencrypted messages in a system such as system 10.

In the system of Figure 2 a network protocol stack 40 includes a physical layer 42, an Internet protocol (IP) layer 44, a Transport layer 46 and an application layer 48. Such a protocol stack exists, for instance on application level gateway firewall 18 of Figure 1. An application executing in application layer 48 can communicate to an application executing on another system by preparing a message and transmitting it through one of the existing transport services executing on transport layer 46. Transport layer 46 in turn uses a process executing in IP layer 44 to continue the transfer. Physical layer 42 provides the software needed to transfer data through the communication hardware (e.g., a network interface card or a modem). As noted above, IPSEC executes within IP layer 44. Encryption and authentication is transparent to the host as long as the network administrator has the Security Association Database correctly configured and a key management mechanism is in place on the firewall.

In application level gateway firewall 18, a proxy 50 operating within application layer 48 processes messages transferred between internal and external networks. All network-to-network traffic must pass through one of the proxies within application layer 48 before being the transfer across networks is allowed. A message arriving from external network 16 is examined at IP layer 44 and an SADB is queried to determine if the source address and SPI are associated with an SA. In the embodiment shown in Figure 2, an SADB Master copy 52 is maintained in persistent memory at application layer 48 while a copy 54 of SADB is maintained in volatile memory within the kernel. If the message is supposed to be encrypted, the message is decrypted based on the algorithm and key associated with the particular SA and the message is transferred up through transport layer 46 to proxy 50. Proxy 50 examines the source and destination addresses and the type of service desired and decides whether authentication of the sender is warranted. If so, proxy 50 initiates an authentication protocol. The protocol may be as simple as requesting a user



name and password or it may include a challenge/response authentication process. Proxy 50 also looks to see whether the message coming in was encrypted or not and may factor that into whether a particular type of authentication is needed. In Telnet, for instance, user name/password authentication may be sufficient for an FFE link while the security policy may dictate that a more stringent challenge/response protocol is needed for unencrypted links. In that case, proxy 50 will be a Telnet proxy and it will base its authentication protocol on whether the link was encrypted or not.

Since IPSEC executes within IP layer 44 there is no need for host firewalls to update their applications. Users that already have IPSEC available on their own host machine will, however, have to request that the firewall administrator set up SA's in the SADB for their traffic.

In the embodiment shown in Figure 2, a working copy 54 of the Security Association Database consisting of all currently active SA's is kept resident in memory for ready access by IP layer processing as datagrams are received and transmitted. In addition, a working master copy 52 of the SADB is maintained in a file in nonvolatile memory. During system startup and initialization processing the content of all of the required SA's in master SADB 52 is added to the working copy 54 stored in kernel memory.

In one embodiment, firewall 18 maintains different levels of security on internal and external network interfaces. It is desirable for a firewall to have different levels of security on both the internal and external interfaces. In one embodiment, firewall 18 supports three different levels, numbered 0 through 2. These levels provide a simple policy mechanism that controls permission for both in-bound and out-bound packets.

Level 0 - do not allow any in-bound or out-bound traffic unless there is a security association between the source and destination.

- Level 1 - Allow both in-bound and out-bound non-IPSEC traffic but force the use of IPSEC if a SA exists for the address. (To support this firewall 18 must look for a SA for each in-bound datagram.)

- Level 2 - allow NULL security associations to exist. NULL associations  
5 are just like normal security associations, except no encryption or authentication transform is performed on in-bound or out-bound packets that correspond to this NULL association. With Level 2 enabled, the machine will still receive unprotected traffic, but it will not transmit unless Level 1 is enabled.

The default protection level established when the Security Association  
10 Database (SADB) is initialized at boot time is 1 for in-bound traffic and 2 for out-bound traffic.

An Access Control List, or ACL, is a list of rules that regulate the flow of Internet connections through a firewall. These rules control how a firewall's servers and proxies will react to connection attempts. When a server or proxy  
15 receives an incoming connection, it performs an ACL check on that connection.

An ACL check compares a set of parameters associated with the connection against a list of ACL rules. The rules determine whether the connection is allowed or denied. A rule can also have one or more side effects. A side effect causes the proxy to change its behavior in some fashion. For  
20 example, a common side effect is to redirect the destination IP address to an alternate machine. In addition to IP connection attempts, ACL checks can also be made on the console logins and on logins made from serial ports. Finally, ACL checks can also be made on behalf of IP access devices, such as a Cisco box, through the use of the industry standard TACACS+ protocol.

25 In one embodiment, the ACL is managed by an acld daemon running in the kernel of firewalls 10 and 30. The acld daemon receives two types of requests, one to query the ACL and one to administer it. In one such embodiment, the ACL is stored in a relational database such as the Oracle database for fast access. By using such a database, query execution is  
30 asynchronous and many queries can be executing concurrently. In addition, these types of databases are designed to manipulate long lists of rules quickly

and efficiently. These qualities ensure that a given query cannot hang up the process that issued the query for any appreciable time (> 1-2 seconds).

In one such embodiment, the database can hold up to 100,000 users and up to 10,000 hosts but can be scaled up to the capacity of the underlying  
 5 database engine. The results of an ACL check is cached, allowing repeated checks to be turned around very quickly.

Applications on firewalls 10 and 30 can query `acld` to determine if a given connection attempt should be allowed to succeed. In one embodiment, the types of applications (i.e. "agents") that can make ACL queries can be divided  
 10 into four classes:

- 1) Proxies. These allow connections to pass through firewall 10 or 30 in order to provide access to a remote service. They include `tnauthp` (authenticated telnet proxy), `pftp` (FTP proxy), `httpd` (HTTP proxy), and `tcpd` (TCP generic service proxy).
- 15 2) Servers. These provide a service on the firewall itself. They include `ftpd` and `httpd`.
- 3) Login agents. Login agent is a program on the firewall that can create a Unix shell. It is not considered a server because it cannot receive IP connections. One example is `/usr/bin/login` when used to create a dialup  
 20 session or a console session on firewall 10 or 30. Another example is the command `role`.
- 4) Network Access Servers (NAS). NAS is a remote IP access device, typically a dialup box manufactured by such companies as Cisco or Bridge. The NAS usually provides dialup telnet service and may also  
 25 provide SLIP or PPP service.

Proxies, servers, login agents, and NASes make queries to `acld` to determine if a given connection attempt should be allowed to succeed. All of the agents except NAS make their queries directly. NAS, because it is remote, must communicate via an auxiliary daemon that typically uses an industry standard  
 30 protocol such as RADIUS or TACACS+. The auxiliary daemon (e.g., `tacadd`) in turn forwards the query to local `acld`.

As a side effect of the query, `acd` tells the agent if authentication is needed. If no authentication is needed, the connection proceeds immediately. Otherwise `acd` provides (as another side effect) a list of allowed authentication methods that the user can choose from. The agent can present a menu of choices or simply pick the first authentication method by default. Typical authentication methods include plain password, SNK DSS, SDI SecurID, LOCKout DES, and LOCKout FORTEZZA. In one embodiment, the list of allowed authentication methods varies depending on the host name, user name, time of day, or any combination thereof.

10 In the case of a Level 0 policy, it would be safe to assume that all incoming traffic is encrypted or authenticated. In the case of Levels 1 through 2, a determination must be made whether or not a security association exists for a given peer. Otherwise an application may believe that in-bound traffic has been authenticated when it really has not. (That is why it is necessary to look for an SA on input of each non-IPSEC datagram.)

15 In one embodiment, a flag which accompanies the message as it is sent from IP layer 44 to proxy 50 indicates whether the incoming message was or was not encrypted. In another embodiment, proxy 50 accesses Security Association Database 54 (the table in the kernel can be queried via an SADB routing socket (PF-SADB)) to determine whether or not a security association exists for a given peer.. The SADB socket is much like a routing socket found in the stock BSD 4.4 kernel (protocol family PF-ROUTE) except that PF-SADB sockets are used to maintain the Security Association Database (SADB) instead of the routing table. Because the private keys used for encryption, decryption, and keyed authentication are stored in this table, access must be strictly prohibited and allowed to only administrators and key management daemons. Care must be taken when allowing user-level daemons access to `/dev/mem` or `/dev/kmem` as well, since the keys are stored in kernel memory and could be exposed with some creative hacking.

25  
30 In one embodiment, a command-line tool called `sadb` is used to support the generation and maintenance of in-kernel version 54 of SADB. The primary

interface between this tool and the SADB is the PF-SADB socket. The kernel provides socket processing to receive client requests to add, update, or change entries in in-kernel SADB 54. As noted above, the default protection level established when the Security Association Database (SADB) is initialized at boot  
 5 time is 1 for in-bound traffic and 2 for out-bound traffic. This may be changed by the use of the `sadb` command.

The existing `sadb` command was derived from the NIST implementation of IPSEC. As noted above, this tool is much like `route` in that it uses a special socket to pass data structures in and out of the kernel. There are three commands  
 10 recognized by the `sadb` command: *get*, *set*, *delete*. The following simple shell script supports adding and removing a single SA entry to SADB 54. It shows one embodiment of a parameter order for adding a SA to the SADB.

```

# ! /bin/sh
15 if [ $# -ne 1 ]
    then
        echo "usage: $0 <on>|<off>" >&2
        exit 1
    fi
20 ONOFF=$1

addsa ()
{
    IPADDRESS=$2
25 PEERADDRESS=0.0.0.0
    PREFIXLEN=0                # Num of bits, 0 => full 32
    bit match
    LOCALADDRESS=0.0.0.0
    REALADDRESS=0.0.0.0
30 PORT=0
    PROTOCOL=0
    UID=0
    DESALG=1                    # I = DES-CBC
    IVLEN=4                     # bytes
35 DESKEY=0b0b0b0b0b0b0b0b
    DESKEYLEN=8                 # bytes
    AHALG=1                     # 1 = MD5
    AHKEY=30313233343536373031323334353637
    AHKEYLEN=16                 # bytes
40 LOCAL_SPI=$1

```

```

PEER_SPI=$1
TUNNEL_MODE=0
AHRESULTLEN=4
COMBINED_MODE=1          # On output, 1 = ESP, then
5 AH; 0 = AH, then ESP
DYNAMIC_FLAG=0

if [ "$SONOFF" = "on"
then
10 ./sadb add dst $IPADDRESS $PREFIXLEN $LOCAL_SPI
   $UID $PEERADDRESS $PEER_SPI $TUNNEL_MODE $LOCALADDRESS
   $REALADDRESS $PROTOCOL $SPORT $DESALG $IVLEN $DESKEYLEN
   $DESKEY $DESKEYLEN $DESKEY $AHALG $AHKEYLEN $AHKEY
15 $AHKEYLEN $AHKEY $AHRESULTLEN $COMBINED_MODE
   $DYNAMIC_FLAG
else
   ./sadb delete dst $IPADDRESS $LOCAL-SPI
fi
}
20 # Get down to work:
   addsa 500 172.17.128.115          # number6.sctc.com

```

The current status of in-kernel SADB 54 can be obtained with the `sadb` command. The `get` option allows dumping the entire SADB or a single entry. In one embodiment, the complete dump approach uses `/dev/kmem` to find the information. The information may be presented as follows:

```

# sadb get dst
30 Local-SPI Address-Family Destination-Addr
   Preflx_length UID
   Peer-Address Peer-SPI Transport-Type
   Local-Address Real-Address
35 Protocol Port
   ESP_Alq_ID ESP_IVEC_Length
   ESP_Enc_Key_length ESP_Enc_ESP_Key
   ESP_Dec_Key_length ESP_Dec_ESP_Key
   AH_Alq_ID AH_Data_Length
40 AH_Gen_Key_Length AH_Gen_Key
   AH_Check_Key_Length AH_Check_Key
   Combined_Mode Dynamic_Flag

```

```

-----
-
500 INET: number6.sctc.com 0 0
      0.0.0.0 500 Transport(0) 0
5      0.0.0.0 0.0.0.0
      None None
      DES/CBC-RFC1829(1) 4
          8 0b0b0b0b0b0b0b0b
          8 0b0b0b0b0b0b0b0b
10     MD5-RFC1828(1) 4
          16 30313233343536373031323334353637
          16 30313233343536373031323334353637
      ESP+AH(1) 0
501 INET: spokes.sctc.com 0 0
15     0.0.0.0 501 Transport(0) 0
      0.0.0.0.0.0.0.0.0.0
      None None
      DES/CBC-RFC1829(1) 4
          8 0b0b0b0b0b0b0b0b
20     8 0b0b0b0b0b0b0b0b
      MD5-RFC1828(1) 4
          16 30313233343536373031323334353637
          16 30313233343536373031323334353637
      ESP+AH(1) 0
25
End of list.

```

When a new entry is added to in-kernel SADB 54, the add process first checks to see that no existing entry will match the values provided in the new entry. If no match is found then the entry is added to the end of the existing SADB list.

To illustrate the use and administration of an FFE, we'll go through an example using FFE 70 in Figure 3. Firewalls 14 and 18 are both application level gateway firewalls implemented according to the present invention. Workstations H2 and H3 both want to communicate with H1. For the administrator of firewalls 14 and 18, this is easy to accomplish. The administrator sets up a line something like this (we'll only show the IP address part and SPI parts of the SA, since they're the trickiest values to configure. Also, assume that we are using tunnel mode):

```

40 # Hypothetical SW1 Config File

```