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Toby H. Kusmer, P.C. Attorney at Law tkusmer@mwe.com +1 617 535 4065

June 6, 2013

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office on June 6, 2013 /lessica Brown/ Jessica Brown

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

Re:	U.S. Continuation Patent Application
	Attorney Docket No. 77580-196(VRNK1CP3CNFT10)
	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL
	FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
Subject:	Transmitting Patent Application for Track I Prioritized Examination

Dear Sir/Madam:

We enclose for filing the patent application for Track I Prioritized Examination of:

Inventors:	Victor Larson (Fairfax, VA); Robert Dunham Short III (Lexington, VA); Edmond Colby Munger (Tarpon Springs, FL); Michael Williamson (South Riding, VA)
Applicant:	VIRNETX, INC.
For:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

This patent application is a continuation of U.S. Application No. 13/903,788, filed May 28, 2013, which is a continuation of U.S. Application 13/336,790, filed December 23, 2011, issuing on June 4, 2013 as U.S. Patent No. 8,458,341, which is a continuation of U.S. Application No. 13/049,552, filed March 16, 2011, now U.S. Patent No. 8,458,341, which is a continuation of U.S. Application No. 11/840,560, filed August 17, 2007, now U.S. Patent No. 7,921,211, issued April 5, 2011, which is a continuation of U.S. Application No. 10/714,849, filed November 18, 2003, now U.S. Patent No. 7,418,504, issued August 26, 2008, which is a continuation of U.S. Application No. 09/558,210, filed April 26, 2000, now abandoned, which is a continuation-in-part of U.S. Application No. 09/504,783, filed on February 15, 2000, now U.S. Patent No. 6,502,135, issued December 31, 2002, which is a continuation-in-part of U.S. Application No. 09/429,643, filed October 29, 1999, now U.S. Patent No. 7,010,604, issued March 07, 2006, which derives from U.S. Provisional Application Nos. 60/106,261, filed

28 State Street Boston Massachusetts 02109-1775 Telephone: +1 617 535 4000 Facsimile: +1 617 535 3800 www.mwe.com

U.S. practice conducted through McDermott Will & Emery LLP.

Commissioner for Patents June 6, 2013 Page 2

October 30, 1998, and 60/137,704, filed June 7, 1999, and includes:

- Certification and Request for Prioritized Examination (Track I)
- Ninety-three (93) pages of specification, claims, and abstract;
- Forty (40) sheets of drawings (Figs. 1-37);
- Application Data Sheet (8 pages);
- Declaration (37 CFR 1.63)
- Power of Attorney and Statement under 37 CFR 3.73(b)

The filing fee has been calculated as shown below:

	NO. OF CLAIMS		EXTRA CLAIMS	UN- DISCOUNTED RATE	AMOUNT		
Total Claims	25	-20	5	\$80	\$400		
Independent Claims	2	-3	0	\$400	\$0		
			Multiple D	ependent Claim(s)	\$0		
				Basic Filing Fee	\$280		
	Search Fee	\$600					
				Examination Fee	\$720		
Utility Application	Size Fee for £	50 additiona	l sheets that	exceed 100 sheets	\$0		
				Publication Fee	\$300		
Prioritiz	ed Examina	tion Fee (Tr	ack I) under	37 C.F.R. 1.17(c)	\$4000		
Processing Fee 37 C.F.R. 1.17(i)							
Total of Above Calculations \$6							
	\$6430						

- Please charge my Deposit Account No. 501133 in the amount of <u>\$6430.00</u>. Please reference attorney docket no. 77580-196(VRNK1CP3CNFT10).
- The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 501133.
 - Any additional filing fees required under 37 CFR 1.16.
- The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 501133.
 - Any patent application processing fees under 37 CFR 1.17.
 - Any filing fees under 37 CFR 1.16 for presentation of extra claims.

Commissioner for Patents June 6, 2013 Page 3

Please return the Official Filing Receipt to the undersigned.

Respectfully submitted, McDERMOTT WILL & EMERY LLP CUSTOMER NUMBER 23630

/Toby H. Kusmer/ Toby H. Kusmer, P.C., Reg. No. 26,418

The McDermott Building 500 North Capitol Street, N.W. Washington, DC 20001 Telephone: (617) 535-4000 Facsimile: (617) 535-3800 Date: June 6, 2013

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CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)										
First Named Inventor:	LARSON, Victor Nonprovisional Application Number (if known): filed herewith									
Title of Invention:	Title of SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES									
APPLICANT HE THE ABOVE-ID	APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.									
1. The pro 37 CFR been file excess paid.	 The processing fee set forth in 37 CFR 1.17(i)(1), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, examination fee, and any required excess claims and application size fees are filed with the request or have been already been paid. 									
2. The app more th	blication contains or is amended t an thirty total claims, and no mult	o contain no more thai iple dependent claims.	n four inde	pendent claims and no						
3. The app	blicable box is checked below:									
I. 🔽	Original Application (Track One	e) - Prioritized Exami	nation und	der <u>§ 1.102(e)(1)</u>						
i. (a) The This	application is an original nonprov certification and request is being OR-	risional utility applicatic filed with the utility ap 	n filed und plication vi	ler 35 U.S.C. 111(a). a EFS-Web.						
(b) The This	application is an original nonprov certification and request is being	risional plant application filed with the plant application filed with the plant application of the second structure of the se	n filed und plication in	er 35 U.S.C. 111(a). paper.						
ii. The exe	ecuted inventor's oath or declaration	ion is filed with the app	lication. (3	7 CFR 1.63 and 1.64)						
II. 🔲	Request for Continued Examin	ation - Prioritized Exa	amination	under § 1.102(e)(2)						
 i. A request for continued examination has been filed with, or prior to, this form. ii. If the application is a utility application, this certification and request is being filed via EFS-Web. iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371. iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination. v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2). 										
_{Signature} /Toby	H. Kusmer/		Date June	e 6, 2013						

Toby H.Kusmer, P.C. Name (Print/Typed)

Date Julie 0, 2013

Registration Number 26418

Note: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.*

*Total of <u>1</u> _ forms are submitted.

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Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

- The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
- 2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
- 5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
- 6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
- 7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
- 8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
- 9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Da	ta Sheet 37 CER 1 76	Attorney Docket Number	77580-196(VRNK1CP3CNFT10)					
		Application Number						
Title of Invention	SYSTEM AND METHOD EMP COMMUNICATIONS USING	PLOYING AN AGILE NETWORH SECURE DOMAIN NAMES	CPROTOCOL FOR SECURE					
The application data sh bibliographic data arran	eet is part of the provisional or nonp ged in a format specified by the Uni	provisional application for which it is ted States Patent and Trademark O	being submitted. The following form contains the ffice as outlined in 37 CFR 1.76.					

This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Invent	tor	1							R	emove		
Legal	Name	2										
Prefix	Giv	en Name		Middle	Name	9		Family	Name		Suffix	
	Vict	ог						Larson				
Resid	lence	Information ((Select One)	• US Resid	dency	0	Non US	Residency	sidency O Active US Military Service			
City	Fair	fax		State/Prov	ince	VA	Cou	ntry of Res	idence ⁱ	US		
Mailing	Add	ress of Invent	or:									
Addre	ss 1		12026 Lisa M	arie Court								
Addre	ss 2											
City		Fairfax					State/P	rovince	VA			
Posta	l Cod	e	22033			Cour	itry i	US				
Invent	tor	2	•					•	R	emove		
Legal	Name	<u> </u>										
Prefix	Giv	en Name		Middle	Name	5		Family	Name		Suffix	
	Rob	ert		Dunham	Dunham			Short	Short			
Resid	lence	Information (Select One)	US Resid) US Residency () Non US Resid			Residency	sidency O Active US Military Service			
City	Lexi	ngton		State/Prov	ince	VA Country of Residence i US			US			
	1		I			1	I					
Mailing	Add	ress of Invent	or:									
Addre	ss 1		1172 Still Hou	use Drive								
Addre	ss 2											
City		Lexington					State/P	rovince	VA			
Posta	l Cod	e	24450			Cour	itry i	US	•			
Invent	tor	3	•					•	R	emove		
Legal	Name	;										
Prefix	Giv	en Name		Middle	Name	5		Family	Name		Suffix	
	Edm	nund		Colby				Munger				
Resid	lence	Information (Select One)	US Resid	dency	0	Non US	Residency	Activ	e US Military Service	;	

PTO/AIA/14 (03-13)

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Application Data Sheet 37 CEI				not 37 CED	1 76	Attorney	Docke	et Number	77580-19	77580-196(VRNK1CP3CNFT10)			
Арри	cauc		la Sili		1.70	Applicatio	on Nu	umber					
⊺itle of	Title of Invention SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES												
City	City Tarpon Springs State/Province FL Country of Residence i US												
Mailing	Addr	ess of	Invent	or:									
Addre	ss 1			1447 Meyer L	ane								
Addre	ss 2												
City		Tarpo	n Sprin	gs				State/Prov	vince	FL			
Postal	Code	5		34688			Cou	ntry i	US				
Invent	or 4	4								Re	emove		
Legal I	Name												
Prefix	Give	en Narr	ne		Mi	ddle Name	9		Family I	Name		Suffix	
	Mich	ael							Williamso	on			
Resid	ence	Inform	ation ((Select One)	⊙ US	Residency	0	Non US Re	sidency (O Active	e US Military Service		
City	Sout	h Riding	1		State/	Province	VA	Count	y of Resid	dence ⁱ	US		
Mailing	Addr	ess of	Invent	or:									
Addre	ss 1			26203 Ocala	Circle								
Addre	ss 2												
City		South	Riding					State/Prov	vince	VA			
Postal	Code	5		20152			Cou	ntry i	US	•			
All Inv genera	rentors	s Must ithin thi	Be L i s form	isted - Addit by s electing t	ional In the Add	ventor Info	ormati	ion blocks	m a y be		Add		

Correspondence Information:

 Enter either Customer Number or complete the Correspondence Information section below.

 For further information see 37 CFR 1.33(a).

 An Address is being provided for the correspondence Information of this application.

 Customer Number
 23630

 Email Address
 mweipdocket@mwe.com
 Add Email
 Remove Email

 Email Address
 bostonipdocket@mwe.com
 Add Email
 Remove Email

Application Information:

Title of the Invention	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES						
Attorney Docket Number	77580-196(VRNK1CP3CNFT10) Small Entity Status Claimed						
Application Type	Nonprovisional						
Subject Matter	Utility						
Total Number of Drawing	Sheets (if any)	40	Suggested Figure for Publication (if any)				

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Application Da	ta Shoot 37 CED 1 76	Attorney Docket Number	77580-196(VRNK1CP3CNFT10)
Application Da	ita Sheet 37 Cr K 1.70	Application Number	
Title of Invention	SYSTEM AND METHOD EMP COMMUNICATIONS USING	PLOYING AN AGILE NETWOR	KPROTOCOL FOR SECURE

Publication Information:

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	Oustomer Number	O US Patent Practitioner	Limited Recognition (37 CFR 11.9)
Customer Number	23630		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status		Pending		Remove				
Application Number		Conti	nuity Type	Prior Application Number Filing Date (YYYY-MM-DD				
		Continuation of	of	13/903788	2013-05-28			
Prior Application	on Status	Pending		Remove				
Application N	umber	Conti	nuity Type	Prior Application Number Filing Da			te (YYYY-MM-DD)	
13/903788	13/903788 Continuation of		of	13/336790 2011-12				
Prior Application	on Status	Patented		Remove				
Application Number	Cont	tinuity Type	Prior Application Numbe r	Filing Date (YYYY-MM-DD)	Pat	ent Number	Issue Date (YYYY-MM-DD)	
13/336790	Continua	tion of	13/049552	2011-03-16	84	58341	2013-06-04	
Prior Application	on Status	Patented		Remove			nove	
Application Number	Application Number Continuity Type		Prior Application Numbe r	Filing Date (YYYY-MM-DD) Patent Number		ent Number	Issue Date (YYYY-MM-DD)	
13/049552 Continuation of		tion of	11/840560	2007-08-17	7921211		2011-04-05	
Prior Application Status		Patented		Remove				

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Attorney Decket Number 77580 196(V/PNK1CP3CNET10)									
Application D)ata She	et 37 CFR ²	1.76	Allomey D			TANK TOF JO		
••				Application	Number				
Title of Invention SYSTEM AND METHOD EMPL COMMUNICATIONS USING SE				PLOYING AN A	AGILE NETWORI MAIN NAMES	<pre><pre><pre></pre><pre><pre><pre><pre><pre><pre><pre><</pre></pre></pre></pre></pre></pre></pre></pre></pre>	COL	FOR SECU	RE
Application Number	Cont	inuity Type	Pri	or Application Number	Filing Date (YYYY-MM-DD)		DD) Patent Number		Issue Date (YYYY-MM-DD)
11/840560	Continuat	tion of	10/7	14849	2003-11-18		741	18504	2008-08-26
Prior Application	on Status	Abandoned	1			l		Rer	nove
Application N	umber	Cont	inuity [·]	Туре	Prior Applicati	ion Numl	ber	Filing Da	te (YYYY-MM-DD)
10/714849		Continuation of	of		09/558210			2000-04-26	
Prior Application	on Status	Patented	Patented				E	Remove	
Application Number	Continuity Type		Prior Application Number		Filing Date (YYYY-MM-DD)		Patent Number		Issue Date (YYYY-MM-DD)
09/558210	Continuat	tion in part of	09/5	9/504783 2000-02-15		6502135)2135	2002-12-31
Prior Application	on Status	Patented					Rer	nove	
Application Number	Cont	inuity Type	Pri	ior Application Number	Filing Date (YYYY-MM-DD)		D) Patent Number		Issue Date (YYYY-MM-DD)
09/504783	Continuat	tion in part of	09/4:	29643	1999-10-29 70		70 ⁻	10604	2006-03-07
Prior Application	on Status	Expired						Rer	nove
Application N	umber	Cont	inuity ⁻	Туре	Prior Applicati	on Numl	ber	Filing Date (YYYY-MM-DD)	
09/429643		non provisiona	al of		60/106261 1998-10-30				
Prior Application Status		Expired				Remove		nove	
Application Number		Cont	inuity	Гуре	Prior Application Number		Imber Filing Date (YYYY-MM-DD)		
09/429643		non provisiona	al of		60/137704			1999-06-07	
Additional Domes	Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button. Add								

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Add button.	Data may be generated wit	hin this form by selecting the	Add

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	77580-196(VRNK1CP3CNFT10)	
		Application Number		
Title of Invention	SYSTEM AND METHOD EMP COMMUNICATIONS USING	THOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE NS USING SECURE DOMAIN NAMES		

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Authorization to Permit Access:

Authorization to Permit Access to the Instant Application by the Participating Offices If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR
to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section. Clear Assignee Person to whom the inventor is obligated to assign. Person who shows sufficient proprietary interest

Petitioner Apple Inc. - Ex. 1004, p. 10

Remove

PTO/AIA/14 (03-13)

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	77580-196(VRNK1CP3CNFT10)		
		Application Number			
Title of Invention SYSTEM AND METHOD EMP COMMUNICATIONS USING		PLOYING AN AGILE NETWOR SECURE DOMAIN NAMES	K PROTOCOL FOR SECURE		
If applicant is the lega	al repre	esentative, indicate th	e authority to file the patent	application, the inventor is:	
Name of the Deceas	ed or L	egally Incapacitated	Inventor :		
If the Applicant is an Organization check here.			X		
Organization Name VIRNETX, INC.					
Mailing Address Information:					
Address 1 P.O. Box 439					
Address 2					
City Zephyr Cove		Zephyr Cove	State/Provi	nce NV	
Country i US		Postal Code	e 89448		
Phone Number	Phone Number		Fax Number	r	
Email Address			ŀ		
Additional Applicant E)ata ma	y be generated within	this form by selecting the Ado	d button. Add	

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

			귀	Remove
If the Assignee is an Organization check here.				
Prefix	Given Name	Middle Name	Family Name	Suffix

Under the P	aperwork Red	luction Act of 1995, no per	sons are required to	respond to a collection	on of information unless it contains a valid OMB control number.
Application Date Chest 27 OED 4 70		Attorney Docket Number		77580-196(VRNK1CP3CNFT10)	
Application Da	la Shee	137 CFK 1.70	Application Number		
Title of Invention	SYSTEM COMMUN	AND METHOD EMP	EMPLOYING AN AGILE NETWORI NG SECURE DOMAIN NAMES		K PROTOCOL FOR SECURE
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Title of SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES	
As the below named inventor, I hereby declare that:	
This declaration The attached application, or is directed to:	
United States application or PCT international application number	
filed on	
The above-identified application was made or authorized to be made by me.	
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.	
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.	
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LEGAL NAME OF INVENTOR	
Inventor: Date (Optional) : 5/28/2013 Signature: Uiuta Carren	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must habeen previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	ave
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)
Title of Invention SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
As the below named inventor, I hereby declare that:
This declaration The attached application, or is directed to:
United States application or PCT international application number
filed on
The above-identified application was made or authorized to be made by me.
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.
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LEGAL NAME OF INVENTOR
Inventor: Robert Dunham Short III Date (Optional): 512812015 Signature: A.L.D. Charles
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.
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LEGAL NAME OF INVENTOR	
Inventor: Edmund Colby Munger Date (Optional) :	
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United States application or PCT international application number
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The above-identified application was made or authorized to be made by me.
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.
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LEGAL NAME OF INVENTOR
Inventor: Date (Optional) :28/5/2019
Signature:
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.
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SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from U.S. Application No. 13/903,788, filed [0001] May 28, 2013, which claims priority from and is a continuation of co-pending U.S. Application No. 13/336,790, filed December 23, 2011, now U.S. Patent No. 8,458,341, which claims priority from and is a continuation of co-pending U.S. Application No. 13/049,552, filed March 16, 2011, which is a continuation of U.S. Application No. 11/840,560, filed August 17, 2007, now U.S. Patent No. 7,921,211, which is a continuation of U.S. Application No. 10/714,849, filed November 18, 2003, now U.S. Patent No. 7,418,504, which is a continuation of U.S. Application No. 09/558,210, filed April 26, 2000, now abandoned, which is a continuation-in-part of U.S. Application No. 09/504,783, filed on February 15, 2000, now U.S. Patent No. 6,502,135, issued December 31, 2002, which claims priority from and is a continuation-in-part patent application of previously-filed U.S. Application No. 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, which is bodily incorporated herein, derives from provisional U.S. Application Nos. 60/106,261 (filed October 30, 1998) and 60/137,704 (filed June 7, 1999). 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. Each of the above-mentioned applications is incorporated herein by reference in its entirety as though fully set forth herein.

BACKGROUND OF THE INVENTION

[0002] A tremendous variety of methods have been proposed and implemented to provide security and anonymity for communications over the Internet. The variety stems, in part, from the different needs of different Internet users. A basic heuristic framework to aid in discussing these different security techniques is illustrated in FIG. 1. Two terminals, an originating terminal 100 and a destination terminal 110 are in communication over the Internet. It is desired for the communications to be secure, that is, immune to eavesdropping. For example, terminal 100 may transmit secret information to terminal 110 over the Internet 107. Also, it may be desired to prevent an eavesdropper from discovering that terminal 100 is in

communication with terminal 110. For example, if terminal 100 is a user and terminal 110 hosts a web site, terminal 100's user may not want anyone in the intervening networks to know what web sites he is "visiting." Anonymity would thus be an issue, for example, for companies that want to keep their market research interests private and thus would prefer to prevent outsiders from knowing which websites or other Internet resources they are "visiting." These two security issues may be called data security and anonymity, respectively.

[0003] Data security is usually tackled using some form of data encryption. An encryption key 48 is known at both the originating and terminating terminals 100 and 110. The keys may be private and public at the originating and destination terminals 100 and 110, respectively or they may be symmetrical keys (the same key is used by both parties to encrypt and decrypt). Many encryption methods are known and usable in this context.

[0004] To hide traffic from a local administrator or ISP, a user can employ a local proxy server in communicating over an encrypted channel with an outside proxy such that the local administrator or ISP only sees the encrypted traffic. Proxy servers prevent destination servers from determining the identities of the originating clients. This system employs an intermediate server interposed between client and destination server. The destination server sees only the Internet Protocol (IP) address of the proxy server and not the originating client. The target server only sees the address of the outside proxy. This scheme relies on a trusted outside proxy server. Also, proxy schemes are vulnerable to traffic analysis methods of determining identities of transmitters and receivers. Another important limitation of proxy servers is that the server knows the identities of both calling and called parties. In many instances, an originating terminal, such as terminal A, would prefer to keep its identity concealed from the proxy, for example, if the proxy server is provided by an Internet service provider (ISP).

[0005] To defeat traffic analysis, a scheme called Chaum's mixes employs a proxy server that transmits and receives fixed length messages, including dummy messages. Multiple originating terminals are connected through a mix (a server) to multiple target servers. It is difficult to tell which of the originating terminals are communicating to which of the connected target servers, and the dummy messages confuse eavesdroppers' efforts to detect communicating pairs by analyzing traffic. A drawback is that there is a risk that the mix server could be

compromised. One way to deal with this risk is to spread the trust among multiple mixes. If one mix is compromised, the identities of the originating and target terminals may remain concealed. This strategy requires a number of alternative mixes so that the intermediate servers interposed between the originating and target terminals are not determinable except by compromising more than one mix. The strategy wraps the message with multiple layers of encrypted addresses. The first mix in a sequence can decrypt only the outer layer of the message to reveal the next destination mix in sequence. The second mix can decrypt the message to reveal the next mix and so on. The target server receives the message and, optionally, a multi-layer encrypted payload containing return information to send data back in the same fashion. The only way to defeat such a mix scheme is to collude among mixes. If the packets are all fixed-length and intermixed with dummy packets, there is no way to do any kind of traffic analysis.

[0006] Still another anonymity technique, called 'crowds,' protects the identity of the originating terminal from the intermediate proxies by providing that originating terminals belong to groups of proxies called crowds. The crowd proxies are interposed between originating and target terminals. Each proxy through which the message is sent is randomly chosen by an upstream proxy. Each intermediate proxy can send the message either to another randomly chosen proxy in the "crowd" or to the destination. Thus, even crowd members cannot determine if a preceding proxy is the originator of the message or if it was simply passed from another proxy.

[0007] ZKS (Zero-Knowledge Systems) Anonymous IP Protocol allows users to select up to any of five different pseudonyms, while desktop software encrypts outgoing traffic and wraps it in User Datagram Protocol (UDP) packets. The first server in a 2+-hop system gets the UDP packets, strips off one layer of encryption to add another, then sends the traffic to the next server, which strips off yet another layer of encryption and adds a new one. The user is permitted to control the number of hops. At the final server, traffic is decrypted with an untraceable IP address. The technique is called onion-routing. This method can be defeated using traffic analysis. For a simple example, bursts of packets from a user during low-duty periods can reveal the identities of sender and receiver.

[0008] Firewalls attempt to protect LANs from unauthorized access and hostile exploitation or damage to computers connected to the LAN. Firewalls provide a server through which all access to the LAN must pass. Firewalls are centralized systems that require administrative overhead to maintain. They can be compromised by virtual-machine applications ("applets"). They instill a false sense of security that leads to security breaches for example by users sending sensitive information to servers outside the firewall or encouraging use of modems to sidestep the firewall security. Firewalls are not useful for distributed systems such as business travelers, extranets, small teams, etc.

SUMMARY OF THE INVENTION

[0009] A secure mechanism for communicating over the internet, including a protocol referred to as the Tunneled Agile Routing Protocol (TARP), uses a unique two-layer encryption format and special TARP routers. TARP routers are similar in function to regular IP routers. Each TARP router has one or more IP addresses and uses normal IP protocol to send IP packet messages ("packets" or "datagrams"). The IP packets exchanged between TARP terminals via TARP routers are actually encrypted packets whose true destination address is concealed except to TARP routers and servers. The normal or "clear" or "outside" IP header attached to TARP IP packets contains only the address of a next hop router or destination server. That is, instead of indicating a final destination in the destination field of the IP header, the TARP packet's IP header always points to a next-hop in a series of TARP router hops, or to the final destination. This means there is no overt indication from an intercepted TARP packet of the true destination.

[0010] Each TARP packet's true destination is concealed behind a layer of encryption generated using a link key. The link key is the encryption key used for encrypted communication between the hops intervening between an originating TARP terminal and a destination TARP terminal. Each TARP router can remove the outer layer of encryption to reveal the destination router for each TARP packet. To identify the link key needed to decrypt the outer layer of encryption of a TARP packet, a receiving TARP or routing terminal may identify the transmitting terminal by the sender/receiver IP numbers in the cleartext IP header.

[0011] Once the outer layer of encryption is removed, the TARP router determines the final destination. Each TARP packet 140 undergoes a minimum number of hops to help foil traffic analysis. The hops may be chosen at random or by a fixed value. As a result, each TARP packet may make random trips among a number of geographically disparate routers before reaching its destination. Each trip is highly likely to be different for each packet composing a given message because each trip is independently randomly determined. This feature is called *agile routing*. The fact that different packets take different routes provides distinct advantages by making it difficult for an interloper to obtain all the packets forming an entire multi-packet message. The associated advantages have to do with the inner layer of encryption discussed below. Agile routing is combined with another feature that furthers this purpose; a feature that ensures that any message is broken into multiple packets.

[0012] The IP address of a TARP router can be changed, a feature called *IP agility*. Each TARP router, independently or under direction from another TARP terminal or router, can change its IP address. A separate, unchangeable identifier or address is also defined. This address, called the TARP address, is known only to TARP routers and terminals and may be correlated at any time by a TARP router or a TARP terminal using a Lookup Table (LUT). When a TARP router or terminal changes its IP address, it updates the other TARP routers and terminals which in turn update their respective LUTs.

[0013] The message payload is hidden behind an inner layer of encryption in the TARP packet that can only be unlocked using a session key. The session key is not available to any of the intervening TARP routers. The session key is used to decrypt the payloads of the TARP packets permitting the data stream to be reconstructed.

[0014] Communication may be made private using link and session keys, which in turn may be shared and used according to any desired method. For example, public/private keys or symmetric keys may be used.

[0015] To transmit a data stream, a TARP originating terminal constructs a series of TARP packets from a series of IP packets generated by a network (IP) layer process. (Note that the terms "network layer," "data link layer," "application layer," etc. used in this specification

correspond to the Open Systems Interconnection (OSI) network terminology.) The payloads of these packets are assembled into a block and chain-block encrypted using the session key. This assumes, of course, that all the IP packets are destined for the same TARP terminal. The block is then interleaved and the interleaved encrypted block is broken into a series of payloads, one for each TARP packet to be generated. Special TARP headers IP_T are then added to each payload using the IP headers from the data stream packets. The TARP headers can be identical to normal IP headers or customized in some way. They should contain a formula or data for deinterleaving the data at the destination TARP terminal, a time-to-live (TTL) parameter to indicate the number of hops still to be executed, a data type identifier which indicates whether the payload contains, for example, TCP or UDP data, the sender's TARP address, the destination TARP address, and an indicator as to whether the packet contains real or decoy data or a formula for filtering out decoy data if decoy data is spread in some way through the TARP payload data.

[0016] Note that although chain-block encryption is discussed here with reference to the session key, any encryption method may be used. Preferably, as in chain block encryption, a method should be used that makes unauthorized decryption difficult without an entire result of the encryption process. Thus, by separating the encrypted block among multiple packets and making it difficult for an interloper to obtain access to all of such packets, the contents of the communications are provided an extra layer of security.

[0017] Decoy or dummy data can be added to a stream to help foil traffic analysis by reducing the peak-to-average network load. It may be desirable to provide the TARP process with an ability to respond to the time of day or other criteria to generate more decoy data during low traffic periods so that communication bursts at one point in the Internet cannot be tied to communication bursts at another point to reveal the communicating endpoints.

[0018] Dummy data also helps to break the data into a larger number of inconspicuously-sized packets permitting the interleave window size to be increased while maintaining a reasonable size for each packet. (The packet size can be a single standard size or selected from a fixed range of sizes.) One primary reason for desiring for each message to be broken into multiple packets is apparent if a chain block encryption scheme is used to form the

first encryption layer prior to interleaving. A single block encryption may be applied to a portion, or entirety, of a message, and that portion or entirety then interleaved into a number of separate packets. Considering the agile IP routing of the packets, and the attendant difficulty of reconstructing an entire sequence of packets to form a single block-encrypted message element, decoy packets can significantly increase the difficulty of reconstructing an entire data stream.

[0019] The above scheme may be implemented entirely by processes operating between the data link layer and the network layer of each server or terminal participating in the TARP system. Because the encryption system described above is insertable between the data link and network layers, the processes involved in supporting the encrypted communication may be completely transparent to processes at the IP (network) layer and above. The TARP processes may also be completely transparent to the data link layer processes as well. Thus, no operations at or above the Network layer, or at or below the data link layer, are affected by the insertion of the TARP stack. This provides additional security to all processes at or above the network layer, since the difficulty of unauthorized penetration of the network layer (by, for example, a hacker) is increased substantially. Even newly developed servers running at the session layer leave all processes below the session layer vulnerable to attack. Note that in this architecture, security is distributed. That is, notebook computers used by executives on the road, for example, can communicate over the Internet without any compromise in security.

[0020] IP address changes made by TARP terminals and routers can be done at regular intervals, at random intervals, or upon detection of "attacks." The variation of IP addresses hinders traffic analysis that might reveal which computers are communicating, and also provides a degree of immunity from attack. The level of immunity from attack is roughly proportional to the rate at which the IP address of the host is changing.

[0021] As mentioned, IP addresses may be changed in response to attacks. An attack may be revealed, for example, by a regular series of messages indicating that a router is being probed in some way. Upon detection of an attack, the TARP layer process may respond to this event by changing its IP address. In addition, it may create a subprocess that maintains the original IP address and continues interacting with the attacker in some manner.

[0022] Decoy packets may be generated by each TARP terminal on some basis determined by an algorithm. For example, the algorithm may be a random one which calls for the generation of a packet on a random basis when the terminal is idle. Alternatively, the algorithm may be responsive to time of day or detection of low traffic to generate more decoy packets during low traffic times. Note that packets are preferably generated in groups, rather than one by one, the groups being sized to simulate real messages. In addition, so that decoy packets may be inserted in normal TARP message streams, the background loop may have a latch that makes it more likely to insert decoy packets when a message stream is being received. Alternatively, if a large number of decoy packets is received along with regular TARP packets, the algorithm may increase the rate of dropping of decoy packets rather than forwarding them. The result of dropping and generating decoy packets in this way is to make the apparent incoming message size different from the apparent outgoing message size to help foil traffic analysis.

[0023] In various other embodiments of the invention, a scalable version of the system may be constructed in which a plurality of IP addresses are preassigned to each pair of communicating nodes in the network. Each pair of nodes agrees upon an algorithm for "hopping" between IP addresses (both sending and receiving), such that an eavesdropper sees apparently continuously random IP address pairs (source and destination) for packets transmitted between the pair. Overlapping or "reusable" IP addresses may be allocated to different users on the same subnet, since each node merely verifies that a particular packet includes a valid source/destination pair from the agreed-upon algorithm. Source/destination pairs are preferably not reused between any two nodes during any given end-to-end session, though limited IP block sizes or lengthy sessions might require it.

[0024] Further improvements described in this continuation-in-part application include: (1) a load balancer that distributes packets across different transmission paths according to transmission path quality; (2) a DNS proxy server that transparently creates a virtual private network in response to a domain name inquiry; (3) a large-to-small link bandwidth management feature that prevents denial-of service attacks at system chokepoints; (4) a traffic limiter that regulates incoming packets by limiting the rate at which a transmitter can be synchronized with a

receiver; and (5) a signaling synchronizer that allows a large number of nodes to communicate with a central node by partitioning the communication function between two separate entities.

[0025] The present invention provides key technologies for implementing a secure virtual Internet by using a new agile network protocol that is built on top of the existing Internet protocol (IP). The secure virtual Internet works over the existing Internet infrastructure, and interfaces with client applications the same way as the existing Internet. The key technologies provided by the present invention that support the secure virtual Internet include a "one-click" and "no-click" technique to become part of the secure virtual Internet, a secure domain name service (SDNS) for the secure virtual Internet, and a new approach for interfacing specific client applications onto the secure virtual Internet. According to the invention, the secure domain name service interfaces with existing applications, in addition to providing a way to register and serve domain names and addresses.

[0026] According to one aspect of the present invention, a user can conveniently establish a VPN using a "one-click" or a "no-click" technique without being required to enter user identification information, a password and/or an encryption key for establishing a VPN. The advantages of the present invention are provided by a method for establishing a secure communication link between a first computer and a second computer over a computer network, such as the Internet. In one embodiment, a secure communication mode is enabled at a first computer without a user entering any cryptographic information for establishing the secure communication mode of communication, preferably by merely selecting an icon displayed on the first computer. Alternatively, the secure communication mode of communication can be enabled by entering a command into the first computer. Then, a secure communication link is established between the first computer and a second computer over a computer network based on the enabled secure communication mode of communication. According to the invention, it is determined whether a secure communication software module is stored on the first computer in response to the step of enabling the secure communication mode of communication. A predetermined computer network address is then accessed for loading the secure communication software module when the software module is not stored on the first computer. Subsequently, the proxy software module is stored in the first computer. The secure communication link is a virtual private network communication link over the computer network. Preferably, the virtual private network can be based on inserting into each data packet one or more data values that vary according to a pseudo-random sequence. Alternatively, the virtual private network can be based on a computer network address hopping regime that is used to pseudorandomly change computer network addresses or other data values in packets transmitted between the first computer and the second computer, such that the second computer compares the data values in each data packet transmitted between the first computer and the second computer to a moving window of valid values. Yet another alternative provides that the virtual private network can be based on a comparison between a discriminator field in each data packet to a table of valid discriminator fields maintained for the first computer.

[0027] According to another aspect of the invention, a command is entered to define a setup parameter associated with the secure communication link mode of communication. Consequently, the secure communication mode is automatically established when a communication link is established over the computer network.

[0028] The present invention also provides a computer system having a communication link to a computer network, and a display showing a hyperlink for establishing a virtual private network through the computer network. When the hyperlink for establishing the virtual private network is selected, a virtual private network is established over the computer network. A non-standard top-level domain name is then sent over the virtual private network communication to a predetermined computer network address, such as a computer network address for a secure domain name service (SDNS).

[0029] The present invention provides a domain name service that provides secure computer network addresses for secure, non-standard top-level domain names. The advantages of the present invention are provided by a secure domain name service for a computer network that includes a portal connected to a computer network, such as the Internet, and a domain name database connected to the computer network through the portal. According to the invention, the portal authenticates a query for a secure computer network address, and the domain name database stores secure computer network addresses for the computer network. Each secure

computer network address is based on a non-standard top-level domain name, such as .scom, .sorg, .snet, .snet, .sedu, .smil and .sint.

[0030] The present invention provides a way to encapsulate existing application network traffic at the application layer of a client computer so that the client application can securely communicate with a server protected by an agile network protocol. The advantages of the present invention are provided by a method for communicating using a private communication link between a client computer and a server computer over a computer network, such as the Internet. According to the invention, an information packet is sent from the client computer to the server computer over the computer network. The information packet contains data that is inserted into the payload portion of the packet at the application layer of the client computer and is used for forming a virtual private connection between the client computer and the server computer. The modified information packet can be sent through a firewall before being sent over the computer network to the server computer and by working on top of existing protocols (i.e., UDP, ICMP and TCP), the present invention more easily penetrates the firewall. The information packet is received at a kernel layer of an operating system on the server side. It is then determined at the kernel layer of the operating system on the host computer whether the information packet contains the data that is used for forming the virtual private connection. The server side replies by sending an information packet to the client computer that has been modified at the kernel layer to containing virtual private connection information in the payload portion of the reply information packet. Preferably, the information packet from the client computer and the reply information packet from the server side are each a UDP protocol information packet. Alternative, both information packets could be a TCP/IP protocol information packet, or an ICMP protocol information packet.

[0031] In accordance with one aspect of the invention, a network device comprises a storage device storing an application program for a secure communications service; and at least one processor configured to execute the application program for the secure communications service so as to enable the network device to: (a) send a request to look up a network address of a second network device based on an identifier associated with the second network device; (b) receive an indication that the second network device is available for the secure communications

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service, the indication including the requested network address of the second network device and provisioning information for a secure communication link; (c) connect to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and (d) communicate at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

In accordance with another aspect of the invention, a method executed by a first network device for communicating with a second network device. The method comprises: (a) sending a request to look up a network address of a second network device based on an identifier associated with the second network device; (b) receiving an indication that the second network device is available for a secure communications service, the indication including the requested network address of the second network device and provisioning information for a secure communication link; (c) connecting to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and (d) communicating at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] FIG. 1 is an illustration of secure communications over the Internet according to a prior art embodiment.

[0033] FIG. 2 is an illustration of secure communications over the Internet according to an embodiment of the invention.

[0034] FIG. 3a is an illustration of a process of forming a tunneled IP packet according to an embodiment of the invention.

[0035] FIG. 3b is an illustration of a process of forming a tunneled IP packet according to another embodiment of the invention.

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[0036] FIG. 4 is an illustration of an OSI layer location of processes that may be used to implement the invention.

[0037] FIG. 5 is a flow chart illustrating a process for routing a tunneled packet according to an embodiment of the invention.

[0038] FIG. 6 is a flow chart illustrating a process for forming a tunneled packet according to an embodiment of the invention.

[0039] FIG. 7 is a flow chart illustrating a process for receiving a tunneled packet according to an embodiment of the invention.

[0040] FIG. 8 shows how a secure session is established and synchronized between a client and a TARP router.

[0041] FIG. 9 shows an IP address hopping scheme between a client computer and TARP router using transmit and receive tables in each computer.

[0042] FIG. 10 shows physical link redundancy among three Internet Service Providers (ISPs) and a client computer.

[0043] FIG. 11 shows how multiple IP packets can be embedded into a single "frame" such as an Ethernet frame, and further shows the use of a discriminator field to camouflage true packet recipients.

[0044] FIG. 12A shows a system that employs hopped hardware addresses, hopped IP addresses, and hopped discriminator fields.

[0045] FIG. 12B shows several different approaches for hopping hardware addresses, IP addresses, and discriminator fields in combination.

[0046] FIG. 13 shows a technique for automatically re-establishing synchronization between sender and receiver through the use of a partially public sync value.

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[0047] FIG. 14 shows a "checkpoint" scheme for regaining synchronization between a sender and recipient.

[0048] FIG. 15 shows further details of the checkpoint scheme of FIG. 14.

[0049] FIG. 16 shows how two addresses can be decomposed into a plurality of segments for comparison with presence vectors.

[0050] FIG. 17 shows a storage array for a receiver's active addresses.

[0051] FIG. 18 shows the receiver's storage array after receiving a sync request.

[0052] FIG. 19 shows the receiver's storage array after new addresses have been generated.

[0053] FIG. 20 shows a system employing distributed transmission paths.

[0054] FIG. 21 shows a plurality of link transmission tables that can be used to route packets in the system of FIG. 20.

[0055] FIG. 22A shows a flowchart for adjusting weight value distributions associated with a plurality of transmission links.

[0056] FIG. 22B shows a flowchart for setting a weight value to zero if a transmitter turns off.

[0057] FIG. 23 shows a system employing distributed transmission paths with adjusted weight value distributions for each path.

[0058] FIG. 24 shows an example using the system of FIG. 23.

[0059] FIG. 25 shows a conventional domain-name look-up service.

[0060] FIG. 26 shows a system employing a DNS proxy server with transparent VPN creation.

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[0061] FIG. 27 shows steps that can be carried out to implement transparent VPN creation based on a DNS look-up function.

[0062] FIG. 28 shows a system including a link guard function that prevents packet overloading on a low-bandwidth link LOW BW.

[0063] FIG. 29 shows one embodiment of a system employing the principles of FIG. 28.

[0064] FIG. 30 shows a system that regulates packet transmission rates by throttling the rate at which synchronizations are performed.

[0065] FIG. 31 shows a signaling server 3101 and a transport server 3102 used to establish a VPN with a client computer.

[0066] FIG. 32 shows message flows relating to synchronization protocols of FIG. 31.

[0067] FIG. 33 shows a system block diagram of a computer network in which the "one-click" secure communication link of the present invention is suitable for use.

[0068] FIG. 34 shows a flow diagram for installing and establishing a "one-click" secure communication link over a computer network according to the present invention.

[0069] FIG. 35 shows a flow diagram for registering a secure domain name according to the present invention.

[0070] FIG. 36 shows a system block diagram of a computer network in which a private connection according to the present invention can be configured to more easily traverse a firewall between two computer networks.

[0071] FIG. 37 shows a flow diagram for establishing a virtual private connection that is encapsulated using an existing network protocol.

DETAILED DESCRIPTION OF THE INVENTION

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[0072] Referring to FIG. 2, a secure mechanism for communicating over the internet employs a number of special routers or servers, called TARP routers 122-127 that are similar to regular IP routers 128-132 in that each has one or more IP addresses and uses normal IP protocol to send normal-looking IP packet messages, called TARP packets 140. TARP packets 140 are identical to normal IP packet messages that are routed by regular IP routers 128-132 because each TARP packet 140 contains a destination address as in a normal IP packet. However, instead of indicating a final destination in the destination field of the IP header, the TARP packet's 140 IP header always points to a next-hop in a series of TARP router hops, or the final destination, TARP terminal 110. Because the header of the TARP packet contains only the next-hop destination, there is no overt indication from an intercepted TARP packet of the true destination of the TARP packet 140 since the destination could always be the next-hop TARP router as well as the final destination, TARP terminal 110.

[0073] Each TARP packet's true destination is concealed behind an outer layer of encryption generated using a link key 146. The link key 146 is the encryption key used for encrypted communication between the end points (TARP terminals or TARP routers) of a single link in the chain of hops connecting the originating TARP terminal 100 and the destination TARP terminal 110. Each TARP router 122-127, using the link key 146 it uses to communicate with the previous hop in a chain, can use the link key to reveal the true destination of a TARP packet. To identify the link key needed to decrypt the outer layer of encryption of a TARP packet, a receiving TARP or routing terminal may identify the transmitting terminal (which may indicate the link key used) by the sender field of the clear IP header. Alternatively, this identity may be hidden behind another layer of encryption in available bits in the clear IP header. Each TARP router, upon receiving a TARP message, determines if the message is a TARP message by using authentication data in the TARP packet. This could be recorded in available bytes in the TARP packet's IP header. Alternatively, TARP packets could be authenticated by attempting to decrypt using the link key 146 and determining if the results are as expected. The former may have computational advantages because it does not involve a decryption process.

[0074] Once the outer layer of decryption is completed by a TARP router 122-127, the TARP router determines the final destination. The system is preferably designed to cause

each TARP packet 140 to undergo a minimum number of hops to help foil traffic analysis. The time to live counter in the IP header of the TARP message may be used to indicate a number of TARP router hops yet to be completed. Each TARP router then would decrement the counter and determine from that whether it should forward the TARP packet 140 to another TARP router 122-127 or to the destination TARP terminal 110. If the time to live counter is zero or below zero after decrementing, for an example of usage, the TARP router receiving the TARP packet 140 may forward the TARP packet 140 to the destination TARP terminal 110. If the time to live counter receiving the TARP packet 140 may forward the TARP packet 140 to the destination TARP terminal 110. If the time to live counter is above zero after decrementing, for an example of usage, the TARP router receiving the TARP packet 140 may forward the TARP packet 140 to the destination TARP terminal 110. If the time to live counter is above zero after decrementing, for an example of usage, the TARP router receiving the TARP packet 140 may forward the TARP packet 140 to a TARP router 122-127 that the current TARP terminal chooses at random. As a result, each TARP packet 140 is routed through some minimum number of hops of TARP routers 122-127 which are chosen at random.

[0075] Thus, each TARP packet, irrespective of the traditional factors determining traffic in the Internet, makes random trips among a number of geographically disparate routers before reaching its destination and each trip is highly likely to be different for each packet composing a given message because each trip is independently randomly determined as described above. This feature is called *agile routing*. For reasons that will become clear shortly, the fact that different packets take different routes provides distinct advantages by making it difficult for an interloper to obtain all the packets forming an entire multi-packet message. Agile routing is combined with another feature that furthers this purpose, a feature that ensures that any message is broken into multiple packets.

[0076] A TARP router receives a TARP packet when an IP address used by the TARP router coincides with the IP address in the TARP packet's IP header IPc. The IP address of a TARP router, however, may not remain constant. To avoid and manage attacks, each TARP router, independently or under direction from another TARP terminal or router, may change its IP address. A separate, unchangeable identifier or address is also defined. This address, called the TARP address, is known only to TARP routers and terminals and may be correlated at any time by a TARP router or a TARP terminal using a Lookup Table (LUT). When a TARP router or terminal changes its IP address, it updates the other TARP routers and terminals which in turn update their respective LUTs. In reality, whenever a TARP router looks up the address of a

destination in the encrypted header, it must convert a TARP address to a real IP address using its LUT.

[0077] While every TARP router receiving a TARP packet has the ability to determine the packet's final destination, the message payload is embedded behind an inner layer of encryption in the TARP packet that can only be unlocked using a session key. The session key is not available to any of the TARP routers 122-127 intervening between the originating 100 and destination 110 TARP terminals. The session key is used to decrypt the payloads of the TARP packets 140 permitting an entire message to be reconstructed.

[0078] In one embodiment, communication may be made private using link and session keys, which in turn may be shared and used according any desired method. For example, a public key or symmetric keys may be communicated between link or session endpoints using a public key method. Any of a variety of other mechanisms for securing data to ensure that only authorized computers can have access to the private information in the TARP packets 140 may be used as desired.

[0079] Referring to FIG. 3a, to construct a series of TARP packets, a data stream 300 of IP packets 207a, 207b, 207c, etc., such series of packets being formed by a network (IP) layer process, is broken into a series of small sized segments. In the present example, equal-sized segments 1-9 are defined and used to construct a set of interleaved data packets A, B, and C. Here it is assumed that the number of interleaved packets A, B, and C formed is three and that the number of IP packets 207a-207c used to form the three interleaved packets A, B, and C is exactly three. Of course, the number of IP packets spread over a group of interleaved packets may be any convenient number as may be the number of interleaved packets over which the incoming data stream is spread. The latter, the number of interleaved packets over which the data stream is spread, is called the *interleave window*.

[0080] To create a packet, the transmitting software interleaves the normal IP packets 207a *et. seq, to* form a new set of interleaved payload data 320. This payload data 320 is then encrypted using a session key to form a set of session-key-encrypted payload data 330, each of which, A, B, and C, will form the payload of a TARP packet. Using the IP header data, from the

original packets 207a-207c, new TARP headers IPT are formed. The TARP headers IPT can be identical to normal IP headers or customized in some way. In a preferred embodiment, the TARP headers IPT are IP headers with added data providing the following information required for routing and reconstruction of messages, some of which data is ordinarily, or capable of being, contained in normal IP headers:

1. A window sequence number — an identifier that indicates where the packet belongs in the original message sequence.

2. An interleave sequence number — an identifier that indicates the interleaving sequence used to form the packet so that the packet can be deinterleaved along with other packets in the interleave window.

3. A time-to-live (TTL) datum — indicates the number of TARP-router-hops to be executed before the packet reaches its destination. Note that the TTL parameter may provide a datum to be used in a probabilistic formula for determining whether to route the packet to the destination or to another hop.

4. Data type identifier — indicates whether the payload contains, for example, TCP or UDP data.

5. Sender's address — indicates the sender's address in the TARP network.

6. Destination address — indicates the destination terminal's address in the TARP network.

7. Decoy/Real — an indicator of whether the packet contains real message data or dummy decoy data or a combination.

[0081] Obviously, the packets going into a single interleave window must include only packets with a common destination. Thus, it is assumed in the depicted example that the IP headers of IP packets 207a-207c all contain the same destination address or at least will be received by the same terminal so that they can be deinterleaved. Note that dummy or decoy data or packets can be added to form a larger interleave window than would otherwise be required by

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the size of a given message. Decoy or dummy data can be added to a stream to help foil traffic analysis by leveling the load on the network. Thus, it may be desirable to provide the TARP process with an ability to respond to the time of day or other criteria to generate more decoy data during low traffic periods so that communication bursts at one point in the Internet cannot be tied to communication bursts at another point to reveal the communicating endpoints.

[0082] Dummy data also helps to break the data into a larger number of inconspicuously-sized packets permitting the interleave window size to be increased while maintaining a reasonable size for each packet. (The packet size can be a single standard size or selected from a fixed range of sizes.) One primary reason for desiring for each message to be broken into multiple packets is apparent if a chain block encryption scheme is used to form the first encryption layer prior to interleaving. A single block encryption may be applied to a portion, or the entirety, of a message, and that portion or entirety then interleaved into a number of separate packets.

[0083] Referring to FIG. 3b, in an alternative mode of TARP packet construction, a series of IP packets are accumulated to make up a predefined interleave window. The payloads of the packets are used to construct a single block 520 for chain block encryption using the session key. The payloads used to form the block are presumed to be destined for the same terminal. The block size may coincide with the interleave window as depicted in the example embodiment of FIG. 3b. After encryption, the encrypted block is broken into separate payloads and segments which are interleaved as in the embodiment of Fig 3a. The resulting interleaved packets A, B, and C, are then packaged as TARP packets with TARP headers as in the Example of FIG. 3a. The remaining process is as shown in, and discussed with reference to, FIG. 3a.

[0084] Once the TARP packets 340 are formed, each entire TARP packet 340, including the TARP header IPT, is encrypted using the link key for communication with the first-hop-TARP router. The first hop TARP router is randomly chosen. A final unencrypted IP header IPc is added to each encrypted TARP packet 340 to form a normal IP packet 360 that can be transmitted to a TARP router. Note that the process of constructing the TARP packet 360 does not have to be done in stages as described. The above description is just a useful heuristic for describing the final product, namely, the TARP packet.

[0085] Note that, TARP header IP_T could be a completely custom header configuration with no similarity to a normal IP header except that it contain the information identified above. This is so since this header is interpreted by only TARP routers.

[0086] The above scheme may be implemented entirely by processes operating between the data link layer and the network layer of each server or terminal participating in the TARP system. Referring to FIG. 4, a TARP transceiver 405 can be an originating terminal 100, a destination terminal 110, or a TARP router 122-127. In each TARP Transceiver 405, a transmitting process is generated to receive normal packets from the Network (IP) layer and generate TARP packets for communication over the network. A receiving process is generated to receive normal IP packets containing TARP packets and generate from these normal IP packets which are "passed up" to the Network (IP) layer. Note that where the TARP Transceiver 405 is a router, the received TARP packets 140 are not processed into a stream of IP packets 415 because they need only be authenticated as proper TARP packets and then passed to another TARP router or a TARP destination terminal 110. The intervening process, a "TARP Layer" 420, could be combined with either the data link layer 430 or the Network layer 410. In either case, it would intervene between the data link layer 430 so that the process would receive regular IP packets containing embedded TARP packets and "hand up" a series of reassembled IP packets to the Network layer 410. As an example of combining the TARP layer 420 with the data link layer 430, a program may augment the normal processes running a communications card, for example, an Ethernet card. Alternatively, the TARP layer processes may form part of a dynamically loadable module that is loaded and executed to support communications between the network and data link layers.

[0087] Because the encryption system described above can be inserted between the data link and network layers, the processes involved in supporting the encrypted communication may be completely transparent to processes at the IP (network) layer and above. The TARP processes may also be completely transparent to the data link layer processes as well. Thus, no operations at or above the network layer, or at or below the data link layer, are affected by the insertion of the TARP stack. This provides additional security to all processes at or above the network layer, since the difficulty of unauthorized penetration of the network layer (by, for

example, a hacker) is increased substantially. Even newly developed servers running at the session layer leave all processes below the session layer vulnerable to attack. Note that in this architecture, security is distributed. That is, notebook computers used by executives on the road, for example, can communicate over the Internet without any compromise in security.

[0088] Note that IP address changes made by TARP terminals and routers can be done at regular intervals, at random intervals, or upon detection of "attacks." The variation of IP addresses hinders traffic analysis that might reveal which computers are communicating, and also provides a degree of immunity from attack. The level of immunity from attack is roughly proportional to the rate at which the IP address of the host is changing.

[0089] As mentioned, IP addresses may be changed in response to attacks. An attack may be revealed, for example, by a regular series of messages indicates that a router is being probed in some way. Upon detection of an attack, the TARP layer process may respond to this event by changing its IP address. To accomplish this, the TARP process will construct a TARPformatted message, in the style of Internet Control Message Protocol (ICMP) datagrams as an example; this message will contain the machine's TARP address, its previous IP address, and its new IP address. The TARP layer will transmit this packet to at least one known TARP router; then upon receipt and validation of the message, the TARP router will update its LUT with the new IP address for the stated TARP address. The TARP router will then format a similar message, and broadcast it to the other TARP routers so that they may update their LUTs. Since the total number of TARP routers on any given subnet is expected to be relatively small, this process of updating the LUTs should be relatively fast. It may not, however, work as well when there is a relatively large number of TARP routers and/or a relatively large number of clients; this has motivated a refinement of this architecture to provide scalability; this refinement has led to a second embodiment, which is discussed below.

[0090] Upon detection of an attack, the TARP process may also create a subprocess that maintains the original IP address and continues interacting with the attacker. The latter may provide an opportunity to trace the attacker or study the attacker's methods (called "fishbowling" drawing upon the analogy of a small fish in a fish bowl that "thinks" it is in the ocean but is actually under captive observation). A history of the communication between the attacker and the

abandoned (fishbowled) IP address can be recorded or transmitted for human analysis or further synthesized for purposes of responding in some way.

[0091] As mentioned above, decoy or dummy data or packets can be added to outgoing data streams by TARP terminals or routers. In addition to making it convenient to spread data over a larger number of separate packets, such decoy packets can also help to level the load on inactive portions of the Internet to help foil traffic analysis efforts.

[0092] Decoy packets may be generated by each TARP terminal 100, 110 or each router 122-127 on some basis determined by an algorithm. For example, the algorithm may be a random one which calls for the generation of a packet on a random basis when the terminal is idle. Alternatively, the algorithm may be responsive to time of day or detection of low traffic to generate more decoy packets during low traffic times. Note that packets are preferably generated in groups, rather than one by one, the groups being sized to simulate real messages. In addition, so that decoy packets may be inserted in normal TARP message streams, the background loop may have a latch that makes it more likely to insert decoy packets when a message stream is being received. That is, when a series of messages are received, the decoy packet generation rate may be increased. Alternatively, if a large number of decoy packets is received along with regular TARP packets, the algorithm may increase the rate of dropping of decoy packets rather than forwarding them. The result of dropping and generating decoy packets in this way is to make the apparent incoming message size different from the apparent outgoing message size to help foil traffic analysis. The rate of reception of packets, decoy or otherwise, may be indicated to the decoy packet dropping and generating processes through perishable decoy and regular packet counters. (A perishable counter is one that resets or decrements its value in response to time so that it contains a high value when it is incremented in rapid succession and a small value when incremented either slowly or a small number of times in rapid succession.) Note that destination TARP terminal 110 may generate decoy packets equal in number and size to those TARP packets received to make it appear it is merely routing packets and is therefore not the destination terminal.

[0093] Referring to FIG. 5, the following particular steps may be employed in the above- described method for routing TARP packets.

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- S0. A background loop operation is performed which applies an algorithm which determines the generation of decoy IP packets. The loop is interrupted when an encrypted TARP packet is received.
- S2. The TARP packet may be probed in some way to authenticate the packet before attempting to decrypt it using the link key. That is, the router may determine that the packet is an authentic TARP packet by performing a selected operation on some data included with the clear IP header attached to the encrypted TARP packet contained in the payload. This makes it possible to avoid performing decryption on packets that are not authentic TARP packets.
- S3. The TARP packet is decrypted to expose the destination TARP address and an indication of whether the packet is a decoy packet or part of a real message.
- S4. If the packet is a decoy packet, the perishable decoy counter is incremented.
- S5. Based on the decoy generation/dropping algorithm and the perishable decoy counter value, if the packet is a decoy packet, the router may choose to throw it away. If the received packet is a decoy packet and it is determined that it should be thrown away (S6), control returns to step S0.
- S7. The TTL parameter of the TARP header is decremented and it is determined if the TTL parameter is greater than zero.
- S8. If the TTL parameter is greater than zero, a TARP address is randomly chosen from a list of TARP addresses maintained by the router and the link key and IP address corresponding to that TARP address memorized for use in creating a new IP packet containing the TARP packet.
- S9. If the TTL parameter is zero or less, the link key and IP address corresponding to the TARP address of the destination are memorized for use in creating the new IP packet containing the TARP packet.
- S 10. The TARP packet is encrypted using the memorized link key.

• S 11. An IP header is added to the packet that contains the stored IP address, the encrypted TARP packet wrapped with an IP header, and the completed packet transmitted to the next hop or destination.

[0094] Referring to FIG. 6, the following particular steps may be employed in the above- described method for generating TARP packets.

- S20. A background loop operation applies an algorithm that determines the generation of decoy IP packets. The loop is interrupted when a data stream containing IP packets is received for transmission.
- S21. The received IP packets are grouped into a set consisting of messages with a constant IP destination address. The set is further broken down to coincide with a maximum size of an interleave window The set is encrypted, and interleaved into a set of payloads destined to become TARP packets.
- S22. The TARP address corresponding to the IP address is determined from a lookup table and stored to generate the TARP header. An initial TTL count is generated and stored in the header. The TTL count may be random with minimum and maximum values or it may be fixed or determined by some other parameter.
- S23. The window sequence numbers and interleave sequence numbers are recorded in the TARP headers of each packet.
- S24. One TARP router address is randomly chosen for each TARP packet and the IP address corresponding to it stored for use in the clear IP header. The link key corresponding to this router is identified and used to encrypt TARP packets containing interleaved and encrypted data and TARP headers.
- S25. A clear IP header with the first hop router's real IP address is generated and added to each of the encrypted TARP packets and the resulting packets.

[0095] Referring to FIG. 7, the following particular steps may be employed in the above- described method for receiving TARP packets.

- S40. A background loop operation is performed which applies an algorithm which determines the generation of decoy IP packets. The loop is interrupted when an encrypted TARP packet is received.
- S42. The TARP packet may be probed to authenticate the packet before attempting to decrypt it using the link key.
- S43. The TARP packet is decrypted with the appropriate link key to expose the destination TARP address and an indication of whether the packet is a decoy packet or part of a real message.
- S44. If the packet is a decoy packet, the perishable decoy counter is incremented.
- S45. Based on the decoy generation/dropping algorithm and the perishable decoy counter value, if the packet is a decoy packet, the receiver may choose to throw it away.
- S46. The TARP packets are cached until all packets forming an interleave window are received.
- S47. Once all packets of an interleave window are received, the packets are deinterleaved.
- S48. The packets block of combined packets defining the interleave window is then decrypted using the session key.
- S49. The decrypted block is then divided using the window sequence data and the IP_T headers are converted into normal IP_C headers. The window sequence numbers are integrated in the IP_C headers.
- S50. The packets are then handed up to the IP layer processes.

1. SCALABILITY ENHANCEMENTS

[0096] The IP agility feature described above relies on the ability to transmit IP address changes to all TARP routers. The embodiments including this feature will be referred to as "boutique" embodiments due to potential limitations in scaling these features up for a large

network, such as the Internet. (The "boutique" embodiments would, however, be robust for use in smaller networks, such as small virtual private networks, for example). One problem with the boutique embodiments is that if IP address changes are to occur frequently, the message traffic required to update all routers sufficiently quickly creates a serious burden on the Internet when the TARP router and/or client population gets large. The bandwidth burden added to the networks, for example in ICMP packets, that would be used to update all the TARP routers could overwhelm the Internet for a large scale implementation that approached the scale of the Internet. In other words, the boutique system's scalability is limited.

[0097] A system can be constructed which trades some of the features of the above embodiments to provide the benefits of IP agility without the additional messaging burden. This is accomplished by IP address-hopping according to shared algorithms that govern IP addresses used between links participating in communications sessions between nodes such as TARP nodes. (Note that the IP hopping technique is also applicable to the boutique embodiment.) The IP agility feature discussed with respect to the boutique system can be modified so that it becomes decentralized under this scalable regime and governed by the above-described shared algorithm. Other features of the boutique system may be combined with this new type of IPagility.

[0098] The new embodiment has the advantage of providing IP agility governed by a local algorithm and set of IP addresses exchanged by each communicating pair of nodes. This local governance is session-independent in that it may govern communications between a pair of nodes, irrespective of the session or end points being transferred between the directly communicating pair of nodes.

[0099] In the scalable embodiments, blocks of IP addresses are allocated to each node in the network. (This scalability will increase in the future, when Internet Protocol addresses are increased to 128-bit fields, vastly increasing the number of distinctly addressable nodes). Each node can thus use any of the IP addresses assigned to that node to communicate with other nodes in the network. Indeed, each pair of communicating nodes can use a plurality of source IP addresses and destination IP addresses for communicating with each other. **[00100]** Each communicating pair of nodes in a chain participating in any session stores two blocks of IP addresses, called netblocks, and an algorithm and randomization seed for selecting, from each netblock, the next pair of source/destination IP addresses that will be used to transmit the next message. In other words, the algorithm governs the sequential selection of IP-address pairs, one sender and one receiver IP address, from each netblock. The combination of algorithm, seed, and netblock (IP address block) will be called a "hopblock." A router issues separate transmit and receive hopblocks to its clients. The send address and the receive address of the IP header of each outgoing packet sent by the client are filled with the send and receive IP addresses generated by the algorithm. The algorithm is "clocked" (indexed) by a counter so that each time a pair is used, the algorithm turns out a new transmit pair for the next packet to be sent.

[00101] The router's receive hopblock is identical to the client's transmit hopblock. The router uses the receive hopblock to predict what the send and receive IP address pair for the next expected packet from that client will be. Since packets can be received out of order, it is not possible for the router to predict with certainty what IP address pair will be on the next sequential packet. To account for this problem, the router generates a range of predictions encompassing the number of possible transmitted packet send/receive addresses, of which the next packet received could leap ahead. Thus, if there is a vanishingly small probability that a given packet will arrive at the router ahead of 5 packets transmitted by the client before the given packet, then the router can generate a series of 6 send/receive IP address pairs (or "hop window") to compare with the next received packet. When a packet is received, it is marked in the hop window as such, so that a second packet with the same IP address pair will be discarded. If an out-of-sequence packet does not arrive within a predetermined timeout period, it can be requested for retransmission or simply discarded from the receive table, depending upon the protocol in use for that communications session, or possibly by convention.

[00102] When the router receives the client's packet, it compares the send and receive IP addresses of the packet with the next N predicted send and receive IP address pairs and rejects the packet if it is not a member of this set. Received packets that do not have the predicted source/destination IP addresses falling with the window are rejected, thus thwarting possible hackers. (With the number of possible combinations, even a fairly large window would be hard to fall into at random.) If it is a member of this set, the router accepts the packet and processes it further. This link-based IP-hopping strategy, referred to as "IHOP," is a network element that stands on its own and is not necessarily accompanied by elements of the boutique system described above. If the routing agility feature described in connection with the boutique embodiment is combined with this link-based IP-hopping strategy, the router's next step would be to decrypt the TARP header to determine the destination TARP router for the packet and determine what should be the next hop for the packet. The TARP router would then forward the packet to a random TARP router or the destination TARP router with which the source TARP router has a link-based IP hopping communication established.

[00103] Figure 8 shows how a client computer 801 and a TARP router 811 can establish a secure session. When client 801 seeks to establish an IHOP session with TARP router 811, the client 801 sends "secure synchronization" request ("SSYN") packet 821 to the TARP router 811. This SYN packet 821 contains the client's 801 authentication token, and may be sent to the router 811 in an encrypted format. The source and destination IP numbers on the packet 821 are the client's 801 current fixed IP address, and a "known" fixed IP address for the router 811. (For security purposes, it may be desirable to reject any packets from outside of the local network that are destined for the router's known fixed IP address.) Upon receipt and validation of the client's 801 SSYN packet 821, the router 811 responds by sending an encrypted "secure synchronization acknowledgment" ("SSYN ACK") 822 to the client 801. This SSYN ACK 822 will contain the transmit and receive hopblocks that the client 801 will use when communicating with the TARP router 811. The client 801 will acknowledge the TARP router's 811 response packet 822 by generating an encrypted SSYN ACK ACK packet 823 which will be sent from the client's 801 fixed IP address and to the TARP router's 811 known fixed IP address. The client 801 will simultaneously generate a SSYN ACK ACK packet; this SSYN ACK packet, referred to as the Secure Session Initiation (SSI) packet 824, will be sent with the first {sender, receiver} IP pair in the client's transmit table 921 (FIG. 9), as specified in the transmit hopblock provided by the TARP router 811 in the SSYN ACK packet 822. The TARP router 811 will respond to the SSI packet 824 with an SSI ACK packet 825, which will be sent with the first {sender, receiver} IP pair in the TARP router's transmit table 923. Once these packets have been successfully exchanged, the secure communications session is established, and all further secure

communications between the client 801 and the TARP router 811 will be conducted via this secure session, as long as synchronization is maintained. If synchronization is lost, then the client 801 and TARP router 802 may re-establish the secure session by the procedure outlined in Figure 8 and described above.

[00104] While the secure session is active, both the client 901 and TARP router 911 (FIG. 9) will maintain their respective transmit tables 921, 923 and receive tables 922, 924, as provided by the TARP router during session synchronization 822. It is important that the sequence of IP pairs in the client's transmit table 921 be identical to those in the TARP router's receive table 924; similarly, the sequence of IP pairs in the client's receive table 922 must be identical to those in the router's transmit table 923. This is required for the session synchronization to be maintained. The client 901 need maintain only one transmit table 921 and one receive table 922 during the course of the secure session. Each sequential packet sent by the client 901 will employ the next {send, receive} IP address pair in the transmit table, regardless of TCP or UDP session. The TARP router 911 will expect each packet arriving from the client 901 to bear the next IP address pair shown in its receive table.

[00105] Since packets can arrive out of order, however, the router 911 can maintain a "look ahead" buffer in its receive table, and will mark previously-received IP pairs as invalid for future packets; any future packet containing an IP pair that is in the look-ahead buffer but is marked as previously received will be discarded. Communications from the TARP router 911 to the client 901 are maintained in an identical manner; in particular, the router 911 will select the next IP address pair from its transmit table 923 when constructing a packet to send to the client 901, and the client 901 will maintain a look-ahead buffer of expected IP pairs on packets that it is receiving. Each TARP router will maintain separate pairs of transmit and receive tables for each client that is currently engaged in a secure session with or through that TARP router.

[00106] While clients receive their hopblocks from the first server linking them to the Internet, routers exchange hopblocks. When a router establishes a link-based IP-hopping communication regime with another router, each router of the pair exchanges its transmit hopblock. The transmit hopblock of each router becomes the receive hopblock of the other

router. The communication between routers is governed as described by the example of a client sending a packet to the first router.

[00107] While the above strategy works fine in the IP milieu, many local networks that are connected to the Internet are Ethernet systems. In Ethernet, the IP addresses of the destination devices must be translated into hardware addresses, and vice versa, using known processes ("address resolution protocol," and "reverse address resolution protocol"). However, if the link- based IP-hopping strategy is employed, the correlation process would become explosive and burdensome. An alternative to the link-based IP hopping strategy may be employed within an Ethernet network. The solution is to provide that the node linking the Internet to the Ethernet (call it the border node) use the link-based IP-hopping communication regime to communicate with nodes outside the Ethernet LAN. Within the Ethernet LAN, each TARP node would have a single IP address which would be addressed in the conventional way. Instead of comparing the {sender, receiver} IP address pairs to authenticate a packet, the intra-LAN TARP node would use one of the IP header extension fields to do so. Thus, the border node uses an algorithm shared by the intra-LAN TARP node to generate a symbol that is stored in the free field in the IP header, and the intra-LAN TARP node generates a range of symbols based on its prediction of the next expected packet to be received from that particular source IP address. The packet is rejected if it does not fall into the set of predicted symbols (for example, numerical values) or is accepted if it does. Communications from the intra-LAN TARP node to the border node are accomplished in the same manner, though the algorithm will necessarily be different for security reasons. Thus, each of the communicating nodes will generate transmit and receive tables in a similar manner to that of Figure 9; the intra-LAN TARP nodes transmit table will be identical to the border node's receive table, and the intra-LAN TARP node's receive table will be identical to the border node's transmit table.

[00108] The algorithm used for IP address-hopping can be any desired algorithm. For example, the algorithm can be a given pseudo-random number generator that generates numbers of the range covering the allowed IP addresses with a given seed. Alternatively, the session participants can assume a certain type of algorithm and specify simply a parameter for applying

the algorithm. For example the assumed algorithm could be a particular pseudo-random number generator and the session participants could simply exchange seed values.

[00109] Note that there is no permanent physical distinction between the originating and destination terminal nodes. Either device at either end point can initiate a synchronization of the pair. Note also that the authentication/synchronization-request (and acknowledgment) and hopblock-exchange may all be served by a single message so that separate message exchanges may not be required.

[00110] As another extension to the stated architecture, multiple physical paths can be used by a client, in order to provide link redundancy and further thwart attempts at denial of service and traffic monitoring. As shown in Figure 10, for example, client 1001 can establish three simultaneous sessions with each of three TARP routers provided by different ISPs 1011, 1012, 1013. As an example, the client 1001 can use three different telephone lines 1021, 1022, 1023 to connect to the ISPs, or two telephone lines and a cable modem, etc. In this scheme, transmitted packets will be sent in a random fashion among the different physical paths. This architecture provides a high degree of communications redundancy, with improved immunity from denial-of- service attacks and traffic monitoring.

2. FURTHER EXTENSIONS

[00111] The following describes various extensions to the techniques, systems, and methods described above. As described above, the security of communications occurring between computers in a computer network (such as the Internet, an Ethernet, or others) can be enhanced by using seemingly random source and destination Internet Protocol (IP) addresses for data packets transmitted over the network. This feature prevents eavesdroppers from determining which computers in the network are communicating with each other while permitting the two communicating computers to easily recognize whether a given received data packet is legitimate or not. In one embodiment of the above-described systems, an IP header extension field is used to authenticate incoming packets on an Ethernet.

[00112] Various extensions to the previously described techniques described herein include: (1) use of hopped hardware or "MAC" addresses in broadcast type network; (2) a self

synchronization technique that permits a computer to automatically regain synchronization with a sender; (3) synchronization algorithms that allow transmitting and receiving computers to quickly re-establish synchronization in the event of lost packets or other events; and (4) a fastpacket rejection mechanism for rejecting invalid packets. Any or all of these extensions can be combined with the features described above in any of various ways.

A. Hardware Address Hopping

[00113] Internet protocol-based communications techniques on a LAN—or across any dedicated physical medium—typically embed the IP packets within lower-level packets, often referred to as "frames." As shown in FIG. 11, for example, a first Ethernet frame 1150 comprises a frame header 1101 and two embedded IP packets IP1 and IP2, while a second Ethernet frame 1160 comprises a different frame header 1104 and a single IP packet IP3. Each frame header generally includes a source hardware address 1101 A and a destination hardware address 1101 B; other well-known fields in frame headers are omitted from FIG. 11 for clarity. Two hardware nodes communicating over a physical communication channel insert appropriate source and destination hardware addresses to indicate which nodes on the channel or network should receive the frame.

[00114] It may be possible for a nefarious listener to acquire information about the contents of a frame and/or its communicants by examining frames on a local network rather than (or in addition to) the IP packets themselves. This is especially true in broadcast media, such as Ethernet, where it is necessary to insert into the frame header the hardware address of the machine that generated the frame and the hardware address of the machine to which frame is being sent. All nodes on the network can potentially "see" all packets transmitted across the network. This can be a problem for secure communications, especially in cases where the communicants do not want for any third party to be able to identify who is engaging in the information exchange. One way to address this problem is to push the address-hopping scheme down to the hardware layer. In accordance with various embodiments of the invention, hardware addresses are "hopped" in a manner similar to that used to change IP addresses, such that a listener cannot determine which hardware node generated a particular message nor which node is the intended recipient.

[00115] FIG. 12A shows a system in which Media Access Control ("MAC") hardware addresses are "hopped" in order to increase security over a network such as an Ethernet. While the description refers to the exemplary case of an Ethernet environment, the inventive principles are equally applicable to other types of communications media. In the Ethernet case, the MAC address of the sender and receiver are inserted into the Ethernet frame and can be observed by anyone on the LAN who is within the broadcast range for that frame. For secure communications, it becomes desirable to generate frames with MAC addresses that are not attributable to any specific sender or receiver.

[00116] As shown in FIG. 12A, two computer nodes 1201 and 1202 communicate over a communication channel such as an Ethernet. Each node executes one or more application programs 1203 and 1218 that communicate by transmitting packets through communication software 1204 and 1217, respectively. Examples of application programs include video conferencing, e-mail, word processing programs, telephony, and the like. Communication software 1204 and 1217 can comprise, for example, an OSI layered architecture or "stack" that standardizes various services provided at different levels of functionality.

[00117] The lowest levels of communication software 1204 and 1217 communicate with hardware components 1206 and 1214 respectively, each of which can include one or more registers 1207 and 1215 that allow the hardware to be reconfigured or controlled in accordance with various communication protocols. The hardware components (an Ethernet network interface card, for example) communicate with each other over the communication medium. Each hardware component is typically pre-assigned a fixed hardware address or MAC number that identifies the hardware component to other nodes on the network. One or more interface drivers control the operation of each card and can, for example, be configured to accept or reject packets from certain hardware addresses. As will be described in more detail below, various embodiments of the inventive principles provide for "hopping" different addresses using one or more algorithms and one or more moving windows that track a range of valid addresses to validate received packets. Packets transmitted according to one or more of the inventive principles will be generally referred to as "secure" packets or "secure communications" to

differentiate them from ordinary data packets that are transmitted in the clear using ordinary, machine-correlated addresses.

[00118] One straightforward method of generating non-attributable MAC addresses is an extension of the IP hopping scheme. In this scenario, two machines on the same LAN that desire to communicate in a secure fashion exchange random-number generators and seeds, and create sequences of quasi-random MAC addresses for synchronized hopping. The implementation and synchronization issues are then similar to that of IP hopping.

[00119] This approach, however, runs the risk of using MAC addresses that are currently active on the LAN—which, in turn, could interrupt communications for those machines. Since an Ethernet MAC address is at present 48 bits in length, the chance of randomly misusing an active MAC address is actually quite small. However, if that figure is multiplied by a large number of nodes (as would be found on an extensive LAN), by a large number of frames (as might be the case with packet voice or streaming video), and by a large number of concurrent Virtual Private Networks (VPNs), then the chance that a non-secure machine's MAC address could be used in an address-hopped frame can become non-trivial. In short, any scheme that runs even a small risk of interrupting communications for other machines on the LAN is bound to receive resistance from prospective system administrators. Nevertheless, it is technically feasible, and can be implemented without risk on a LAN on which there is a small number of machines, or if all of the machines on the LAN are engaging in MAC-hopped communications.

[00120] Synchronized MAC address hopping may incur some overhead in the course of session establishment, especially if there are multiple sessions or multiple nodes involved in the communications. A simpler method of randomizing MAC addresses is to allow each node to receive and process every incident frame on the network. Typically, each network interface driver will check the destination MAC address in the header of every incident frame to see if it matches that machine's MAC address; if there is no match, then the frame is discarded. In one embodiment, however, these checks can be disabled, and every incident packet is passed to the TARP stack for processing. This will be referred to as "promiscuous" mode, since every incident frame is processed. Promiscuous mode allows the sender to use completely random, unsynchronized MAC addresses, since the destination machine is guaranteed to process the

frame. The decision as to whether the packet was truly intended for that machine is handled by the TARP stack, which checks the source and destination IP addresses for a match in its IP synchronization tables. If no match is found, the packet is discarded; if there is a match, the packet is unwrapped, the inner header is evaluated, and if the inner header indicates that the packet is destined for that machine then the packet is forwarded to the IP stack—otherwise it is discarded.

[00121] One disadvantage of purely-random MAC address hopping is its impact on processing overhead; that is, since every incident frame must be processed, the machine's CPU is engaged considerably more often than if the network interface driver is discriminating and rejecting packets unilaterally. A compromise approach is to select either a single fixed MAC address or a small number of MAC addresses (e.g., one for each virtual private network on an Ethernet) to use for MAC-hopped communications, regardless of the actual recipient for which the message is intended. In this mode, the network interface driver can check each incident frame against one (or a few) pre-established MAC addresses, thereby freeing the CPU from the task of physical- layer packet discrimination. This scheme does not betray any useful information to an interloper on the LAN; in particular, every secure packet can already be identified by a unique packet type in the outer header. However, since all machines engaged in secure communications would either be using the same MAC address, or be selecting from a small pool of predetermined MAC addresses, the association between a specific machine and a specific MAC address is effectively broken.

[00122] In this scheme, the CPU will be engaged more often than it would be in nonsecure communications (or in synchronized MAC address hopping), since the network interface driver cannot always unilaterally discriminate between secure packets that are destined for that machine, and secure packets from other VPNs. However, the non-secure traffic is easily eliminated at the network interface, thereby reducing the amount of processing required of the CPU. There are boundary conditions where these statements would not hold, of course—e.g., if all of the traffic on the LAN is secure traffic, then the CPU would be engaged to the same degree as it is in the purely-random address hopping case; alternatively, if each VPN on the LAN uses a different MAC address, then the network interface can perfectly discriminate secure frames destined for the local machine from those constituting other VPNs. These are engineering tradeoffs that might be best handled by providing administrative options for the users when installing the software and/or establishing VPNs.

[00123] Even in this scenario, however, there still remains a slight risk of selecting MAC addresses that are being used by one or more nodes on the LAN. One solution to this problem is to formally assign one address or a range of addresses for use in MAC-hopped communications. This is typically done via an assigned numbers registration authority; e.g., in the case of Ethernet, MAC address ranges are assigned to vendors by the Institute of Electrical and Electronics Engineers (IEEE). A formally-assigned range of addresses would ensure that secure frames do not conflict with any properly-configured and properly-functioning machines on the LAN.

[00124] Reference will now be made to FIGS. 12A and 12B in order to describe the many combinations and features that follow the inventive principles. As explained above, two computer nodes 1201 and 1202 are assumed to be communicating over a network or communication medium such as an Ethernet. A communication protocol in each node (1204 and 1217, respectively) contains a modified element 1205 and 1216 that performs certain functions that deviate from the standard communication protocols. In particular, computer node 1201 implements a first "hop" algorithm 1208X that selects seemingly random source and destination IP addresses (and, in one embodiment, seemingly random IP header discriminator fields) in order to transmit each packet to the other computer node. For example, node 1201 maintains a transmit table 1208 containing triplets of source (S), destination (D), and discriminator fields (DS) that are inserted into outgoing IP packet headers. The table is generated through the use of an appropriate algorithm (e.g., a random number generator that is seeded with an appropriate seed) that is known to the recipient node 1202. As each new IP packet is formed, the next sequential entry out of the sender's transmit table 1208 is used to populate the IP source, IP destination, and IP header extension field (e.g., discriminator field). It will be appreciated that the transmit table need not be created in advance but could instead be created on-the-fly by executing the algorithm when each packet is formed.

[00125] At the receiving node 1202, the same IP hop algorithm 1222X is maintained and used to generate a receive table 1222 that lists valid triplets of source IP address, destination IP address, and discriminator field. This is shown by virtue of the first five entries of transmit table 1208 matching the second five entries of receive table 1222. (The tables may be slightly offset at any particular time due to lost packets, misordered packets, or transmission delays). Additionally, node 1202 maintains a receive window W3 that represents a list of valid IP source, IP destination, and discriminator fields that will be accepted when received as part of an incoming IP packet. As packets are received, window W3 slides down the list of valid entries, such that the possible valid entries change over time. Two packets that arrive out of order but are nevertheless matched to entries within window W3 will be accepted; those falling outside of window W3 will be rejected as invalid. The length of window W3 can be adjusted as necessary to reflect network delays or other factors.

[00126] Node 1202 maintains a similar transmit table 1221 for creating IP packets and frames destined for node 1201 using a potentially different hopping algorithm 1221 X, and node 1201 maintains a matching receive table 1209 using the same algorithm 1209X. As node 1202 transmits packets to node 1201 using seemingly random IP source, IP destination, and/or discriminator fields, node 1201 matches the incoming packet values to those falling within window WI maintained in its receive table. In effect, transmit table 1208 of node 1201 is synchronized (i.e., entries are selected in the same order) to receive table 1222 of receiving node 1202. Similarly, transmit table 1221 of node 1202 is synchronized to receive table 1209 of node 1201. It will be appreciated that although a common algorithm is shown for the source, destination and discriminator fields in FIG. 12A (using, e.g., a different seed for each of the three fields), an entirely different algorithm could in fact be used to establish values for each of these fields. It will also be appreciated that one or two of the fields can be "hopped" rather than all three as illustrated.

[00127] In accordance with another aspect of the invention, hardware or "MAC" addresses are hopped instead of or in addition to IP addresses and/or the discriminator field in order to improve security in a local area or broadcast-type network. To that end, node 1201 further maintains a transmit table 1210 using a transmit algorithm 1210X to generate source and

destination hardware addresses that are inserted into frame headers (e.g., fields 1101A and 1101 B in FIG. 11) that are synchronized to a corresponding receive table 1224 at node 1202. Similarly, node 1202 maintains a different transmit table 1223 containing source and destination hardware addresses that is synchronized with a corresponding receive table 1211 at node 1201. In this manner, outgoing hardware frames appear to be originating from and going to completely random nodes on the network, even though each recipient can determine whether a given packet is intended for it or not. It will be appreciated that the hardware hopping feature can be implemented at a different level in the communications protocol than the IP hopping feature (e.g., in a card driver or in a hardware card itself to improve performance).

[00128] FIG. 12B shows three different embodiments or modes that can be employed using the aforementioned principles. In a first mode referred to as "promiscuous" mode, a common hardware address (e.g., a fixed address for source and another for destination) or else a completely random hardware address is used by all nodes on the network, such that a particular packet cannot be attributed to any one node. Each node must initially accept all packets containing the common (or random) hardware address and inspect the IP addresses or discriminator field to determine whether the packet is intended for that node. In this regard, either the IP addresses or the discriminator field or both can be varied in accordance with an algorithm as described above. As explained previously, this may increase each node's overhead since additional processing is involved to determine whether a given packet has valid source and destination hardware addresses.

[00129] In a second mode referred to as "promiscuous per VPN" mode, a small set of fixed hardware addresses are used, with a fixed source/destination hardware address used for all nodes communicating over a virtual private network. For example, if there are six nodes on an Ethernet, and the network is to be split up into two private virtual networks such that nodes on one VPN can communicate with only the other two nodes on its own VPN, then two sets of hardware addresses could be used: one set for the first VPN and a second set for the second VPN. This would reduce the amount of overhead involved in checking for valid frames since only packets arriving from the designated VPN would need to be checked. IP addresses and one or more discriminator fields could still be hopped as before for secure communication within the

VPN. Of course, this solution compromises the anonymity of the VPNs (i.e., an outsider can easily tell what traffic belongs in which VPN, though he cannot correlate it to a specific machine/person). It also requires the use of a discriminator field to mitigate the vulnerability to certain types of DoS attacks, (For example, without the discriminator field, an attacker on the LAN could stream frames containing the MAC addresses being used by the VPN; rejecting those frames could lead to excessive processing overhead. The discriminator field would provide a low-overhead means of rejecting the false packets.)

[00130] In a third mode referred to as "hardware hopping" mode, hardware addresses are varied as illustrated in FIG. 12A, such that hardware source and destination addresses are changed constantly in order to provide non-attributable addressing. Variations on these embodiments are of course possible, and the invention is not intended to be limited in any respect by these illustrative examples.

B. Extending the Address Space

[00131] Address hopping provides security and privacy. However, the level of protection is limited by the number of addresses in the blocks being hopped. A hopblock denotes a field or fields modulated on a packet-wise basis for the purpose of providing a VPN. For instance, if two nodes communicate with IP address hopping using hopblocks of 4 addresses (2 bits) each, there would be 16 possible address-pair combinations. A window of size 16 would result in most address pairs being accepted as valid most of the time. This limitation can be overcome by using a discriminator field in addition to or instead of the hopped address fields. The discriminator field would be hopped in exactly the same fashion as the address fields and it would be used to determine whether a packet should be processed by a receiver.

[00132] Suppose that two clients, each using four-bit hopblocks, would like the same level of protection afforded to clients communicating via IP hopping between two A blocks (24 address bits eligible for hopping). A discriminator field of 20 bits, used in conjunction with the 4 address bits eligible for hopping in the IP address field, provides this level of protection. A 24-bit discriminator field would provide a similar level of protection if the address fields were not hopped or ignored. Using a discriminator field offers the following advantages: (1) an arbitrarily

high level of protection can be provided, and (2) address hopping is unnecessary to provide protection. This may be important in environments where address hopping would cause routing problems.

C. Synchronization Techniques

[00133] It is generally assumed that once a sending node and receiving node have exchanged algorithms and seeds (or similar information sufficient to generate quasi-random source and destination tables), subsequent communication between the two nodes will proceed smoothly. Realistically, however, two nodes may lose synchronization due to network delays or outages, or other problems. Consequently, it is desirable to provide means for re-establishing synchronization between nodes in a network that have lost synchronization.

[00134] One possible technique is to require that each node provide an acknowledgment upon successful receipt of each packet and, if no acknowledgment is received within a certain period of time, to re-send the unacknowledged packet. This approach, however, drives up overhead costs and may be prohibitive in high-throughput environments such as streaming video or audio, for example.

[00135] A different approach is to employ an automatic synchronizing technique that will be referred to herein as "self-synchronization." In this approach, synchronization information is embedded into each packet, thereby enabling the receiver to re-synchronize itself upon receipt of a single packet if it determines that is has lost synchronization with the sender. (If communications are already in progress, and the receiver determines that it is still in sync with the sender, then there is no need to re-synchronize.) A receiver could detect that it was out of synchronization by, for example, employing a "dead-man" timer that expires after a certain period of time, wherein the timer is reset with each valid packet. A time stamp could be hashed into the public sync field (see below) to preclude packet-retry attacks.

[00136] In one embodiment, a "sync field" is added to the header of each packet sent out by the sender. This sync field could appear in the clear or as part of an encrypted portion of the packet. Assuming that a sender and receiver have selected a random-number generator (RNG) and seed value, this combination of RNG and seed can be used to generate a random-

number sequence (RNS). The RNS is then used to generate a sequence of source/destination IP pairs (and, if desired, discriminator fields and hardware source and destination addresses), as described above. It is not necessary, however, to generate the entire sequence (or the first N-1 values) in order to generate the Nth random number in the sequence; if the sequence index N is known, the random value corresponding to that index can be directly generated (see below). Different RNGs (and seeds) with different fundamental periods could be used to generate the source and destination IP sequences, but the basic concepts would still apply. For the sake of simplicity, the following discussion will assume that IP source and destination address pairs (only) are hopped using a single RNG sequencing mechanism.

[00137] In accordance with a "self-synchronization" feature, a sync field in each packet header provides an index (i.e., a sequence number) into the RNS that is being used to generate IP pairs. Plugging this index into the RNG that is being used to generate the RNS yields a specific random number value, which in turn yields a specific IP pair. That is, an IP pair can be generated directly from knowledge of the RNG, seed, and index number; it is not necessary, in this scheme, to generate the entire sequence of random numbers that precede the sequence value associated with the index number provided.

[00138] Since the communicants have presumably previously exchanged RNGs and seeds, the only new information that must be provided in order to generate an IP pair is the sequence number. If this number is provided by the sender in the packet header, then the receiver need only plug this number into the RNG in order to generate an IP pair — and thus verify that the IP pair appearing in the header of the packet is valid. In this scheme, if the sender and receiver lose synchronization, the receiver can immediately re-synchronize upon receipt of a single packet by simply comparing the IP pair in the packet header to the IP pair generated from the index number. Thus, synchronized communications can be resumed upon receipt of a single packet, making this scheme ideal for multicast communications. Taken to the extreme, it could obviate the need for synchronization tables entirely; that is, the sender and receiver could simply rely on the index number in the sync field to validate the IP pair on each packet, and thereby eliminate the tables entirely.

[00139] The aforementioned scheme may have some inherent security issues associated with it — namely, the placement of the sync field. If the field is placed in the outer header, then an interloper could observe the values of the field and their relationship to the IP stream. This could potentially compromise the algorithm that is being used to generate the IP-address sequence, which would compromise the security of the communications. If, however, the value is placed in the inner header, then the sender must decrypt the inner header before it can extract the sync value and validate the IP pair; this opens up the receiver to certain types of denial-of-service (DoS) attacks, such as packet replay. That is, if the receiver must decrypt a packet before it can validate the IP pair, then it could potentially be forced to expend a significant amount of processing on decryption if an attacker simply retransmits previously valid packets. Other attack methodologies are possible in this scenario.

[00140] A possible compromise between algorithm security and processing speed is to split up the sync value between an inner (encrypted) and outer (unencrypted) header. That is, if the sync value is sufficiently long, it could potentially be split into a rapidly-changing part that can be viewed in the clear, and a fixed (or very slowly changing) part that must be protected. The part that can be viewed in the clear will be called the "public sync" portion and the part that must be protected will be called the "private sync" portion.

[00141] Both the public sync and private sync portions are needed to generate the complete sync value. The private portion, however, can be selected such that it is fixed or will change only occasionally. Thus, the private sync value can be stored by the recipient, thereby obviating the need to decrypt the header in order to retrieve it. If the sender and receiver have previously agreed upon the frequency with which the private part of the sync will change, then the receiver can selectively decrypt a single header in order to extract the new private sync if the communications gap that has led to lost synchronization has exceeded the lifetime of the previous private sync. This should not represent a burdensome amount of decryption, and thus should not open up the receiver to denial-of-service attack simply based on the need to occasionally decrypt a single header.

[00142] One implementation of this is to use a hashing function with a one-to-one mapping to generate the private and public sync portions from the sync value. This

implementation is shown in FIG. 13, where (for example) a first ISP 1302 is the sender and a second ISP 1303 is the receiver. (Other alternatives are possible from FIG. 13.) A transmitted packet comprises a public or "outer" header 1305 that is not encrypted, and a private or "inner" header 1306 that is encrypted using for example a link key. Outer header 1305 includes a public sync portion while inner header 1306 contains the private sync portion. A receiving node decrypts the inner header using a decryption function 1307 in order to extract the private sync portion. This step is necessary only if the lifetime of the currently buffered private sync has expired. (If the currently-buffered private sync is still valid, then it is simply extracted from memory and "added" (which could be an inverse hash) to the public sync, as shown in step 1308.) The public and decrypted private sync portions are combined in function 1308 in order to generate the combined sync 1309. The combined sync (1309) is then fed into the RNG (1310) and compared to the IP address pair (1311) to validate or reject the packet.

[00143] An important consideration in this architecture is the concept of "future" and "past" where the public sync values are concerned. Though the sync values, themselves, should be random to prevent spoofing attacks, it may be important that the receiver be able to quickly identify a sync value that has already been sent — even if the packet containing that sync value was never actually received by the receiver. One solution is to hash a time stamp or sequence number into the public sync portion, which could be quickly extracted, checked, and discarded, thereby validating the public sync portion itself.

[00144] In one embodiment, packets can be checked by comparing the source/destination IP pair generated by the sync field with the pair appearing in the packet header. If (1) they match, (2) the time stamp is valid, and (3) the dead-man timer has expired, then re-synchronization occurs; otherwise, the packet is rejected. If enough processing power is available, the dead-man timer and synchronization tables can be avoided altogether, and the receiver would simply resynchronize (e.g., validate) on every packet.

[00145] The foregoing scheme may require large-integer (e.g., 160-bit) math, which may affect its implementation. Without such large-integer registers, processing throughput would be affected, thus potentially affecting security from a denial-of-service standpoint. Nevertheless,

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as large integer math processing features become more prevalent, the costs of implementing such a feature will be reduced.

D. Other Synchronization Schemes

[00146] As explained above, if W or more consecutive packets are lost between a transmitter and receiver in a VPN (where W is the window size), the receiver's window will not have been updated and the transmitter will be transmitting packets not in the receiver's window. The sender and receiver will not recover synchronization until perhaps the random pairs in the window are repeated by chance. Therefore, there is a need to keep a transmitter and receiver in synchronization whenever possible and to re-establish synchronization whenever it is lost.

[00147] A "checkpoint" scheme can be used to regain synchronization between a sender and a receiver that have fallen out of synchronization. In this scheme, a checkpoint message comprising a random IP address pair is used for communicating synchronization information. In one embodiment, two messages are used to communicate synchronization information between a sender and a recipient:

- 1. SYNC_REQ is a message used by the sender to indicate that it wants to synchronize; and
- 2. SYNC_ACK is a message used by the receiver to inform the transmitter that it has been synchronized.

[00148] According to one variation of this approach, both the transmitter and receiver maintain three checkpoints (see FIG. 14):

- In the transmitter, ckpt_o ("checkpoint old") is the IP pair that was used to re-send the last SYNC_REQ packet to the receiver. In the receiver, ckpt_o ("checkpoint old") is the IP pair that receives repeated SYNC_REQ packets from the transmitter.
- 2. In the transmitter, ckpt_n ("checkpoint new") is the IP pair that will be used to send the next SYNC_REQ packet to the receiver. In the receiver, ckpt_n ("checkpoint new") is the IP pair that receives a new SYNC_REQ packet from the transmitter and which causes the

receiver's window to be re-aligned, ckpt_o set to ckpt_n, a new ckpt_n to be generated and a new ckpt_r to be generated.

3. In the transmitter, ckpt_r is the IP pair that will be used to send the next SYNC_ACK packet to the receiver. In the receiver, ckpt_r is the IP pair that receives a new SYNC_ACK packet from the transmitter and which causes a new ckpt_n to be generated. Since SYNC_ACK is transmitted from the receiver ISP to the sender ISP, the transmitter ckpt_r refers to the ckpt_r of the receiver and the receiver ckpt_r refers to the ckpt_r of the transmitter (see FIG. 14).

When a transmitter initiates synchronization, the IP pair it will use to transmit the next data packet is set to a predetermined value and when a receiver first receives a SYNC_REQ, the receiver window is updated to be centered on the transmitter's next IP pair. This is the primary mechanism for checkpoint synchronization.

[00149] Synchronization can be initiated by a packet counter (e.g., after every N packets transmitted, initiate a synchronization) or by a timer (every S seconds, initiate a synchronization) or a combination of both. See FIG. 15. From the transmitter's perspective, this technique operates as follows: (1) Each transmitter periodically transmits a "sync request" message to the receiver to make sure that it is in sync. (2) If the receiver is still in sync, it sends back a "sync ack" message. (If this works, no further action is necessary). (3) If no "sync ack" has been received within a period of time, the transmitter retransmits the sync request again. If the transmitter reaches the next checkpoint without receiving a "sync ack" response, then synchronization is broken, and the transmitter should stop transmitting. The transmitter will continue to send sync_reqs until it receives a sync_ack, at which point transmission is reestablished.

[00150] From the receiver's perspective, the scheme operates as follows: (1) when it receives a "sync request" request from the transmitter, it advances its window to the next checkpoint position (even skipping pairs if necessary), and sends a "sync ack" message to the transmitter. If sync was never lost, then the "jump ahead" really just advances to the next available pair of addresses in the table (i.e., normal advancement).

[00151] If an interloper intercepts the "sync request" messages and tries to interfere with communication by sending new ones, it will be ignored if the synchronization has been established or it will actually help to re-establish synchronization.

[00152] A window is realigned whenever a re-synchronization occurs. This realignment entails updating the receiver's window to straddle the address pairs used by the packet transmitted immediately after the transmission of the SYNC_REQ packet. Normally, the transmitter and receiver are in synchronization with one another. However, when network events occur, the receiver's window may have to be advanced by many steps during resynchronization. In this case, it is desirable to move the window ahead without having to step through the intervening random numbers sequentially. (This feature is also desirable for the auto-sync approach discussed above).

E. Random Number Generator with a Jump-Ahead capability

[00153] An attractive method for generating randomly hopped addresses is to use identical random number generators in the transmitter and receiver and advance them as packets are transmitted and received. There are many random number generation algorithms that could be used. Each one has strengths and weaknesses for address hopping applications.

[00154] Linear congruential random number generators (LCRs) are fast, simple and well characterized random number generators that can be made to jump ahead *n* steps efficiently. An LCR generates random numbers $X_1, X_2, X_3 \dots$ Xk starting with seed X_0 using a recurrence

$$X_{i} = (a X_{i-1} + b) \mod c,$$
 (1)

where a, b and c define a particular LCR. Another expression for X_i,

$$X_i = ((a^i(X_0+b)-b)/(a-1)) \mod c$$
 (2)

enables the jump-ahead capability. The factor a^i can grow very large even for modest i if left unfettered. Therefore some special properties of the modulo operation can be used to control the size and processing time required to compute (2). (2) can be rewritten as:

$$X_i = (a^i(X_0(a-1)+b)-b)/(a-1) \mod c.$$
 (3)

It can be shown that:

$$(a^{i}(X_{0}(a-1)+b)-b)/(a-1) \mod c =$$

((a^{i} mod((a-1)c)(X_{0}(a-1)+b) -b) /(a-1)) mod c (4).

[00155] $(X_0(a-1)+b)$ can be stored as $(X_0(a-1)+b)$ mod c, b as b mod c and compute $a^i mod((a-1)c)$ (this requires O(log(i)) steps).

[00156] A practical implementation of this algorithm would jump a fixed distance, n, between synchronizations; this is tantamount to synchronizing every *n* packets. The window would commence *n* IP pairs from the start of the previous window. Using X_j^w , the random number at the jth checkpoint, as X_0 and *n* as *i*, a node can store aⁿmod((a-1)c) once per LCR and set

$$[00157] X_{j+1}^{w} = X_{n(j+1)}^{w} = ((a^{n} \mod((a-1)c) (X_{j}^{w} (a-1)+b)-b)/(a-1)) \mod c, (5)$$

to generate the random number for the j+1th synchronization. Using this construction, a node could jump ahead an arbitrary (but fixed) distance between synchronizations in a constant amount of time (independent of n).

[00158] Pseudo-random number generators, in general, and LCRs, in particular, will eventually repeat their cycles. This repetition may present vulnerability in the IP hopping scheme. An adversary would simply have to wait for a repeat to predict future sequences. One way of coping with this vulnerability is to create a random number generator with a known long cycle. A random sequence can be replaced by a new random number generator before it repeats. LCRs can be constructed with known long cycles. This is not currently true of many random number generators.

[00159] Random number generators can be cryptographically insecure. An adversary can derive the RNG parameters by examining the output or part of the output. This is true of

LCGs. This vulnerability can be mitigated by incorporating an encryptor, designed to scramble the output as part of the random number generator. The random number generator prevents an adversary from mounting an attack—e.g., a known plaintext attack—against the encryptor.

F. Random Number Generator Example

[00160] Consider a RNG where a=31,b=4 and c=15. For this case equation (1) becomes:

 $X_i = (31 X_{i-1} + 4) \mod 15.$ (6)

If one sets $X_0=1$, equation (6) will produce the sequence 1, 5, 9, 13, 2, 6, 10, 14, 3, 7, 11, 0, 4, 8, 12. This sequence will repeat indefinitely. For a jump ahead of 3 numbers in this sequence $a^n = 31^3=29791$, $c^*(a-1)=15*30=450$ and $a^n \mod((a-1)c) = 31^3 \mod(15*30)=29791 \mod(450)=91$. Equation (5) becomes:

 $((91 (X_i 30+4)-4)/30) \mod 15 (7).$

Table 1 shows the jump ahead calculations from (7) . The calculations start at 5 and jump ahead 3.

Ι	X _i	(X _i 30+4)	91 (X _i 30+4)-4	((91 (X ₁ 30+4)-4)/30	X _{i+3}
1	5	154	14010	467	2
4	2	64	5820	194	14
7	14	424	38580	1286	11
10	11	334	30390	1013	8
13	8	244	22200	740	5

TABLE 1

G. Fast Packet Filter

[00161] Address hopping VPNs must rapidly determine whether a packet has a valid header and thus requires further processing, or has an invalid header (a hostile packet) and should be immediately rejected. Such rapid determinations will be referred to as "fast packet filtering." This capability protects the VPN from attacks by an adversary who streams hostile packets at the receiver at a high rate of speed in the hope of saturating the receiver's processor (a so-called "denial of service" attack). Fast packet filtering is an important feature for implementing VPNs on shared media such as Ethernet.

[00162] Assuming that all participants in a VPN share an unassigned "A" block of addresses, one possibility is to use an experimental "A" block that will never be assigned to any machine that is not address hopping on the shared medium. "A" blocks have a 24 bits of address that can be hopped as opposed to the 8 bits in "C" blocks. In this case a hopblock will be the "A" block. The use of the experimental "A" block is a likely option on an Ethernet because:

- 1. The addresses have no validity outside of the Ethernet and will not be routed out to a valid outside destination by a gateway.
- 2. There are 2²⁴ (~16 million) addresses that can be hopped within each "A" block. This yields >280 trillion possible address pairs making it very unlikely that an adversary would guess a valid address. It also provides acceptably low probability of collision between separate VPNs (all VPNs on a shared medium independently generate random address pairs from the same "A" block).
- 3. The packets will not be received by someone on the Ethernet who is not on a VPN (unless the machine is in promiscuous mode) minimizing impact on non-VPN computers.

[00163] The Ethernet example will be used to describe one implementation of fast packet filtering. The ideal algorithm would quickly examine a packet header, determine whether the packet is hostile, and reject any hostile packets or determine which active IP pair the packet header matches. The problem is a classical associative memory problem. A variety of techniques

have been developed to solve this problem (hashing, B—trees etc). Each of these approaches has its strengths and weaknesses. For instance, hash tables can be made to operate quite fast in a statistical sense, but can occasionally degenerate into a much slower algorithm. This slowness can persist for a period of time. Since there is a need to discard hostile packets quickly at all times, hashing would be unacceptable.

H. Presence Vector Algorithm

[00164] A presence vector is a bit vector of length 2^n that can be indexed by *n*-bit numbers (each ranging from 0 to 2^n -1). One can indicate the presence of *k n*-bit numbers (not necessarily unique), by setting the bits in the presence vector indexed by each number to 1. Otherwise, the bits in the presence vector are 0. An *n*-bit number, *x*, is one of the *k* numbers if and only if the x^{th} bit of the presence vector is 1. A fast packet filter can be implemented by indexing the presence vector and looking for a 1, which will be referred to as the "test."

[00165] For example, suppose one wanted to represent the number 135 using a presence vector. The 135th bit of the vector would be set. Consequently, one could very quickly determine whether an address of 135 was valid by checking only one bit: the 135th bit. The presence vectors could be created in advance corresponding to the table entries for the IP addresses. In effect, the incoming addresses can be used as indices into a long vector, making comparisons very fast. As each RNG generates a new address, the presence vector is updated to reflect the information. As the window moves, the presence vector is updated to zero out addresses that are no longer valid.

[00166] There is a trade-off between efficiency of the test and the amount of memory required for storing the presence vector(s). For instance, if one were to use the 48 bits of hopping addresses as an index, the presence vector would have to be 35 terabytes. Clearly, this is too large for practical purposes. Instead, the 48 bits can be divided into several smaller fields. For instance, one could subdivide the 48 bits into four 12-bit fields (see FIG. 16). This reduces the storage requirement to 2048 bytes at the expense of occasionally having to process a hostile packet. In effect, instead of one long presence vector, the decomposed address portions must match all four shorter presence vectors before further processing is allowed. (If the first part of

the address portion doesn't match the first presence vector, there is no need to check the remaining three presence vectors).

[00167] A presence vector will have a 1 in the y^{th} bit if and only if one or more addresses with a corresponding field of y are active. An address is active only if each presence vector indexed by the appropriate sub-field of the address is 1.

[00168] Consider a window of 32 active addresses and 3 checkpoints. A hostile packet will be rejected by the indexing of one presence vector more than 99% of the time. A hostile packet will be rejected by the indexing of all 4 presence vectors more than 99.9999995% of the time. On average, hostile packets will be rejected in less than 1.02 presence vector index operations.

[00169] The small percentage of hostile packets that pass the fast packet filter will be rejected when matching pairs are not found in the active window or are active checkpoints. Hostile packets that serendipitously match a header will be rejected when the VPN software attempts to decrypt the header. However, these cases will be extremely rare. There are many other ways this method can be configured to arbitrate the space/speed tradeoffs.

I. Further Synchronization Enhancements

[00170] A slightly modified form of the synchronization techniques described above can be employed. The basic principles of the previously described checkpoint synchronization scheme remain unchanged. The actions resulting from the reception of the checkpoints are, however, slightly different. In this variation, the receiver will maintain between OoO ("Out of Order") and 2xWINDOW_SIZE+OoO active addresses (1 \leq OoO \leq WINDOW_SIZE and WINDOW_SIZE \geq 1). OoO and WINDOW_SIZE are engineerable parameters, where OoO is the minimum number of addresses needed to accommodate lost packets due to events in the network or out of order arrivals and WINDOW_SIZE is the number of packets transmitted before a SYNC REQ is issued. FIG. 17 depicts a storage array for a receiver's active addresses.

[00171] The receiver starts with the first 2xWINDOW_SIZE addresses loaded and active (ready to receive data). As packets are received, the corresponding entries are marked as

"used" and are no longer eligible to receive packets. The transmitter maintains a packet counter, initially set to 0, containing the number of data packets transmitted since the last *initial* transmission of a SYNC_REQ for which SYNC_ACK has been received. When the transmitter packet counter equals WINDOW_SIZE, the transmitter generates a SYNC_REQ and does its initial transmission. When the receiver receives a SYNC_REQ corresponding to its current CKPT_N, it generates the next WINDOW_SIZE addresses and starts loading them in order starting at the first location after the last active address wrapping around to the beginning of the array after the end of the array has been reached. The receiver's array might look like FIG. 18 when a SYNC_REQ has been received. In this case a couple of packets have been either lost or will be received out of order when the SYNC_REQ is received.

[00172] FIG. 19 shows the receiver's array after the new addresses have been generated. If the transmitter does not receive a SYNC_ACK, it will re-issue the SYNC_REQ at regular intervals. When the transmitter receives a SYNC_ACK, the packet counter is decremented by WINDOW_SIZE. If the packet counter reaches 2xWINDOW_SIZE — OoO then the transmitter ceases sending data packets until the appropriate SYNC_ACK is finally received. The transmitter then resumes sending data packets. Future behavior is essentially a repetition of this initial cycle. The advantages of this approach are:

- 1. There is no need for an efficient jump ahead in the random number generator,
- 2. No packet is ever transmitted that does not have a corresponding entry in the receiver side
- 3. No timer based re-synchronization is necessary. This is a consequence of 2.
- 4. The receiver will always have the ability to accept data messages transmitted within OoO messages of the most recently transmitted message.

J. Distributed Transmission Path Variant

[00173] Another embodiment incorporating various inventive principles is shown in FIG. 20. In this embodiment, a message transmission system includes a first computer 2001 in communication with a second computer 2002 through a network 2011 of intermediary

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computers. In one variant of this embodiment, the network includes two edge routers 2003 and 2004 each of which is linked to a plurality of Internet Service Providers (ISPs) 2005 through 2010. Each ISP is coupled to a plurality of other ISPs in an arrangement as shown in FIG. 20, which is a representative configuration only and is not intended to be limiting. Each connection between ISPs is labeled in FIG. 20 to indicate a specific physical transmission path (e.g., AD is a physical path that links ISP A (element 2005) to ISP D (element 2008)). Packets arriving at each edge router are selectively transmitted to one of the ISPs to which the router is attached on the basis of a randomly or quasi-randomly selected basis.

[00174] As shown in FIG. 21, computer 2001 or edge router 2003 incorporates a plurality of link transmission tables 2100 that identify, for each potential transmission path through the network, valid sets of IP addresses that can be used to transmit the packet. For example, AD table 2101 contains a plurality of IP source/destination pairs that are randomly or quasi-randomly generated. When a packet is to be transmitted from first computer 2001 to second computer 2002, one of the link tables is randomly (or quasi-randomly) selected, and the next valid source/destination address pair from that table is used to transmit the packet through the network. If path AD is randomly selected, for example, the next source/destination IP address pair (which is pre-determined to transmit between ISP A (element 2005) and ISP B (element 2008)) is used to transmit the packet. If one of the transmission paths becomes degraded or inoperative, that link table can be set to a "down" condition as shown in table 2105, thus preventing addresses from being selected from that table. Other transmission paths would be unaffected by this broken link.

3. CONTINUATION-IN-PART IMPROVEMENTS

[00175] The following describes various improvements and features that can be applied to the embodiments described above. The improvements include: (1) a load balancer that distributes packets across different transmission paths according to transmission path quality; (2) a DNS proxy server that transparently creates a virtual private network in response to a domain name inquiry; (3) a large-to-small link bandwidth management feature that prevents denial-of-service attacks at system chokepoints; (4) a traffic limiter that regulates incoming packets by limiting the rate at which a transmitter can be synchronized with a receiver; and (5) a signaling

synchronizer that allows a large number of nodes to communicate with a central node by partitioning the communication function between two separate entities. Each is discussed separately below.

A. Load Balancer

[00176] Various embodiments described above include a system in which a transmitting node and a receiving node are coupled through a plurality of transmission paths, and wherein successive packets are distributed quasi-randomly over the plurality of paths. See, for example, FIGS. 20 and 21 and accompanying description. The improvement extends this basic concept to encompass distributing packets across different paths in such a manner that the loads on the paths are generally balanced according to transmission link quality.

[00177] In one embodiment, a system includes a transmitting node and a receiving node that are linked via a plurality of transmission paths having potentially varying transmission quality. Successive packets are transmitted over the paths based on a weight value distribution function for each path. The rate that packets will be transmitted over a given path can be different for each path. The relative "health" of each transmission path is monitored in order to identify paths that have become degraded. In one embodiment, the health of each path is monitored in the transmitter by comparing the number of packets transmitted to the number of packet acknowledgements received. Each transmission path may comprise a physically separate path (e.g., via dial-up phone line, computer network, router, bridge, or the like), or may comprise logically separate paths contained within a broadband communication medium (e.g., separate channels in an FDM, TDM, CDMA, or other type of modulated or unmodulated transmission link).

[00178] When the transmission quality of a path falls below a predetermined threshold and there are other paths that can transmit packets, the transmitter changes the weight value used for that path, making it less likely that a given packet will be transmitted over that path. The weight will preferably be set no lower than a minimum value that keeps nominal traffic on the path. The weights of the other available paths are altered to compensate for the change in the affected path. When the quality of a path degrades to where the transmitter is turned off by the
synchronization function (i.e., no packets are arriving at the destination), the weight is set to zero. If all transmitters are turned off, no packets are sent.

[00179] Conventional TCP/IP protocols include a "throttling" feature that reduces the transmission rate of packets when it is determined that delays or errors are occurring in transmission. In this respect, timers are sometimes used to determine whether packets have been received. These conventional techniques for limiting transmission of packets, however, do not involve multiple transmission paths between two nodes wherein transmission across a particular path relative to the others is changed based on link quality.

[00180] According to certain embodiments, in order to damp oscillations that might otherwise occur if weight distributions are changed drastically (e.g., according to a step function), a linear or an exponential decay formula can be applied to gradually decrease the weight value over time that a degrading path will be used. Similarly, if the health of a degraded path improves, the weight value for that path is gradually increased.

[00181] Transmission link health can be evaluated by comparing the number of packets that are acknowledged within the transmission window (see embodiments discussed above) to the number of packets transmitted within that window and by the state of the transmitter (i.e., on or off). In other words, rather than accumulating general transmission statistics over time for a path, one specific implementation uses the "windowing" concepts described above to evaluate transmission path health.

[00182] The same scheme can be used to shift virtual circuit paths from an "unhealthy" path to a "healthy" one, and to select a path for a new virtual circuit.

[00183] FIG. 22A shows a flowchart for adjusting weight values associated with a plurality of transmission links. It is assumed that software executing in one or more computer nodes executes the steps shown in FIG. 22A. It is also assumed that the software can be stored on a computer-readable medium such as a magnetic or optical disk for execution by a computer.

[00184] Beginning in step 2201, the transmission quality of a given transmission path is measured. As described above, this measurement can be based on a comparison between the

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number of packets transmitted over a particular link to the number of packet acknowledgements received over the link (e.g., per unit time, or in absolute terms). Alternatively, the quality can be evaluated by comparing the number of packets that are acknowledged within the transmission window to the number of packets that were transmitted within that window. In yet another variation, the number of missed synchronization messages can be used to indicate link quality. Many other variations are of course possible.

[00185] In step 2202, a check is made to determine whether more than one transmitter (e.g., transmission path) is turned on. If not, the process is terminated and resumes at step 2201.

[00186] In step 2203, the link quality is compared to a given threshold (e.g., 50%, or any arbitrary number). If the quality falls below the threshold, then in step 2207 a check is made to determine whether the weight is above a minimum level (e.g., 1%). If not, then in step 2209 the weight is set to the minimum level and processing resumes at step 2201. If the weight is above the minimum level, then in step 2208 the weight is gradually decreased for the path, then in step 2206 the weights for the remaining paths are adjusted accordingly to compensate (e.g., they are increased).

[00187] If in step 2203 the quality of the path was greater than or equal to the threshold, then in step 2204 a check is made to determine whether the weight is less than a steady-state value for that path. If so, then in step 2205 the weight is increased toward the steady-state value, and in step 2206 the weights for the remaining paths are adjusted accordingly to compensate (e.g., they are decreased). If in step 2204 the weight is not less than the steady-state value, then processing resumes at step 2201 without adjusting the weights.

[00188] The weights can be adjusted incrementally according to various functions, preferably by changing the value gradually. In one embodiment, a linearly decreasing function is used to adjust the weights; according to another embodiment, an exponential decay function is used. Gradually changing the weights helps to damp oscillators that might otherwise occur if the probabilities were abruptly.

[00189] Although not explicitly shown in FIG. 22A the process can be performed only periodically (e.g., according to a time schedule), or it can be continuously run, such as in a background mode of operation. In one embodiment, the combined weights of all potential paths should add up to unity (e.g., when the weighting for one path is decreased, the corresponding weights that the other paths will be selected will increase).

[00190] Adjustments to weight values for other paths can be prorated. For example, a decrease of 10% in weight value for one path could result in an evenly distributed increase in the weights for the remaining paths. Alternatively, weightings could be adjusted according to a weighted formula as desired (e.g., favoring healthy paths over less healthy paths). In yet another variation, the difference in weight value can be amortized over the remaining links in a manner that is proportional to their traffic weighting.

[00191] FIG. 22B shows steps that can be executed to shut down transmission links where a transmitter turns off. In step 2210, a transmitter shut-down event occurs. In step 2211, a test is made to determine whether at least one transmitter is still turned on. If not, then in step 2215 all packets are dropped until a transmitter turns on. If in step 2211 at least one transmitter is turned on, then in step 2212 the weight for the path is set to zero, and the weights for the remaining paths are adjusted accordingly.

[00192] FIG. 23 shows a computer node 2301 employing various principles of the above- described embodiments. It is assumed that two computer nodes of the type shown in FIG. 23 communicate over a plurality of separate physical transmission paths. As shown in FIG. 23, four transmission paths X1 through X4 are defined for communicating between the two nodes. Each node includes a packet transmitter 2302 that operates in accordance with a transmit table 2308 as described above. (The packet transmitter could also operate without using the IP-hopping features described above, but the following description assumes that some form of hopping is employed in conjunction with the path selection mechanism.). The computer node also includes a packet receiver 2303 that operates in accordance with a receive table 2309, including a moving window W that moves as valid packets are received. Invalid packets having source and destination addresses that do not fall within window W are rejected.

[00193] As each packet is readied for transmission, source and destination IP addresses (or other discriminator values) are selected from transmit table 2308 according to any of the various algorithms described above, and packets containing these source/destination address pairs, which correspond to the node to which the four transmission paths are linked, are generated to a transmission path switch 2307. Switch 2307, which can comprise a software function, selects from one of the available transmission paths according to a weight distribution table 2306. For example, if the weight for path X1 is 0.2, then every fifth packet will be transmitted on path X1. A similar regime holds true for the other paths as shown. Initially, each link's weight value can be set such that it is proportional to its bandwidth, which will be referred to as its "steady-state" value.

[00194] Packet receiver 2303 generates an output to a link quality measurement function 2304 that operates as described above to determine the quality of each transmission path. (The input to packet receiver 2303 for receiving incoming packets is omitted for clarity). Link quality measurement function 2304 compares the link quality to a threshold for each transmission link and, if necessary, generates an output to weight adjustment function 2305. If a weight adjustment is required, then the weights in table 2306 are adjusted accordingly, preferably according to a gradual (e.g., linearly or exponentially declining) function. In one embodiment, the weight values for all available paths are initially set to the same value, and only when paths degrade in quality are the weights changed to reflect differences.

[00195] Link quality measurement function 2304 can be made to operate as part of a synchronizer function as described above. That is, if resynchronization occurs and the receiver detects that synchronization has been lost (e.g., resulting in the synchronization window W being advanced out of sequence), that fact can be used to drive link quality measurement function 2304. According to one embodiment, load balancing is performed using information garnered during the normal synchronization, augmented slightly to communicate link health from the receiver to the transmitter. The receiver maintains a count, MESS_R(W), of the messages received in synchronization window W. When it receives a synchronization request (SYNC_REQ) corresponding to the end of window W, the receiver includes counter MESS_R in the resulting synchronization acknowledgement (SYNC_ACK) sent back to the transmitter. This

allows the transmitter to compare messages sent to messages received in order to asses the health of the link.

[00196] If synchronization is completely lost, weight adjustment function 2305 decreases the weight value on the affected path to zero. When synchronization is regained, the weight value for the affected path is gradually increased to its original value. Alternatively, link quality can be measured by evaluating the length of time required for the receiver to acknowledge a synchronization request. In one embodiment, separate transmit and receive tables are used for each transmission path.

[00197] When the transmitter receives a SYNC_ACK, the MESS_R is compared with the number of messages transmitted in a window (MESS_T). When the transmitter receives a SYNC_ACK, the traffic probabilities will be examined and adjusted if necessary. MESS_R is compared with the number of messages transmitted in a window (MESS_T). There are two possibilities:

1. If MESS_R is less than a threshold value, THRESH, then the link will be deemed to be unhealthy. If the transmitter was turned off, the transmitter is turned on and the weight P for that link will be set to a minimum value MIN. This will keep a trickle of traffic on the link for monitoring purposes until it recovers. If the transmitter was turned on, the weight P for that link will be set to:

P'= α x MIN +(1- α)xP (1)

Equation 1 will exponentially damp the traffic weight value to MIN during sustained periods of degraded service.

2. If MESS_R for a link is greater than or equal to THRESH, the link will be deemed healthy. If the weight P for that link is greater than or equal to the steady state value S for that link, then P is left unaltered. If the weight P for that link is less than THRESH then P will be set to:

P'=
$$\beta$$
x S +(1- β)xP (2)

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where β is a parameter such that $0 \le \beta \le 1$ that determines the damping rate of P.

[00198] Equation 2 will increase the traffic weight to S during sustained periods of acceptable service in a damped exponential fashion.

[00199] A detailed example will now be provided with reference to FIG. 24. As shown in FIG. 24, a first computer 2401 communicates with a second computer 2402 through two routers 2403 and 2404. Each router is coupled to the other router through three transmission links. As described above, these may be physically diverse links or logical links (including virtual private networks).

[00200] Suppose that a first link L1 can sustain a transmission bandwidth of 100 Mb/s and has a window size of 32; link L2 can sustain 75 Mb/s and has a window size of 24; and link L3 can sustain 25 Mb/s and has a window size of 8. The combined links can thus sustain 200Mb/s. The steady state traffic weights are 0.5 for link L1; 0.375 for link L2, and 0.125 for link L3. MIN=1Mb/s, THRESH =0.8 MESS_T for each link, α =.75 and β =.5. These traffic weights will remain stable until a link stops for synchronization or reports a number of packets received less than its THRESH. Consider the following sequence of events:

1. Link L1 receives a SYNC_ACK containing a MESS_R of 24, indicating that only 75% of the MESS_T (32) messages transmitted in the last window were successfully received. Link 1 would be below THRESH (0.8). Consequently, link L1's traffic weight value would be reduced to 0.12825, while link L2's traffic weight value would be increased to 0.65812 and link L3's traffic weight value would be increased to 0.217938.

2. Link L2 and L3 remained healthy and link L1 stopped to synchronize. Then link L1's traffic weight value would be set to 0, link L2's traffic weight value would be set to 0.75, and link L33's traffic weight value would be set to 0.25.

3. Link L1 finally received a SYNC_ACK containing a MESS_R of 0 indicating that none of the MESS_T (32) messages transmitted in the last window were successfully received. Link L1 would be below THRESH. Link L1's traffic weight value would be increased to .005,

link L2's traffic weight value would be decreased to 0.74625, and link L3's traffic weight value would be decreased to 0.24875.

4. Link Ll received a SYNC_ACK containing a MESS_R of 32 indicating that 100% of the MESS_T (32) messages transmitted in the last window were successfully received. Link L1 would be above THRESH. Link L1's traffic weight value would be increased to 0.2525, while link L2's traffic weight value would be decreased to 0.560625 and link L3's traffic weight value would be decreased to .186875.

5. Link L1 received a SYNC_ACK containing a MESS_R of 32 indicating that 100% of the MESS_T (32) messages transmitted in the last window were successfully received. Link L1 would be above THRESH. Link L1's traffic weight value would be increased to 0.37625; link L2's traffic weight value would be decreased to 0.4678125, and link L3's traffic weight value would be decreased to 0.1559375.

6. Link L1 remains healthy and the traffic probabilities approach their steady state traffic probabilities.

B. Use of a DNS Proxy to Transparently Create Virtual Private Networks

[00201] A second improvement concerns the automatic creation of a virtual private network (VPN) in response to a domain-name server look-up function.

[00202] Conventional Domain Name Servers (DNSs) provide a look-up function that returns the IP address of a requested computer or host. For example, when a computer user types in the web name "Yahoo.com," the user's web browser transmits a request to a DNS, which converts the name into a four-part IP address that is returned to the user's browser and then used by the browser to contact the destination web site.

[00203] This conventional scheme is shown in FIG. 25. A user's computer 2501 includes a client application 2504 (for example, a web browser) and an IP protocol stack 2505. When the user enters the name of a destination host, a request DNS REQ is made (through IP protocol stack 2505) to a DNS 2502 to look up the IP address associated with the name. The DNS returns the IP address DNS RESP to client application 2504, which is then able to use the

IP address to communicate with the host 2503 through separate transactions such as PAGE REQ and PAGE RESP.

[00204] In the conventional architecture shown in FIG. 25, nefarious listeners on the Internet could intercept the DNS REQ and DNS RESP packets and thus learn what IP addresses the user was contacting. For example, if a user wanted to set up a secure communication path with a web site having the name "Target.com," when the user's browser contacted a DNS to find the IP address for that web site, the true IP address of that web site would be revealed over the Internet as part of the DNS inquiry. This would hamper anonymous communications on the Internet.

[00205] One conventional scheme that provides secure virtual private networks over the Internet provides the DNS server with the public keys of the machines that the DNS server has the addresses for. This allows hosts to retrieve automatically the public keys of a host that the host is to communicate with so that the host can set up a VPN without having the user enter the public key of the destination host. One implementation of this standard is presently being developed as part of the FreeS/WAN project(RFC 2535).

[00206] The conventional scheme suffers from certain drawbacks. For example, any user can perform a DNS request. Moreover, DNS requests resolve to the same value for all users.

[00207] According to certain aspects of the invention, a specialized DNS server traps DNS requests and, if the request is from a special type of user (e.g., one for which secure communication services are defined), the server does not return the true IP address of the target node, but instead automatically sets up a virtual private network between the target node and the user. The VPN is preferably implemented using the IP address "hopping" features of the basic invention described above, such that the true identity of the two nodes cannot be determined even if packets during the communication are intercepted. For DNS requests that are determined to not require secure services (e.g., an unregistered user), the DNS server transparently "passes through" the request to provide a normal look-up function and return the IP address of the target web server, provided that the requesting host has permissions to resolve unsecured sites. Different users who make an identical DNS request could be provided with different results.

[00208] FIG. 26 shows a system employing various principles summarized above. A user's computer 2601 includes a conventional client (e.g., a web browser) 2605 and an IP protocol stack 2606 that preferably operates in accordance with an IP hopping function 2607 as outlined above. A modified DNS server 2602 includes a conventional DNS server function 2609 and a DNS proxy 2610. A gatekeeper server 2603 is interposed between the modified DNS server and a secure target site 2704. An "unsecure" target site 2611 is also accessible via conventional IP protocols.

[00209] According to one embodiment, DNS proxy 2610 intercepts all DNS lookup functions from client 2605 and determines whether access to a secure site has been requested. If access to a secure site has been requested (as determined, for example, by a domain name extension, or by reference to an internal table of such sites), DNS proxy 2610 determines whether the user has sufficient security privileges to access the site. If so, DNS proxy 2610 transmits a message to gatekeeper 2603 requesting that a virtual private network be created between user computer 2601 and secure target site 2604. In one embodiment, gatekeeper 2603 creates "hopblocks" to be used by computer 2601 and secure target site 2604 for secure communication. Then, gatekeeper 2603 communicates these to user computer 2601. Thereafter, DNS proxy 2610 returns to user computer 2601 the resolved address passed to it by the gatekeeper (this address could be different from the actual target computer) 2604, preferably using a secure administrative VPN. The address that is returned need not be the actual address of the destination computer.

[00210] Had the user requested lookup of a non-secure web site such as site 2611, DNS proxy would merely pass through to conventional DNS server 2609 the look-up request, which would be handled in a conventional manner, returning the IP address of non-secure web site 2611. If the user had requested lookup of a secure web site but lacked credentials to create such a connection, DNS proxy 2610 would return a "host unknown" error to the user. In this manner, different users requesting access to the same DNS name could be provided with different look-up results.

[00211] Gatekeeper 2603 can be implemented on a separate computer (as shown in FIG. 26) or as a function within modified DNS server 2602. In general, it is anticipated that

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gatekeeper 2703 facilitates the allocation and exchange of information needed to communicate securely, such as using "hopped" IP addresses. Secure hosts such as site 2604 are assumed to be equipped with a secure communication function such as an IP hopping function 2608.

[00212] It will be appreciated that the functions of DNS proxy 2610 and DNS server 2609 can be combined into a single server for convenience. Moreover, although element 2602 is shown as combining the functions of two servers, the two servers can be made to operate independently.

[00213] FIG. 27 shows steps that can be executed by DNS proxy server 2610 to handle requests for DNS look-up for secure hosts. In step 2701, a DNS look-up request is received for a target host. In step 2702, a check is made to determine whether access to a secure host was requested. If not, then in step 2703 the DNS request is passed to conventional DNS server 2609, which looks up the IP address of the target site and returns it to the user's application for further processing.

[00214] In step 2702, if access to a secure host was requested, then in step 2704 a further check is made to determine whether the user is authorized to connect to the secure host. Such a check can be made with reference to an internally stored list of authorized IP addresses, or can be made by communicating with gatekeeper 2603 (e.g., over an "administrative" VPN that is secure). It will be appreciated that different levels of security can also be provided for different categories of hosts. For example, some sites may be designated as having a certain security level, and the security level of the user requesting access must match that security level. The user's security level can also be determined by transmitting a request message back to the user's computer requiring that it prove that it has sufficient privileges.

[00215] If the user is not authorized to access the secure site, then a "host unknown" message is returned (step 2705). If the user has sufficient security privileges, then in step 2706 a secure VPN is established between the user's computer and the secure target site. As described above, this is preferably done by allocating a hopping regime that will be carried out between the user's computer and the secure target site, and is preferably performed transparently to the user (i.e., the user need not be involved in creating the secure link). As described in various

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embodiments of this application, any of various fields can be "hopped" (e.g., IP source/destination addresses; a field in the header; etc.) in order to communicate securely.

[00216] Some or all of the security functions can be embedded in gatekeeper 2603, such that it handles all requests to connect to secure sites. In this embodiment, DNS proxy 2610 communicates with gatekeeper 2603 to determine (preferably over a secure administrative VPN) whether the user has access to a particular web site. Various scenarios for implementing these features are described by way of example below:

[00217] Scenario #1: Client has permission to access target computer, and gatekeeper has a rule to make a VPN for the client. In this scenario, the client's DNS request would be received by the DNS proxy server 2610, which would forward the request to gatekeeper 2603. The gatekeeper would establish a VPN between the client and the requested target. The gatekeeper would provide the address of the destination to the DNS proxy, which would then return the resolved name as a result. The resolved address can be transmitted back to the client in a secure administrative VPN.

[00218] Scenario #2: Client does not have permission to access target computer. In this scenario, the client's DNS request would be received by the DNS proxy server 2610, which would forward the request to gatekeeper 2603. The gatekeeper would reject the request, informing DNS proxy server 2610 that it was unable to find the target computer. The DNS proxy 2610 would then return a "host unknown" error message to the client.

[00219] Scenario #3: Client has permission to connect using a normal non-VPN link, and the gatekeeper does not have a rule to set up a VPN for the client to the target site. In this scenario, the client's DNS request is received by DNS proxy server 2610, which would check its rules and determine that no VPN is needed. Gatekeeper 2603 would then inform the DNS proxy server to forward the request to conventional DNS server 2609, which would resolve the request and return the result to the DNS proxy server and then back to the client.

[00220] <u>Scenario #4</u>: Client does not have permission to establish a normal/non-VPN link, and the gatekeeper does not have a rule to make a VPN for the client to the target site. In

this scenario, the DNS proxy server would receive the client's DNS request and forward it to gatekeeper 2603. Gatekeeper 2603 would determine that no special VPN was needed, but that the client is not authorized to communicate with non-VPN members. The gatekeeper would reject the request, causing DNS proxy server 2610 to return an error message to the client.

C. Large Link to Small Link Bandwidth Management

[00221] One feature of the basic architecture is the ability to prevent so-called "denial of service" attacks that can occur if a computer hacker floods a known Internet node with packets, thus preventing the node from communicating with other nodes. Because IP addresses or other fields are "hopped" and packets arriving with invalid addresses are quickly discarded, Internet nodes are protected against flooding targeted at a single IP address.

[00222] In a system in which a computer is coupled through a link having a limited bandwidth (e.g., an edge router) to a node that can support a much higher-bandwidth link (e.g., an Internet Service Provider), a potential weakness could be exploited by a determined hacker. Referring to FIG. 28, suppose that a first host computer 2801 is communicating with a second host computer 2804 using the IP address hopping principles described above. The first host computer is coupled through an edge router 2802 to an Internet Service Provider (ISP) 2803 through a low bandwidth link (LOW BW), and is in turn coupled to second host computer 2804 through parts of the Internet through a high bandwidth link (HIGH BW). In this architecture, the ISP is able to support a high bandwidth to the internet, but a much lower bandwidth to the edge router 2802.

[00223] Suppose that a computer hacker is able to transmit a large quantity of dummy packets addressed to first host computer 2801 across high bandwidth link HIGH BW. Normally, host computer 2801 would be able to quickly reject the packets since they would not fall within the acceptance window permitted by the IP address hopping scheme. However, because the packets must travel across low bandwidth link LOW BW, the packets overwhelm the lower bandwidth link before they are received by host computer 2801. Consequently, the link to host computer 2801 is effectively flooded before the packets can be discarded.

[00224] According to one inventive improvement, a "link guard" function 2805 is inserted into the high-bandwidth node (e.g., ISP 2803) that quickly discards packets destined for a low-bandwidth target node if they are not valid packets. Each packet destined for a low-bandwidth node is cryptographically authenticated to determine whether it belongs to a VPN. If it is not a valid VPN packet, the packet is discarded at the high-bandwidth node. If the packet is authenticated as belonging to a VPN, the packet is passed with high preference. If the packet is a valid non-VPN packet, it is passed with a lower quality of service (e.g., lower priority).

[00225] In one embodiment, the ISP distinguishes between VPN and non-VPN packets using the protocol of the packet. In the case of IPSEC [rfc 2401], the packets have IP protocols 420 and 421. In the case of the TARP VPN, the packets will have an IP protocol that is not yet defined. The ISP's link guard, 2805, maintains a table of valid VPNs which it uses to validate whether VPN packets are cryptographically valid. According to one embodiment, packets that do not fall within any hop windows used by nodes on the low-bandwidth link are rejected, or are sent with a lower quality of service. One approach for doing this is to provide a copy of the IP hopping tables used by the low-bandwidth nodes to the high-bandwidth node, such that both the high-bandwidth and low-bandwidth nodes track hopped packets (e.g., the high-bandwidth node moves its hopping window as valid packets are received). In such a scenario, the high-bandwidth node discards packets that do not fall within the hopping window before they are transmitted over the low-bandwidth link. Thus, for example, ISP 2903 maintains a copy 2910 of the receive table used by host computer 2901. Incoming packets that do not fall within this receive table are discarded. According to a different embodiment, link guard 2805 validates each VPN packet using a keyed hashed message authentication code (HMAC) [rfc 2104].

[00226] According to another embodiment, separate VPNs (using, for example, hopblocks) can be established for communicating between the low-bandwidth node and the high-bandwidth node (i.e., packets arriving at the high-bandwidth node are converted into different packets before being transmitted to the low-bandwidth node).

[00227] As shown in FIG. 29, for example, suppose that a first host computer 2900 is communicating with a second host computer 2902 over the Internet, and the path includes a high

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bandwidth link HIGH BW to an ISP 2901 and a low bandwidth link LOW BW through an edge router 2904. In accordance with the basic architecture described above, first host computer 2900 and second host computer 2902 would exchange hopblocks (or a hopblock algorithm) and would be able to create matching transmit and receive tables 2905, 2906, 2912 and 2913. Then in accordance with the basic architecture, the two computers would transmit packets having seemingly random IP source and destination addresses, and each would move a corresponding hopping window in its receive table as valid packets were received.

[00228] Suppose that a nefarious computer hacker 2903 was able to deduce that packets having a certain range of IP addresses (e.g., addresses 100 to 200 for the sake of simplicity) are being transmitted to ISP 2901, and that these packets are being forwarded over a low-bandwidth link. Hacker computer 2903 could thus "flood" packets having addresses falling into the range 100 to 200, expecting that they would be forwarded along low bandwidth link LOW BW, thus causing the low bandwidth link to become overwhelmed. The fast packet reject mechanism in first host computer 3000 would be of little use in rejecting these packets, since the low bandwidth link was effectively jammed before the packets could be rejected. In accordance with one aspect of the improvement, however, VPN link guard 2911 would prevent the attack from impacting the performance of VPN traffic because the packets would either be rejected as invalid VPN packets or given a lower quality of service than VPN traffic over the lower bandwidth link. A denial-of- service flood attack could, however, still disrupt non-VPN traffic.

[00229] According to one embodiment of the improvement, ISP 2901 maintains a separate VPN with first host computer 2900, and thus translates packets arriving at the ISP into packets having a different IP header before they are transmitted to host computer 2900. The cryptographic keys used to authenticate VPN packets at the link guard 2911 and the cryptographic keys used to encrypt and decrypt the VPN packets at host 2902 and host 2901 can be different, so that link guard 2911 does not have access to the private host data; it only has the capability to authenticate those packets.

[00230] According to yet a third embodiment, the low-bandwidth node can transmit a special message to the high-bandwidth node instructing it to shut down all transmissions on a particular IP address, such that only hopped packets will pass through to the low-bandwidth

node. This embodiment would prevent a hacker from flooding packets using a single IP address. According to yet a fourth embodiment, the high-bandwidth node can be configured to discard packets transmitted to the low-bandwidth node if the transmission rate exceeds a certain predetermined threshold for any given IP address; this would allow hopped packets to go through. In this respect, link guard 2911 can be used to detect that the rate of packets on a given IP address are exceeding a threshold rate; further packets addressed to that same IP address would be dropped or transmitted at a lower priority (e.g., delayed).

D. Traffic Limiter

[00231] In a system in which multiple nodes are communicating using "hopping" technology, a treasonous insider could internally flood the system with packets. In order to prevent this possibility, one inventive improvement involves setting up "contracts" between nodes in the system, such that a receiver can impose a bandwidth limitation on each packet sender. One technique for doing this is to delay acceptance of a checkpoint synchronization request from a sender until a certain time period (e.g., one minute) has elapsed. Each receiver can effectively control the rate at which its hopping window moves by delaying "SYNC_ACK" responses to "SYNC REQ" messages.

[00232] A simple modification to the checkpoint synchronizer will serve to protect a receiver from accidental or deliberate overload from an internally treasonous client. This modification is based on the observation that a receiver will not update its tables until a SYNC_REQ is received on hopped address CKPT_N. It is a simple matter of deferring the generation of a new CKPT N until an appropriate interval after previous checkpoints.

[00233] Suppose a receiver wished to restrict reception from a transmitter to 100 packets a second, and that checkpoint synchronization messages were triggered every 50 packets, A compliant transmitter would not issue new SYNC_REQ messages more often than every 0.5 seconds. The receiver could delay a non-compliant transmitter from synchronizing by delaying the issuance of CKPT_N for 0.5 second after the last SYNC_REQ was accepted.

[00234] In general, if M receivers need to restrict N transmitters issuing new SYNC_REQ messages after every W messages to sending R messages a second in aggregate,

each receiver could defer issuing a new CKPT_N until MxNxW/R seconds have elapsed since the last SYNC_REQ has been received and accepted. If the transmitter exceeds this rate between a pair of checkpoints, it will issue the new checkpoint before the receiver is ready to receive it, and the SYNC_REQ will be discarded by the receiver. After this, the transmitter will re-issue the SYNC_REQ every T1 seconds until it receives a SYNC_ACK. The receiver will eventually update CKPT_N and the SYNC_REQ will be acknowledged. If the transmission rate greatly exceeds the allowed rate, the transmitter will stop until it is compliant. If the transmitter exceeds the allowed rate by a little, it will eventually stop after several rounds of delayed synchronization until it is in compliance. Hacking the transmitter's code to not shut off only permits the transmitter to lose the acceptance window. In this case it can recover the window and proceed only after it is compliant again.

[00235] Two practical issues should be considered when implementing the above scheme:

1. The receiver rate should be slightly higher than the permitted rate in order to allow for statistical fluctuations in traffic arrival times and non-uniform load balancing.

2. Since a transmitter will rightfully continue to transmit for a period after a SYNC_REQ is transmitted, the algorithm above can artificially reduce the transmitter's bandwidth. If events prevent a compliant transmitter from synchronizing for a period (e.g. the network dropping a SYNC_REQ or a SYNC_ACK) a SYNC_REQ will be accepted later than expected. After this, the transmitter will transmit fewer than expected messages before encountering the next checkpoint. The new checkpoint will not have been activated and the transmitter will have to retransmit the SYNC_REQ. This will appear to the receiver as if the transmitter is not compliant. Therefore, the next checkpoint will be accepted late from the transmitter's perspective. This has the effect of reducing the transmitter's allowed packet rate until the transmitter transmits at a packet rate below the agreed upon rate for a period of time.

[00236] To guard against this, the receiver should keep track of the times that the last C SYNC_REQs were received and accepted and use the minimum of MxNxW/R seconds after the last SYNC REQ has been received and accepted, 2xMxNxW/R seconds after next to the last

SYNC_REQ has been received and accepted, CxMxNxW/R seconds after (C-1)th to the last SYNC_REQ has been received, as the time to activate CKPT_N. This prevents the receiver from inappropriately limiting the transmitter's packet rate if at least one out of the last C SYNC_REQs was processed on the first attempt.

[00237] FIG. 30 shows a system employing the above-described principles. In FIG. 30, two computers 3000 and 3001 are assumed to be communicating over a network N in accordance with the "hopping" principles described above (e.g., hopped IP addresses, discriminator values, etc.). For the sake of simplicity, computer 3000 will be referred to as the receiving computer and computer 3001 will be referred to as the transmitting computer, although full duplex operation is of course contemplated. Moreover, although only a single transmitter is shown, multiple transmitters can transmit to receiver 3000.

[00238] As described above, receiving computer 3000 maintains a receive table 3002 including a window W that defines valid IP address pairs that will be accepted when appearing in incoming data packets. Transmitting computer 3001 maintains a transmit table 3003 from which the next IP address pairs will be selected when transmitting a packet to receiving computer 3000. (For the sake of illustration, window W is also illustrated with reference to transmit table 3003). As transmitting computer moves through its table, it will eventually generate a SYNC_REQ message as illustrated in function 3010. This is a request to receiver 3000 to synchronize the receive table 3002, from which transmitter 3001 expects a response in the form of a CKPT_N (included as part of a SYNC_ACK message). If transmitting computer 3001 transmits more messages than its allotment, it will prematurely generate the SYNC_REQ message. (If it has been altered to remove the SYNC_REQ message generation altogether, it will fall out of synchronization since receiver 3000 will quickly reject packets that fall outside of window W, and the extra packets generated by transmitter 3001 will be discarded).

[00239] In accordance with the improvements described above, receiving computer 3000 performs certain steps when a SYNC_REQ message is received, as illustrated in FIG. 30. In step 3004, receiving computer 3000 receives the SYNC_REQ message. In step 3005, a check is made to determine whether the request is a duplicate. If so, it is discarded in step 3006. In step 3007, a check is made to determine whether the SYNC_REQ received from transmitter 3001 was

received at a rate that exceeds the allowable rate R (i.e., the period between the time of the last SYNC_REQ message). The value R can be a constant, or it can be made to fluctuate as desired. If the rate exceeds R, then in step 3008 the next activation of the next CKPT_N hopping table entry is delayed by W/R seconds after the last SYNC_REQ has been accepted.

[00240] Otherwise, if the rate has not been exceeded, then in step 3109 the next CKPT_N value is calculated and inserted into the receiver's hopping table prior to the next SYNC_REQ from the transmitter 3101. Transmitter 3101 then processes the SYNC_REQ in the normal manner.

E. Signaling Synchronizer

[00241] In a system in which a large number of users communicate with a central node using secure hopping technology, a large amount of memory must be set aside for hopping tables and their supporting data structures. For example, if one million subscribers to a web site occasionally communicate with the web site, the site must maintain one million hopping tables, thus using up valuable computer resources, even though only a small percentage of the users may actually be using the system at any one time. A desirable solution would be a system that permits a certain maximum number of simultaneous links to be maintained, but which would "recognize" millions of registered users at any one time. In other words, out of a population of a million registered users, a few thousand at a time could simultaneously communicate with a central server, without requiring that the server maintain one million hopping tables of appreciable size.

[00242] One solution is to partition the central node into two nodes: a signaling server that performs session initiation for user log-on and log-off (and requires only minimally sized tables), and a transport server that contains larger hopping tables for the users. The signaling server listens for the millions of known users and performs a fast-packet reject of other (bogus) packets. When a packet is received from a known user, the signaling server activates a virtual private link (VPL) between the user and the transport server, where hopping tables are allocated and maintained. When the user logs onto the signaling server, the user's computer is provided with hop tables for communicating with the transport server, thus activating the VPL. The VPLs can be torn down when they become inactive for a time period, or they can be torn down upon

user log-out. Communication with the signaling server to allow user log-on and log-off can be accomplished using a specialized version of the checkpoint scheme described above.

[00243] FIG. 31 shows a system employing certain of the above-described principles. In FIG. 31, a signaling server 3101 and a transport server 3102 communicate over a link. Signaling server 3101 contains a large number of small tables 3106 and 3107 that contain enough information to authenticate a communication request with one or more clients 3103 and 3104. As described in more detail below, these small tables may advantageously be constructed as a special case of the synchronizing checkpoint tables described previously. Transport server 3102, which is preferably a separate computer in communication with signaling server 3101, contains a smaller number of larger hopping tables 3108, 3109, and 3110 that can be allocated to create a VPN with one of the client computers.

[00244] According to one embodiment, a client that has previously registered with the system (e.g., via a system administration function, a user registration procedure, or some other method) transmits a request for information from a computer (e.g., a web site). In one variation, the request is made using a "hopped" packet, such that signaling server 3101 will quickly reject invalid packets from unauthorized computers such as hacker computer 3105. An "administrative" VPN can be established between all of the clients and the signaling server in order to ensure that a hacker cannot flood signaling server 3101 with bogus packets. Details of this scheme are provided below.

[00245] Signaling server 3101 receives the request 3111 and uses it to determine that client 3103 is a validly registered user. Next, signaling server 3101 issues a request to transport server 3102 to allocate a hopping table (or hopping algorithm or other regime) for the purpose of creating a VPN with client 3103. The allocated hopping parameters are returned to signaling server 3101 (path 3113), which then supplies the hopping parameters to client 3103 via path 3114, preferably in encrypted form.

[00246] Thereafter, client 3103 communicates with transport server 3102 using the normal hopping techniques described above. It will be appreciated that although signaling server 3101 and transport server 3102 are illustrated as being two separate computers, they could of

course be combined into a single computer and their functions performed on the single computer. Alternatively, it is possible to partition the functions shown in FIG. 31 differently from as shown without departing from the inventive principles.

[00247] One advantage of the above-described architecture is that signaling server 3101 need only maintain a small amount of information on a large number of potential users, yet it retains the capability of quickly rejecting packets from unauthorized users such as hacker computer 3105. Larger data tables needed to perform the hopping and synchronization functions are instead maintained in a transport server 3102, and a smaller number of these tables are needed since they are only allocated for "active" links. After a VPN has become inactive for a certain time period (e.g., one hour), the VPN can be automatically torn down by transport server 3102 or signaling server 3101.

[00248] A more detailed description will now be provided regarding how a special case of the checkpoint synchronization feature can be used to implement the signaling scheme described above.

[00249] The signaling synchronizer may be required to support many (millions) of standing, low bandwidth connections. It therefore should minimize per-VPL memory usage while providing the security offered by hopping technology. In order to reduce memory usage in the signaling server, the data hopping tables can be completely eliminated and data can be carried as part of the SYNC_REQ message. The table used by the server side (receiver) and client side (transmitter) is shown schematically as element 3106 in FIG. 31.

[00250] The meaning and behaviors of CKPT_N, CKPT_O and CKPT_R remain the same from the previous description, except that CKPT_N can receive a combined data and SYNC_REQ message or a SYNC_REQ message without the data.

[00251] The protocol is a straightforward extension of the earlier synchronizer. Assume that a client transmitter is on and the tables are synchronized. The initial tables can be generated "out of band." For example, a client can log into a web server to establish an account over the Internet. The client will receive keys etc encrypted over the Internet. Meanwhile, the server will set up the signaling VPN on the signaling server.

[00252] Assuming that a client application wishes to send a packet to the server on the client's standing signaling VPL:

1. The client sends the message marked as a data message on the inner header using the transmitter's CKPT_N address. It turns the transmitter off and starts a timer T1 noting CKPT_O. Messages can be one of three types: DATA, SYNC_REQ and SYNC_ACK. In the normal algorithm, some potential problems can be prevented by identifying each message type as part of the encrypted inner header field. In this algorithm, it is important to distinguish a data packet and a SYNC_REQ in the signaling synchronizer since the data and the SYNC_REQ come in on the same address.

2. When the server receives a data message on its CKPT_N, it verifies the message and passes it up the stack. The message can be verified by checking message type and other information (i.e., user credentials) contained in the inner header It replaces its CKPT_O with CKPT_N and generates the next CKPT_N. It updates its transmitter side CKPT_R to correspond to the client's receiver side CKPT_R and transmits a SYNC_ACK containing CKPT_O in its payload.

3. When the client side receiver receives a SYNC_ACK on its CKPT_R with a payload matching its transmitter side CKPT_O and the transmitter is off, the transmitter is turned on and the receiver side CKPT_R is updated. If the SYNC_ACK's payload does not match the transmitter side CKPT_O or the transmitter is on, the SYNC_ACK is simply discarded.

4. T1 expires: If the transmitter is off and the client's transmitter side CKPT_O matches the CKPTO associated with the timer, it starts timer T1 noting CKPT_O again, and a SYNC_REQ is sent using the transmitter's CKPT_O address. Otherwise, no action is taken.

5. When the server receives a SYNC_REQ on its CKPT_N, it replaces its CKPT_O with CKPT_N and generates the next CKPT_N. It updates its transmitter side CKPT_R to

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correspond to the client's receiver side CKPT_R and transmits a SYNC_ACK containing CKPT_O in its payload.

6. When the server receives a SYNC_REQ on its CKPT_O, it updates its transmitter side CKPT_R to correspond to the client's receiver side CKPT_R and transmits a SYNC_ACK containing CKPT_O in its payload.

[00253] FIG. 32 shows message flows to highlight the protocol. Reading from top to bottom, the client sends data to the server using its transmitter side CKPT_N. The client side transmitter is turned off and a retry timer is turned off. The transmitter will not transmit messages as long as the transmitter is turned off. The client side transmitter then loads CKPT_N into CKPT_O and updates CKPT_N. This message is successfully received and a passed up the stack. It also synchronizes the receiver i.e., the server loads CKPT_N into CKPT_O and generates a new CKPT_N, it generates a new CKPT_R in the server side transmitter and transmits a SYNC_ACK containing the server side receiver's CKPT_O the server. The SYNC_ACK is successfully received at the client. The client side receiver's CKPT_R is updated, the transmitter is turned on and the retry timer is killed. The client side transmitter is ready to transmit a new data message.

[00254] Next, the client sends data to the server using its transmitter side CKPT_N. The client side transmitter is turned off and a retry timer is turned off. The transmitter will not transmit messages as long as the transmitter is turned off. The client side transmitter then loads CKPT_N into CKPT_O and updates CKPT_N. This message is lost. The client side timer expires and as a result a SYNC_REQ is transmitted on the client side transmitter's CKPT_O (this will keep happening until the SYNC_ACK has been received at the client). The SYNC_REQ is successfully received at the server. It synchronizes the receiver i.e., the server loads CKPT_N into CKPT_O and generates a new CKPT_N, it generates an new CKPT_R in the server side transmitter and transmits a SYNC_ACK containing the server side receiver's CKPT_O the server. The SYNC_ACK is successfully received at the client. The client side receiver's CKPT_R is updated, the transmitter is turned off and the retry timer is killed. The client side transmitter is ready to transmit a new data message.

[00255] There are numerous other scenarios that follow this flow. For example, the SYNC_ACK could be lost. The transmitter would continue to re-send the SYNC_REQ until the receiver synchronizes and responds.

[00256] The above-described procedures allow a client to be authenticated at signaling server 3201 while maintaining the ability of signaling server 3201 to quickly reject invalid packets, such as might be generated by hacker computer 3205. In various embodiments, the signaling synchronizer is really a derivative of the synchronizer. It provides the same protection as the hopping protocol, and it does so for a large number of low bandwidth connections.

F. One-Click Secure On-line Communications and Secure Domain Name Service

The present invention provides a technique for establishing a secure [00257] communication link between a first computer and a second computer over a computer network. Preferably, a user enables a secure communication link using a single click of a mouse, or a corresponding minimal input from another input device, such as a keystroke entered on a keyboard or a click entered through a trackball. Alternatively, the secure link is automatically established as a default setting at boot-up of the computer (i.e., no click). FIG. 33 shows a system block diagram 3300 of a computer network in which the one-click secure communication method of the present invention is suitable. In FIG. 33, a computer terminal or client computer 3301, such as a personal computer (PC), is connected to a computer network 3302, such as the Internet, through an ISP 3303. Alternatively, computer 3301 can be connected to computer network 3302 through an edge router. Computer 3301 includes an input device, such as a keyboard and/or mouse, and a display device, such as a monitor. Computer 3301 can communicate conventionally with another computer 3304 connected to computer network 3302 over a communication link 3305 using a browser 3306 that is installed and operates on computer 3301 in a well-known manner.

[00258] Computer 3304 can be, for example, a server computer that is used for conducting e-commerce. In the situation when computer network 3302 is the Internet, computer 3304 typically will have a standard top-level domain name such as .com, .net, .org, .edu, .mil or .gov.

[00259] FIG. 34 shows a flow diagram 3400 for installing and establishing a "oneclick" secure communication link over a computer network according to the present invention. At step 3401, computer 3301 is connected to server computer 3304 over a non-VPN communication link 3305. Web browser 3306 displays a web page associated with server 3304 in a well-known manner. According to one variation of the invention, the display of computer 3301 contains a hyperlink, or an icon representing a hyperlink, for selecting a virtual private network (VPN) communication link ("go secure" hyperlink) through computer network 3302 between terminal 3301 and server 3304. Preferably, the "go secure" hyperlink is displayed as part of the web page downloaded from server computer 3304, thereby indicating that the entity providing server 3304 also provides VPN capability.

[00260] By displaying the "go secure" hyperlink, a user at computer 3301 is informed that the current communication link between computer 3301 and server computer 3304 is a non-secure, non-VPN communication link. At step 3402, it is determined whether a user of computer 3301 has selected the "go secure" hyperlink. If not, processing resumes using a non-secure (conventional) communication method (not shown). If, at step 3402, it is determined that the user has selected the "go secure" hyperlink, flow continues to step 3403 where an object associated with the hyperlink determines whether a VPN communication software module has already been installed on computer 3301. Alternatively, a user can enter a command into computer 3301 to "go secure."

[00261] If, at step 3403, the object determines that the software module has been installed, flow continues to step 3407. If, at step 3403, the object determines that the software module has not been installed, flow continues to step 3404 where a non-VPN communication link 3307 is launched between computer 3301 and a website 3308 over computer network 3302 in a well- known manner. Website 3308 is accessible by all computer terminals connected to computer network 3302 through a non-VPN communication link. Once connected to website 3308, a software module for establishing a secure communication link over computer network 3302 can be downloaded and installed. Flow continues to step 3405 where, after computer 3301 connects to website 3308, the software module for establishing a communication link is downloaded and installed in a well-known manner on computer terminal 3301 as software

module 3309. At step 3405, a user can optionally select parameters for the software module, such as enabling a secure communication link mode of communication for all communication links over computer network 3302. At step 3406, the communication link between computer 3301 and website 3308 is then terminated in a well-known manner.

[00262] By clicking on the "go secure" hyperlink, a user at computer 3301 has enabled a secure communication mode of communication between computer 3301 and server computer 3304. According to one variation of the invention, the user is not required to do anything more than merely click the "go secure" hyperlink. The user does not need to enter any user identification information, passwords or encryption keys for establishing a secure communication link. All procedures required for establishing a secure communication link between computer 3301 and server computer 3304 are performed transparently to a user at computer 3301.

[00263] At step 3407, a secure VPN communications mode of operation has been enabled and software module 3309 begins to establish a VPN communication link. In one embodiment, software module 3309 automatically replaces the top-level domain name for server 3304 within browser 3406 with a secure top-level domain name for server computer 3304. For example, if the top-level domain name for server 3304 is .com, software module 3309 replaces the .com top- level domain name with a .scom top-level domain name, where the "s" stands for secure. Alternatively, software module 3409 can replace the top-level domain name of server 3304 with any other non-standard top-level domain name.

[00264] Because the secure top-level domain name is a non-standard domain name, a query to a standard domain name service (DNS) will return a message indicating that the universal resource locator (URL) is unknown. According to the invention, software module 3409 contains the URL for querying a secure domain name service (SDNS) for obtaining the URL for a secure top-level domain name. In this regard, software module 3309 accesses a secure portal 3310 that interfaces a secure network 3311 to computer network 3302. Secure network 3311 includes an internal router 3312, a secure domain name service (SDNS) 3313, a VPN gatekeeper 3314 and a secure proxy 3315. The secure network can include other network services, such as e-mail 3316, a plurality of chatrooms (of which only one chatroom 3317 is shown), and a standard

domain name service (STD DNS) 3318. Of course, secure network 3311 can include other resources and services that are not shown in FIG. 33.

[00265] When software module 3309 replaces the standard top-level domain name for server 3304 with the secure top-level domain name, software module 3309 sends a query to SDNS 3313 at step 3408 through secure portal 3310 preferably using an administrative VPN communication link 3319. In this configuration, secure portal 3310 can only be accessed using a VPN communication link. Preferably, such a VPN communication link can be based on a technique of inserting a source and destination IP address pair into each data packet that is selected according to a pseudo-random sequence; an IP address hopping regime that pseudorandomly changes IP addresses in packets transmitted between a client computer and a secure target computer; periodically changing at least one field in a series of data packets according to a known sequence; an Internet Protocol (IP) address in a header of each data packet that is compared to a table of valid IP addresses maintained in a table in the second computer; and/or a comparison of the IP address in the header of each data packet to a moving window of valid IP addresses, and rejecting data packets having IP addresses that do not fall within the moving window. Other types of VPNs can alternatively be used. Secure portal 3310 authenticates the query from software module 3309 based on the particular information hopping technique used for VPN communication link 3319.

[00266] SDNS 3313 contains a cross-reference database of secure domain names and corresponding secure network addresses. That is, for each secure domain name, SDNS 3313 stores a computer network address corresponding to the secure domain name. An entity can register a secure domain name in SDNS 3313 so that a user who desires a secure communication link to the website of the entity can automatically obtain the secure computer network address for the secure website. Moreover, an entity can register several secure domain names, with each respective secure domain name representing a different priority level of access in a hierarchy of access levels to a secure website. For example, a securities trading website can provide users secure access so that a denial of service attack on the website will be ineffectual with respect to users subscribing to the secure website service. Different levels of subscription can be arranged based on, for example, an escalating fee, so that a user can select a desired level of guarantee for

connecting to the secure securities trading website. When a user queries SDNS 3313 for the secure computer network address for the securities trading website, SDNS 3313 determines the particular secure computer network address based on the user's identity and the user's subscription level.

[00267] At step 3409, SDNS 3313 accesses VPN gatekeeper 3314 for establishing a VPN communication link between software module 3309 and secure server 3320. Server 3320 can only be accessed through a VPN communication link. VPN gatekeeper 3314 provisions computer 3301 and secure web server computer 3320, or a secure edge router for server computer 3320, thereby creating the VPN. Secure server computer 3320 can be a separate server computer from server computer 3304, or can be the same server computer having both non-VPN and VPN communication link capability, such as shown by server computer 3322. Returning to FIG. 34, in step 3410, SDNS 3313 returns a secure URL to software module 3309 for the .scom server address for a secure server 3320 corresponding to server 3304.

[00268] Alternatively, SDNS 3313 can be accessed through secure portal 3310 "in the clear", that is, without using an administrative VPN communication link. In this situation, secure portal 3310 preferably authenticates the query using any well-known technique, such as a cryptographic technique, before allowing the query to proceed to SDNS 3319. Because the initial communication link in this situation is not a VPN communication link, the reply to the query can be "in the clear." The querying computer can use the clear reply for establishing a VPN link to the desired domain name. Alternatively, the query to SDNS 3313 can be in the clear, and SDNS 3313 and gatekeeper 3314 can operate to establish a VPN communication link to the querying computer for sending the reply.

[00269] At step 3411, software module 3309 accesses secure server 3320 through VPN communication link 3321 based on the VPN resources allocated by VPN gatekeeper 3314. At step 3412, web browser 3306 displays a secure icon indicating that the current communication link to server 3320 is a secure VPN communication link. Further communication between computers 3301 and 3320 occurs via the VPN, e.g., using a "hopping" regime as discussed above. When VPN link 3321 is terminated at step 3413, flow continues to step 3414 where software module 3309 automatically replaces the secure top-level domain name with the

corresponding non-secure top-level domain name for server 3304. Browser 3306 accesses a standard DNS 3325 for obtaining the non-secure URL for server 3304. Browser 3306 then connects to server 3304 in a well-known manner. At step 3415, browser 3306 displays the "go secure" hyperlink or icon for selecting a VPN communication link between terminal 3301 and server 3304. By again displaying the "go secure" hyperlink, a user is informed that the current communication link is a non-secure, non-VPN communication link.

[00270] When software module 3309 is being installed or when the user is off-line, the user can optionally specify that all communication links established over computer network 3302 are secure communication links. Thus, anytime that a communication link is established, the link is a VPN link. Consequently, software module 3309 transparently accesses SDNS 3313 for obtaining the URL for a selected secure website. In other words, in one embodiment, the user need not "click" on the secure option each time secure communication is to be effected.

[00271] Additionally, a user at computer 3301 can optionally select a secure communication link through proxy computer 3315. Accordingly, computer 3301 can establish a VPN communication link 3323 with secure server computer 3320 through proxy computer 3315. Alternatively, computer 3301 can establish a non-VPN communication link 3324 to a non-secure website, such as non-secure server computer 3304.

[00272] FIG. 35 shows a flow diagram 3500 for registering a secure domain name according to the present invention. At step 3501, a requester accesses website 3308 and logs into a secure domain name registry service that is available through website 3308. At step 3502, the requestor completes an online registration form for registering a secure domain name having a top-level domain name, such as .com, .net, .org, .edu, .mil or .gov. Of course, other secure top-level domain name corresponding to the equivalent secure domain name that is being requested. For example, a requester attempting to register secure domain name "website.scom" must have previously registered the corresponding non-secure domain name "website.com".

[00273] At step 3503, the secure domain name registry service at website 3308 queries a non- secure domain name server database, such as standard DNS 3322, using, for example, a

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whois query, for determining ownership information relating to the non-secure domain name corresponding to the requested secure domain name. At step 3504, the secure domain name registry service at website 3308 receives a reply from standard DNS 3322 and at step 3505 determines whether there is conflicting ownership information for the corresponding non-secure domain name. If there is no conflicting ownership information, flow continues to step 3507, otherwise flow continues to step 3506 where the requestor is informed of the conflicting ownership information. Flow returns to step 3502.

[00274] When there is no conflicting ownership information at step 3505, the secure domain name registry service (website 3308) informs the requestor that there is no conflicting ownership information and prompts the requestor to verify the information entered into the online form and select an approved form of payment. After confirmation of the entered information and appropriate payment information, flow continues to step 3508 where the newly registered secure domain name sent to SDNS 3313 over communication link 3326.

[00275] If, at step 3505, the requested secure domain name does not have a corresponding equivalent non-secure domain name, the present invention informs the requestor of the situation and prompts the requestor for acquiring the corresponding equivalent non-secure domain name for an increased fee. By accepting the offer, the present invention automatically registers the corresponding equivalent non-secure domain name with standard DNS 3325 in a well-known manner. Flow then continues to step 3508.

<u>G. Tunneling Secure Address Hopping Protocol Through</u> <u>Existing Protocol Using Web Proxy</u>

[00276] The present invention also provides a technique for implementing the field hopping schemes described above in an application program on the client side of a firewall between two computer networks, and in the network stack on the server side of the firewall. The present invention uses a new secure connectionless protocol that provides good denial of service rejection capabilities by layering the new protocol on top of an existing IP protocol, such as the ICMP, UDP or TCP protocols. Thus, this aspect of the present invention does not require changes in the Internet infrastructure.

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[00277] According to the invention, communications are protected by a client-side proxy application program that accepts unencrypted, unprotected communication packets from a local browser application. The client-side proxy application program tunnels the unencrypted, unprotected communication packets through a new protocol, thereby protecting the communications from a denial of service at the server side. Of course, the unencrypted, unprotected communication packets can be encrypted prior to tunneling.

[00278] The client-side proxy application program is not an operating system extension and does not involve any modifications to the operating system network stack and drivers. Consequently, the client is easier to install, remove and support in comparison to a VPN. Moreover, the client- side proxy application can be allowed through a corporate firewall using a much smaller "hole" in the firewall and is less of a security risk in comparison to allowing a protocol layer VPN through a corporate firewall.

[00279] The server-side implementation of the present invention authenticates valid field-hopped packets as valid or invalid very early in the server packet processing, similar to a standard virtual private network, for greatly minimizing the impact of a denial of service attempt in comparison to normal TCP/IP and HTTP communications, thereby protecting the server from invalid communications.

[00280] FIG. 36 shows a system block diagram of a computer network 3600 in which a virtual private connection according to the present invention can be configured to more easily traverse a firewall between two computer networks. FIG. 37 shows a flow diagram 3700 for establishing a virtual private connection that is encapsulated using an existing network protocol.

[00281] In FIG. 36 a local area network (LAN) 3601 is connected to another computer network 3602, such as the Internet, through a firewall arrangement 3603. Firewall arrangement operates in a well-known manner to interface LAN 3601 to computer network 3602 and to protect LAN 3601 from attacks initiated outside of LAN 3601.

[00282] A client computer 3604 is connected to LAN 3601 in a well-known manner. Client computer 3604 includes an operating system 3605 and a web browser 3606. Operating

system 3605 provides kernel mode functions for operating client computer 3604. Browser 3606 is an application program for accessing computer network resources connected to LAN 3601 and computer network 3602 in a well-known manner. According to the present invention, a proxy application 3607 is also stored on client computer 3604 and operates at an application layer in conjunction with browser 3606. Proxy application 3607 operates at the application layer within client computer 3604 and when enabled, modifies unprotected, unencrypted message packets generated by browser 3606 by inserting data into the message packets that are used for forming a virtual private connection between client computer 3604 and a server computer connected to LAN 3601 or computer network 3602. According to the invention, a virtual private network. A virtual private connection can be conveniently authenticated so that, for example, a denial of service attack can be rapidly rejected, thereby providing different levels of service that can be subscribed to by a user.

[00283] Proxy application 3607 is conveniently installed and uninstalled by a user because proxy application 3607 operates at the application layer within client computer 3604. On installation, proxy application 3607 preferably configures browser 3606 to use proxy application for all web communications. That is, the payload portion of all message packets is modified with the data for forming a virtual private connection between client computer 3604 and a server computer. Preferably, the data for forming the virtual private connection contains field-hopping data, such as described above in connection with VPNs. Also, the modified message packets preferably conform to the UDP protocol. Alternatively, the modified message packets can conform to the TCP/IP protocol or the ICMP protocol. Alternatively, proxy application 3606 can be selected and enabled through, for example, an option provided by browser 3606. Additionally, proxy application 3607 can be enabled so that only the payload portion of specially designated message packets is modified with the data for forming a virtual private connection between client computer 3604 and a designated host computer. Specially designated message packets can be, for example, selected predetermined domain names.

[00284] Referring to FIG. 37, at step 3701, unprotected and unencrypted message packets are generated by browser 3606. At step 3702, proxy application 3607 modifies the

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payload portion of all message packets by tunneling the data for forming a virtual private connection between client computer 3604 and a destination server computer into the payload portion. At step, 3703, the modified message packets are sent from client computer 3604 to, for example, website (server computer) 3608 over computer network 3602.

[00285] Website 3608 includes a VPN guard portion 3609, a server proxy portion 3610 and a web server portion 3611. VPN guard portion 3609 is embedded within the kernel layer of the operating system of website 3608 so that large bandwidth attacks on website 3608 are rapidly rejected. When client computer 3604 initiates an authenticated connection to website 3608, VPN guard portion 3609 is keyed with the hopping sequence contained in the message packets from client computer 3604, thereby performing a strong authentication of the client packet streams entering website 3608 at step 3704. VPN guard portion 3609 can be configured for providing different levels of authentication and, hence, quality of service, depending upon a subscribed level of service. That is, VPN guard portion 3609 can be configured to let all message packets through until a denial of service attack is detected, in which case VPN guard portion 3609 would allow only client packet streams conforming to a keyed hopping sequence, such as that of the present invention.

[00286] Server proxy portion 3610 also operates at the kernel layer within website 3608 and catches incoming message packets from client computer 3604 at the VPN level. At step 3705, server proxy portion 3610 authenticates the message packets at the kernel level within host computer 3604 using the destination IP address, UDP ports and discriminator fields. The authenticated message packets are then forwarded to the authenticated message packets to web server portion 3611 as normal TCP web transactions.

[00287] At step 3705, web server portion 3611 responds to message packets received from client computer 3604 in accordance with the particular nature of the message packets by generating reply message packets. For example, when a client computer requests a webpage, web server portion 3611 generates message packets corresponding to the requested webpage. At step 3706, the reply message packets pass through server proxy portion 3610, which inserts data into the payload portion of the message packets that are used for forming the virtual private connection between host computer 3608 and client computer 3604 over computer network 3602.

Preferably, the data for forming the virtual private connection is contains field-hopping data, such as described above in connection with VPNs. Server proxy portion 3610 operates at the kernel layer within host computer 3608 to insert the virtual private connection data into the payload portion of the reply message packets. Preferably, the modified message packets sent by host computer 3608 to client computer 3604 conform to the UDP protocol. Alternatively, the modified message packets can conform to the TCP/IP protocol or the ICMP protocol.

[00288] At step 3707, the modified packets are sent from host computer 3608 over computer network 3602 and pass through firewall 3603. Once through firewall 3603, the modified packets are directed to client computer 3604 over LAN 3601 and are received at step 3708 by proxy application 3607 at the application layer within client computer 3604. Proxy application 3607 operates to rapidly evaluate the modified message packets for determining whether the received packets should be accepted or dropped. If the virtual private connection data, then the received packets are accepted. Otherwise, the received packets are dropped.

[00289] While the present invention has been described in connection with the illustrated embodiments, it will be appreciated and understood that modifications may be made without departing from the true spirit and scope of the invention.

CLAIMS

What is claimed is:

1. A network device, comprising:

a storage device storing an application program for a secure communications service; and

at least one processor configured to execute the application program for the secure communications service so as to enable the network device to:

send a request to look up a network address of a second network device based on an identifier associated with the second network device;

receive an indication that the second network device is available for the secure communications service, the indication including the requested network address of the second network device and provisioning information for a secure communication link;

connect to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and

communicate at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

2. The network device of claim 1, wherein the secure communications service includes an audio-video conferencing service.

3. The network device of claim 2, wherein the at least one processor is configured to execute the application program so as to encrypt at least one of the video data and the audio data transmitted over the secure communication link.

4. The network device of claim 1, wherein the secure communications service includes a telephony service.

5. The system of claim 4, wherein the telephony service uses modulation.

6. The network device of claim 5, wherein the modulation is based on one of frequencydivision multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

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7. The network device of claim 1, wherein the network device is a mobile device.

8. The network device of claim 7, wherein the mobile device is a notebook computer.

9. The network device of claim 1, wherein the identifier associated with the second network device is a domain name.

10, The network device of claim 1, wherein the secure communication link is a virtual private network link.

11. The network device of claim 1, wherein the secure communication link is based on inserting into each data packet communicated over the secure communication link one or more data values that vary according to a pseudo-random sequence.

12. The network device of claim 1, wherein the secure communication link is based on a network address hopping regime that is used to pseudo-randomly change network addresses in packets transmitted between the network device and the second network device.

13. The network device of claim 1, wherein the indication that the second network device is available for the secure communications service is a function of the result of a domain name lookup.

14. A method executed by a first network device for communicating with a second network device, the method comprising:

sending a request to look up a network address of a second network device based on an identifier associated with the second network device;

receiving an indication that the second network device is available for a secure communications service, the indication including the requested network address of the second network device and provisioning information for a secure communication link; connecting to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and

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communicating at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

15. The method of claim 14, wherein the secure communications service includes a video conferencing service.

16. The method of claim 14, further comprising encrypting at least one of the video data and the audio data over the secure communication link.

17. The method of claim 14, wherein the secure communications service includes a telephony service.

18. The method of claim 17, wherein the telephony service uses modulation.

19. The method of claim 18, wherein the modulation is based on one of frequencydivision multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

20. The method of claim 19, wherein the network device is a mobile device.

21. The method of claim 20, wherein the mobile device is a notebook computer.

22. The method of claim 14, wherein the identifier associated with the second network device is a domain name.

23. The method of claim 14, wherein communicating with the second network device using the secure communications service via the secure communication link includes inserting into data packets communicated over the secure communication link one or more data values that vary according to a pseudo-random sequence.

24. The method of claim 14, wherein communicating with the second network device using the secure communications service via the secure communication link includes a network address hopping regime that is used to pseudo-randomly change network addresses in packets transmitted between the first network device and the second network device.
25. The method of claim 14, wherein the indication that the second network device is available for a secure communications service is a function of a domain name lookup.

ABSTRACT

A network device comprises a storage device storing an application program for a secure communications service; and at least one processor configured to execute the application program enabling the network device to: (a) send a request to look up a network address of a second network device based on an identifier; (b) receive an indication that the second network device is available for the secure communications service, the indication including the requested network address of the second network device and provisioning information for a secure communication link; (c) connect to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and (d) communicate at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

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FIG. 5









FIG.7





FIG. 9







FIG. 12A

FIG. 12B

MODE OR EMBODIMENT	HARDWARE ADDRESSES	IP ADDRESSES	DISCRIMINATOR FIELD VALUES
1. PROMISCUOUS	SAME FOR ALL NODES OR COMPLETELY RANDOM	CAN BE VARIED IN SYNC	CAN BE VARIED IN SYNC
2. PROMISCUOUS	FIXED FOR EACH VPN	CAN BE VARIED	CAN BE VARIED
PER VPN		IN SYNC	IN SYNC
3. HARDWARE	CAN BE VARIED	CAN BE VARIED	CAN BE VARIED
HOPPING	IN SYNC	IN SYNC	IN SYNC



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FIG. 23





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FIG. 31

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FIG. 32

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	STATEMENT UNDER 37 CFR 3.73(c)
Applicant/Patent C	Dwner: VirnetX, Inc.
Application No./Pa	atent No.: Filed herewith Filed/Issue Date: Filed herewith
Titled: System a	nd Method Employing an Agile Network Protocol for Secure Communications Using Secure Domain Names
VirnetX, Inc.	, a_corporation
(Name of Assignee)	(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)
states that, for the	patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):
1. 🗹 The assign	nee of the entire right, title, and interest.
2. 🗌 An assign	ee of less than the entire right, title, and interest (check applicable box):
holding the	ent (by percentage) of its ownership interest is%. Additional Statement(s) by the owners e balance of the interest must be submitted to account for 100% of the ownership interest.
right, title a	are unspecified percentages of ownership. The other parties, including inventors, who together own the entire and interest are:
Additior right, title,	nal Statement(s) by the owner(s) holding the balance of the interest <u>must be submitted</u> to account for the entire and interest.
3. The assign	nee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). including inventors, who together own the entire right, title, and interest are:
Addition right, title,	al Statement(s) by the owner(s) holding the balance of the interest <u>must be submitted</u> to account for the entire and interest.
4. The recipie complete transfer of	ent, via a court proceeding or the like (<i>e.g.</i> , bankruptcy, probate), of an undivided interest in the entirety (a of ownership interest was made). The certified document(s) showing the transfer is attached.
The interest identif	fied in option 1, 2 or 3 above (not option 4) is evidenced by either (choose <u>one</u> of options A or B below):
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This collection of information is required by 37 CFR 3.73(b). 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 1.11 and 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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The undersigne	d (whose title is	supplied below) is auth	orized to act on behalf of the assig	nee.		
/Toby H. Ku	ismer/			June 6, 2013		
Signature				Date		
Toby H. K	Kusmer			26,418		
Printed or Type	d Name			Title or Registration Number		

[Page 2 of 2]

ATTORNEY DOCKET: 77580-195 (VRNK-1CP3CNFT7)

ASSIGNMENT OF PATENT RIGHTS

We, Victor Larson, residing at 12026 Lisa Maria Court, Fairfax, VA 22033, Robert Dunham Short residing at 1172 Still House Drive, Lexington, VA 24450, Edmund Colby Munger residing at 1447 Meyer Lane, Tarpon Springs, FL 34688, and Michael Williamson, residing at 26203 Ocala Circle, South Riding, VA 20152, having invented improvements in SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES, and having filed a patent application in the United States Patent and Trademark Office describing the same and based thereon, Serial No. 13/903,788, filed May 28, 2013, (and we hereby authorize our attorney(s), authorized to prosecute said application, to insert the serial number and filing date of said application, when known), for good and valuable consideration, receipt of which is hereby acknowledged from VirnetX, Inc., a Delaware corporation having its principal place of business at P.O. Box 439, Zephyr Cove, NV 89448 (and hereinafter called the Assignee, which term shall include its successors and assigns), do hereby sell, assign and transfer unto the Assignee, our entire right, title, and interest, in and throughout the United States of America (including its territories and dependencies) and all countries foreign thereto, in and to and under said application (which term shall include hereinafter where the context so admits all divisional, continuing, reissue and other patent applications based thereon) and the inventions (which term shall include each and every such invention, or part thereof) therein described, and any and all patents and like rights of exclusion (including extensions thereof) of any country which may be granted on or for said inventions or on said application;

And for the same consideration we do also hereby sell, assign and transfer unto the Assignee all our rights under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty and all other treaties of like purpose in respect of said inventions and said application, and do hereby authorize the Assignee to apply in our name or in their own name (in a manner to be agreed upon by the Assignee) or their designee, for patents and like rights of exclusion on or for said inventions in all countries, claiming (if the Assignee so desires) the priority of the filing date of said application under the provisions of said Convention, Treaty or any such other Convention or Treaty;

And for the same consideration we do hereby agree for ourselves and for our respective heirs, executors and administrators, promptly upon request of the Assignee, to execute and deliver without further compensation any power of attorney, assignment, original, divisional, continuing, reissue or other application or applications for patent or patents or like rights of exclusion of any country, or other lawful documents and any further assurances that may be deemed necessary or desirable by the Assignee fully to secure to it said right, title, and interest as aforesaid in and to said inventions, application, and said several patents and like rights of exclusion, or any of them, all, however, at the expense of the Assignee;

And we do hereby authorize and request the Commissioner of Patents and Trademarks of the United States of America and the corresponding Official of each country foreign thereto to issue to the Assignee any and all patents and like rights of exclusion which may be granted in any country upon said application or on or for said inventions;

And we do hereby covenant for ourselves and for our respective legal representatives and agree with

the Assignee that we have granted no right or license to make, use or sell said inventions to anyone except the Assignee, that prior to the execution of this deed my right, title and interest in and to said inventions has not been otherwise encumbered by us, and that WE have not executed and will not execute any instrument in conflict herewith.

IN WITNESS WHEREOF, we hereunto set our hands and seal on the day and year hereinafter noted.

Victor Larrow

Victor Larson

State of $\underbrace{Vi(j_i)}_{County of \underline{Fe_i} \subset f_{e_i}}$ ss.

Before me this 28 day of M_{cy} , year of 203, personally appeared Victor Larson, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public

Seal



Robert Dunham Short III

State of)	
County of)	SS.

Before me this _____ day of _____, year of _____, personally appeared Robert Dunham Short III, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public

Seal

the Assignee that we have granted no right or license to make, use or sell said inventions to anyone except the Assignee, that prior to the execution of this deed my right, title and interest in and to said inventions has not been otherwise encumbered by us, and that WE have not executed and will not execute any instrument in conflict herewith.

IN WITNESS WHEREOF, we hereunto set our hands and seal on the day and year hereinafter noted.

Victor Larson

 State of ______)

 County of ______) ss.

Before me this _____ day of _____, year of _____, personally appeared Victor Larson, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public

Seal

Shit.

Robert Dunham Short III

State of VICGINIA County of Rode Ladge) ss.

Before me this $\frac{78^{H}}{1000}$ day of \underline{May} , year of $\underline{7013}$, personally appeared **Robert Dunham Short III**, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public Im

Seal



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DM_US 42795620-1.077580.0195

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Edu Celly My Edmund Colby Munger

State of	FLORIDA)
County of	PINELLAS) ss.

Before me this 24^{\pm} day of <u>MAY</u>, year of <u>2013</u>, personally appeared **Edmund Colby Munger**, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

<u>Janue M. Liss</u> Notary Public

Seal



Michael Williamson

State of ______) County of ______) ss.

Before me this _____ day of ______, year of ______, personally appeared **Michael Williamson**, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public

Seal

Edmund Colby Munger

State of)	
County of)	SS.

Before me this _____ day of _____, year of _____, personally appeared Edmund Colby Munger, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public

Seal

Michael Williamson

State of VIRGINIA County of CONDOUN SS.

Before me this $\frac{26}{26}$ day of \underline{MAY} , year of $\underline{20X3}$, personally appeared **Michael Williamson**, who is to me personally known, and acknowledged the foregoing instrument to be his free act and deed.

Notary Public

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Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:	SYSTEM AND METHO SECURE COMMUNIC	D EMPLOYING A TIONS USING SE	N AGILE NETWORK CURE DOMAIN NA	PROTOCOL FOR MES
First Named Inventor/Applicant Name:	Victor Larson			
Filer: Toby H. Ku		ica Brown		
Attorney Docket Number:	77480-196(VRNK1CP3	3CNFT10)		
Filed as Large Entity				
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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Request for Prioritized Examination	1817	1	4000	4000
Pages:				
Claims:				
Claims in Excess of 20	1202	5	80	400
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EFS ID:	15972049		
Application Number:	13911792		
International Application Number:			
Confirmation Number:	7953		
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES		
First Named Inventor/Applicant Name:	Victor Larson		
Customer Number:	23630		
Filer:	Toby H. Kusmer./Jessica Brown		
Filer Authorized By:	Toby H. Kusmer.		
Attorney Docket Number:	77480-196(VRNK1CP3CNFT10)		
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Warnings:					
Information:					
4	Oath or Declaration filed	196Declaration odf	164179	no	4
•		ryobeclaration.par	430d026fd1af5ab155c74481d7af6b5c44d0 77ce	110	
Warnings:					
Information:					
5		196Specification.pdf	425101	ves	93
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Multipart Description/PDF files in .zip description					
	Document Des	scription	Start	E	nd
	Specificat	Specification		1 88	
	Claims	Claims		S	92
	Abstract		93	93	
Warnings:					
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6	Drawings-only black and white line		549454		40
	drawings	1900rawings.pu	07896a3596fba1a0af0d7290110eefd1f66e 330b		
Warnings:					
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7	Power of Attorney	196POA.pdf	32063	no	1					
			cd4fb9454e6bc4f1d9706293b213554f1d8e aa14							
Warnings:										
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8	Assignee showing of ownership per 37	196AssigneeShowing.pdf	145883	no	7					
	CFR 3.73.		0a7f3f94b04c821cb15d7f41706530cce89f7 b26							
Warnings:					-					
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			42228							
9	Fee Worksheet (SB06) fee-info.pdf		779a1af60ca5ec866d56bc91aaded8410b5 002c2	no	2					
Warnings:										
Information:	Information:									
		Total Files Size (in bytes)	: 31	11305						
This Acknow characterized Post Card, as <u>New Applica</u> If a new appl 1.53(b)-(d) an Acknowledg	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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for										
an internation and of the In national secu the applicati	onal filing date (see PCT Article 11 an ternational Filing Date (Form PCT/R(urity, and the date shown on this Ack on.	d MPEP 1810), a Notification D/105) will be issued in due c nowledgement Receipt will (or the International ourse, subject to pre establish the interna	Application scriptions c tional filing	Number oncerning date of					

	PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875							Applica 13/91	Application or Docket Number 13/911,792			
	APP		S FILEI	D - PART I (Col	umn 2)		SMALL	ENTITY	OR	OTHER THAN ORSMALL ENTITY		
	FOR	NUMBE	RFILE	D NUMBE	R EXTRA		RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)	
BAS (37 C	SIC FEE FR 1.16(a), (b), or (c))	N	/A	١	J/A		N/A			N/A	280	
SEA (37 C	RCH FEE FR 1.16(k), (i), or (m))	N	/A	1	J/A		N/A			N/A	600	
EXA (37 C	MINATION FEE FR 1.16(0), (p), or (q))	N	/A	N	J/A	11	N/A		1	N/A	720	
TOT (37 C	AL CLAIMS FR 1.16(i))	25	minus	20= *	5	11			OR	× 80 =	400	
INDE (37 C	EPENDENT CLAII FR 1.16(h))	^{MS} 2	minus	3 = *		11			1	× 420 =	0.00	
APPLICATION SIZE If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 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).							0.00					
MUL	TIPLE DEPENDE	ENT CLAIM PRE	SENT (37	7 CFR 1.16(j))							0.00	
* lf t	he difference in co	olumn 1 is less th	an zero,	enter "0" in colur	nn 2.	• •	TOTAL		1	TOTAL	2000	
	APPLICATION AS AMENDED - PART II OTHER THAN (Column 1) (Column 2) (Column 3) SMALL ENTITY OR SMALL ENTITY											
NT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
ME	Total (37 CFR 1.16(i))	×	Minus	**	=	11	x =		OR	x =		
END	Independent (37 CFR 1.16(h))	*	Minus	***	=		x =		OR	x =		
AM	Application Size Fe	ee (37 CFR 1.16(s))			•	11						
	FIRST PRESENT	TION OF MULTIPL	E DEPEN	DENT CLAIM (37 C	CFR 1.16(j))				OR			
							TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
		(Column 1)		(Column 2)	(Column 3)				-			
NT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
ME	Total (37 CFR 1.16(i))	*	Minus	**	=		X =		OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus	***	=	11	x =		OR	x =		
AM	Application Size Fe	e (37 CFR 1.16(s))			•	11						
	FIRST PRESENT	TION OF MULTIPL	E DEPEN	DENT CLAIM (37 C	CFR 1.16(j))				OR			
							TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
*	 If the entry in co If the "Highest N If the "Highest Nu The "Highest Num 	lumn 1 is less th lumber Previousl umber Previously f ber Previously Paid	an the en ly Paid Fo Paid For" For" (Tota	try in column 2, or" IN THIS SPA IN THIS SPACE is I or Independent) is	write "0" in col CE is less thar s less than 3, er s the highest four	umr n 20 nter nd in	ר 3.), enter "20". "3". I the appropriate box	in column 1.	_			

	UNITED STATES PATENT AND TRADEMARK OFFICE United States Patent and Trademark Office Address. COMMISSIONER FOR PATENTS P.O. BOX 1450 Alexandria, Virginia 22313-1450 www.uspto.gov										
APPLICATION	FILING or	GRP ART	EII EEE DEC'D	ATTY DOCVET NO	TOT CLAIMS	IND CLAIMS					
NOMBER	3/1(c) DATE	0111			TOT CLAIMS	IND CLAIMS					
13/911,792	06/06/2013	2447	2300	7/580-196(VRNK1CP3CNFT10)	25	2					
				CONF	IRMATION	NO. 7953					
23630				FILING RECEIF	рт						
McDermott Wi	ll & Emerv										
The McDermo	tt Building										
		,			00062259336						
500 North Cap	ntoi Street, N.W	Ι.		00000	00002200000						
Washington, D	C 20001										

Date Mailed: 07/05/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s)

Victor Larson, Fairfax, VA; Robert Dunham Short III, Lexington, VA; Edmund Colby Munger, Tarpon Springs, FL; Michael Williamson, South Riding, VA;

Applicant(s)

VIRNETX, INC., Zephyr Cove, NV

Power of Attorney: The patent practitioners associated with Customer Number 23630

Domestic Priority data as claimed by applicant

This application is a CON of $13/903,788\ 05/28/2013$ which is a CON of $13/336,790\ 12/23/2011\ PAT\ 8458341$ which is a CON of $13/049,552\ 03/16/2011$ which is a CON of $11/840,560\ 08/17/2007\ PAT\ 7921211$ which 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 for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <u>http://www.uspto.gov</u> for more information.) - None. *Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

If Required, Foreign Filing License Granted: 06/27/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/911,792**

Projected Publication Date: 10/10/2013

Non-Publication Request: No

Early Publication Request: No Title

SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

Preliminary Class

709

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

page 2 of 3

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

United Sta	TES DEPARTMENT OF COMMERCE s Patent and Trademark Office SSIONER FOR PATENTS 1450 a, Virginia 22313-1450 o.gov		
APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/911,792	06/06/2013	Victor Larson	77580- 196(VRNK1CP3CNFT10) CONFIRMATION NO. 7953
23630 McDermott Will & Emery The McDermott Building			EPTANCE LETTER
500 North Capitol Street, N Washington, DC 20001	.W.	*	OC00000062258659*

Date Mailed: 07/05/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/06/2013.

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.

/gde la vega/

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



Commissioner for Patents United States Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450 www.uspto.gov

MCDERMOTT WILL & EMERY THE MCDERMOTT BUILDING 500 NORTH CAPITOL STREET, N.W. WASHINGTON DC 20001



Doc Code: TRACK1.GRANT

	Decision Prion (Tra	n Granting Request for ritized Examination ack I or After RCE)	Application No.: 13/911,792					
1.	THE RE	EQUEST FILED June 06, 2013 IS	<u>GRANTED</u> .					
	 The above-identified application has met the requirements for prioritized examination A. X B. In for an application undergoing continued examination (RCE). 							
2.	 The above-identified application will undergo prioritized examination. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs: 							
	A. filing a <u>petition for extension of time</u> to extend the time period for filing a reply;							
	B. filing an amendment to amend the application to contain more than four independent							
	claims, more than thirty total claims, or a multiple dependent claim;							
	C.	filing a request for continued e	xamination;					
	D.	filing a notice of appeal;						
	E.	filing a request for suspension of	action;					
	F.	mailing of a notice of allowance;						
	G.	mailing of a final Office action;						
	H.	completion of examination as de	fined in 37 CFR 41.102; or					
	Ι.	abandonment of the application.						
	Telephone inquiries with regard to this decision should be directed to <u>Michelle R. Eason</u> at (571) 272-4231. In his/her absence, calls may be directed to Brian W. Brown at (571) 272-5338.							
	<u>/Michelle F</u> (<i>Signature</i>	<u>R. Eason/</u>)	Paralegal Specialist, Office of Petitions (Title)					

U.S. Patent and Trademark Office PTO-2298 (Rev. 02-2012)

Subst. f	or form 144	9/PTO		Complete if Known			
				Application Number	13/911,792		
INFO	RMATI	ON DISCLOSU	RE	Filing Dates	06-06-2013		
STA	LEWEN	T BY APPLICAN	IT	First Named Inventor	Victor Larson		
Use as	a many she	ets as necessary)		Art Unit	2495		
				Examiner Name	Olanrewaju I Bucknor		
		T		Docket Number	77E90 406 (V/DNK 0004CD2CNETO)		
					77580-196 (VRNK-0001CP3CNF19)		
			U.	S. PATENTS			
EXAMI NER'S INITIA	CITE NO.	Patent Number	Publication/Pat ent Date	Name of Patentee or Applican Cited Document	nt of Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear		
	A1	09/399 753	09/22/1998	Grain Miller et al			
	A2	60/151.563	08/31/1999	Bryan Whittles			
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Subst. fo	or form 144	9/PTO		Complete if Known				
				Application Number		13/911,792		
INFO	RMATI	ON DISCLOSUF	RE	Filing Dates		06-06-2013		
STAT	EMEN	T BY APPLICAN	IT	First Named Inventor		Victor Larson		
(Use as	many she	ets as necessary)		Art I Init		2495		
				Examinar Namo		Olanrowaiu I Buaknar		
						Clairfewaju J. Buckhor		
				Docket Number	775	80-196 (VRNK-0001CP3CNF19)		
			U.	S. PATENTS				
EXAMI	CITE	Patent Number	Publication/Pat	Name of Patentee or Applicant of		Pages, Columns, Lines, Where Relevant		
NER'S INITIA LS	NO.		ent Date	Cited Document		Passages or Relevant Figures Appear		
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	A54	5,950,195	09/07/1999	Stockwell et al.				
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Subst. f	or form 144	49/PTO		Complete if Known		
				Application Number		13/911,792
INFO	RMATI	ON DISCLOSUR	RE	Filing Dates		06-06-2013
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D320	Exhibit 6, SIP Draft v.2 vs. Claims of the '13	5 Patent			
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ATEMENT BY APPLICANT		First Named Inventor	Victor Larson	
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		Examiner Name	Olanrewaiu J. Buckno	)r
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		Evaminer Name	Olanrewaju I Bucknor		
		Deekst Number	77590 406 (VRNK 0004CR3CNETO)		
		Docket Number	77580-196 (VRNR-0001CP3CNF19)		
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STATEM	IENT BY APPLICANT	First Named Inventor	Victor Larson	<u></u>
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		Fyaminer Name	Olanrowaiu   Ruck	(DOF
	T	Dockot Number	77590 406 (VDNK 00040)	
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D566	Exhibit D: Memorandum Opinion in Vime	etX v. Microsoft.		
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		Examiner Name	Olanrewaiu J. Buck	nor
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D628	Request for Inter Partes Reexamination U	nder 35 U.S.C. § 311 (Pati	ent No. 7,490,151)	
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D636	U.S. Pater	nt 6,839,759				
D637	Exhibit B- Summary	4; VirnetX, In Judgment of	c. v. Microsoft Cor Invalidity of U.S. F	p., Case No. 6:07-cv-80, M Patent No. 6,839,759 (E.D.	icrosoft's Motion for Partial Tex. Dec. 18, 2009)	
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D639	Exhibit D- Transmiss and issued	3; Aziz et al., sion and Rece d Aug. 20, 19	U.S. Patent 5,548 eption of Data Pac 96	,646 to Aziz et al., "System kets Between Computer Ne	for Signatureless etworks," Filed Sept. 15, 1994	
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D642	Exhibit D- 1122 (Oct	12; RFC 1122 . 1989)	2, Braden, "Requir	ements for Internet Hosts –	Communication Layers," RFC	
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D650	Exhibit D-5 ISDN Syst	5; Edwards et em 29, pages	al., "High Security 927-938 (Sept. 1	Web Servers and Gatewa 997)	ys," Computer Networks and	
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STATEN	IENT BY APPLICA	NT	First Named Inventor	Victor Larso	n
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			Examinor Namo	2433	
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		<u> </u>	Docket Number	77580-196 (VRNK-0001	CP3CNFT9)
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	Exhibit 09 118 (249	Name of the 135 Pa	atent		
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		Application Number	Application Number 13/911,792		
<b>NFORM</b>	ATION DISCLOSURE	Filing Date	06-06-2013		
STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson		
(Use as man	y sheets as necessary)	Art I Init	2405		
		Evenines Name		less as	
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		Docket Number	77580-196 (VRNK-0001C	P3CNF19)	
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STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson		
(Use as many	sheets as necessary)	Art Unit	2495		
		Examiner Name		knor	
		Dockot Number	77590 406 (V/DN/K 00040	DICNETO	
		Docket Number	77580-196 (VRNK-0001C	PSCNF19)	
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(Use as many	/ sheets as necessary)	Art Unit	2495		
ve oor aan aan aa a		Examiner Name	Olanrewaju J. Buc	knor	
<u> </u>		Docket Number	77580-196 (\/PNK-00010	DICNETO)	
	, L	Docket Number	77580-150 (VRIAR-00010		
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D837	Exhibit D1, "Lendenmann": Rolf Lende International Technical Support Organ	enman, Understanding OSF D ization (Oct. 1995).	CE 1.1 For AIX and OS/2, IBM		
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D841	Exhibit D8, "Rosenberry"; Ward Roser (1993)	berry, David Kenney, and Ge	erry Fisher, Understanding DCE		
D842	Exhibit D9, Masys; Daniel R. Masys & Computers: The PCASSO Approach," Florida (Nov. 7-11, 1998)	Dixie B. Baker, "Protecting C Proceedings of the AMIA '98	linical Data on Web Client Annual Symposium, Orlando,		
D843	Exhibit E1, Claim Charts Applying Len	denmann as a Primary Refere	ence to the '180 Patent.		
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STATEN	IENT BY	APPLICA	NT	First Named Inventor	Victor Larson		
Use as man	ly sheets as n	ecessary)		Art Unit	2495		
				Examiner Name	Olanrewaju J. Bud	knor	
				Docket Number	77580-196 (VRNK-00010	P3CNFT9)	
0850	Exhibit A	U.S. Patent 1	7 921 211 with Term	Jinal Disclaimer	L		
D851	Exhibit B.	Certificate of	Service to Request	For Inter Partes Reexan	nination Under 35 U.S.C. § 311		
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D862	Exhibit X1 Domains"	, Solana, E. e	et al. "Flexible Interr	net Secure Transactions I	Based on Collaborative		
D863	Exhibit X2	, U.S. Patent	6,557,037				
D864	Exhibit X4 (Novembe	, Atkinson, R r 1997)	., IETF RFC 2230, "	Key Exchange Delegatic	on Record for the DNS"		
D865	Exhibit X6 1998) Is A	, Kent, et al., ccessible at:	IETF RFC 2401, "S http://www.ietf.org/r	ecurity Architecture for th fc/rfc2401.txt	he Internet Protocol" (November		
D866	Exhibit X7 (January 1	, Eastlake, D 997) Is Acce	. et al., IETF RFC 2 ssible at: http://www	065, "Domain Name Sys v.ietf.org/rfc/rfc2065.txt	tem Security Extensions"		
D867	Exhibit X9 Accessible	, Guttman, E e At: http://wv	. et al., IETF RFC 25 w.ietf.org/rfc/rfc250	504, "Users' Security Har )4.txt	ndbook" (February 1999) Is		
D868	Exhibit Y3 October 19	, Braden, R., 989 ("RFC11	RFC 1123, "Require 23").	ements for Internet Hosts	s – Application and Support,"		
D869	Exhibit Y4 Accessible	, Atkinson, R At: http://ww	., RFC 1825, "Secur vw.ietf.org/rfc/rfc182	rity Architecture for the In 25.txt	nternet Protocol (August 1995) Is		
D870	Exhibit Y5 CRL Profil	, Housley, R. e" (January 1	et al., RFC 2459, "I 1999) Is accessible /	nternet X.509 Public Key At: http://www.ietf.org/rfc	/Infrastructure Certificate and /rfc2459.txt		
D871	Exhibit A,	U.S. Patent 7	7,418,504				
D872	Exhibit B, (Patent No	Certificate of 5. 7,418,504)	Service to Request	For Inter Partes Reexan	nination Under 35 U.S.C. § 311		
D873	Exhibit C1 920, Reed	, Claim Char , and Beser	t – USP 7,418,504 F	Relative to Solana, Alone	and in Conjunction with RFC		
D874	Exhibit C2 Conjunctio	, Claim Char n with RFC §	t – USP 7,418,504 F 920, Reed, and Bes	Relative to Solana in view er	v of RFC 2504 and Further in		
D875	Exhibit C3 920, Reed	, Claim Charl , and Beser	t – USP 7,418,504 F	Relative to Provino, Alone	e and in Conjunction with RFC		
D876	Exhibit C4 Conjunctio	, Claim Charl n with RFC §	t – USP 7,418,504 F 920, Reed and Bese	Relative to Provino in Vie er	w of RFC 2230 and Further in		
D877	Exhibit C5 Conjunctio	, Claim Charl n with RFC §	t – USP 7,418,504 F 920, Reed, and Bes	Relative to Provino in Vie er	w of RFC 2504 and in Further		

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				Application Number	r 13/911,792		
INFORM	ATION D	ISCLOSU	RE	Filing Date	06-06-2013		
STATEM	ENT BY	APPLICA	NT	First Named Inventor	Victor Larson		
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				Fueminer Neme	Oleganovic I Bus	- Less	
		11			Olanrewaju J. Bud	KIIOF	
				Docket Number	77580-196 (VRNK-0001C	CP3CNFT9)	
D878	Exhibit C6 920, RFC	, Claim Charl 2401, and Re	: – USP 7,418,504 F eed	Relative to Beser, Alone	and in Conjunction with RFC		
D879	Exhibit C7 RFC 920,	, Claim Charl RFC 2401, R	- USP 7,418,504 F eed, and Beser	Relative to RFC 2230, Al	one and in Conjunction with		
D880	Exhibit C8 RFC 920,	, Claim Charl RFC 2401, R	- USP 7,418,504 F eed, Beser, and RF	Relative to RFC 2538, Al	one and in Conjunction with		
D881	Exhibit D1 Cisco Syst America a	, Asserted Cl tems, Inc., Ap nd Aastra US	aims and Infringeme opice, inc, Aastra Te A, inc., Civ. Act. 6:2	ent Contentions by Plain echnologies Ltd., NEC C 2010cv00417 (E.D. Tex)	tiff VirnetX Inc. in VirnetX, Inc. v. orporation, NEC Corporation of		
D882	Exhibit D2 Inc. Based	, Asserted Cl on the 7,418	aims and Infringeme	ent Contentions by Plain	tiff VirnetX Inc. against Apple		
D883	Exhibit X5 (DNS)" (M	, Eastlake, D. arch 1999)	, et al., IETF RFC 2	538, "Storing Certificate	s in the Domain Name System		
D884	Exhibit X6 (Novembe	, Kent, S. IET r1998) http://	F RFC 2401, "Secu www.ietf.org/rfc/rfc2	rity Architecture for the I 401.txt	nternet Protocol,		
D885	Exhibit X8 http://www	, Postel, J. et .ietf.org/rfc/rf	al., IETF RFC 920, c920.txt	"Domain Requirements"	(October 1984) Is Accessible at		
D886	Exhibit X1 Application	0, Reed, M. e ns Conferenc	t al. "Proxies for An e, San Diego, CA, D	onymous Routing," 12th )ec. 9-13, 1996.	Annual Computer Security		
D887	Request for	or Inter Partes	Reexamination Tra	ansmittal form			
D888	Transmitta	Letter					
D889	Request for	or Inter Partes	Reexamination Un	der 35 U.S.C. § 311			
D890	Exhibit D-7 Dec. 1997	7, "Thomas":   )	Brian Thomas, "Rec	ipe for E-Commerce, IE	EE Internet Computing, (Nov		
D891	Exhibit D-9 Internet Er	), "Kent II": Si ngineering Ta	ephen Kent & Rand sk Force, Internet D	lall Atkinson, "IP Encaps traft (Feb. 1998)	ulating Security Payload (ESP),"		
D892	Exhibit C1, 920, Reed	, Claim Chart and Beser (0	– USP 7,921,211 R Came from Inval. Cis	Relative to Solana, Alone sco dtd 11/18/11)	and in Conjunction with RFC		
D893	Exhibit C2, Conjunctio	, Claim Chart n with RFC 9	– USP 7,921,211 R 20, Reed, and Bese	elative to Solana in Viev er	v of RFC 2504 and Further in		
D894	Exhibit C3, 920, Reed	, Claim Chart , and Beser	– USP 7,921,211 R	elative to Provino, Alone	e and in Conjunction with RFC		
D895	Exhibit C4, Conjunctio	, Claim Chart n with RFC 9	– USP 7,921,211 R 20, Reed and Bese	elative to Provino in Vie r	w of RFC 2230 and Further in		
D896	Exhibit C5, Conjunctio	, Claim Chart n with RFC 9	– USP 7,921,211 R 20, Reed and Bese	elative to Provino in Vie [.] r	w of RFC 2504 and in Further		
D897	Exhibit C6, 920, RFC 2	, Claim Chart 2401, and Re	– USP 7,921,211 R ed	elative to Beser, Alone a	and in Conjunction with RFC		
D898	Exhibit C7, RFC 920,	Claim Chart Reed, and B	– USP 7,921,211 Ř eser	elative to RFC 2230, Ald	one and in Conjunction with		
D899	Exhibit C8, RFC 920, F	Claim Chart RFC 2401, R	– USP 7,921,211 R eed, Beser, and RF	elative to RFC 2538, Alo C 2065	one and in Conjunction with		
D900	211 Reque	st for Inter Pa	artes Reexaminatior	٦			
D901	Exhibit C1, 920, Reed	Claim Chart and Beser	– USP 7,418,504 R	elative to Solana, Alone	and in Conjunction with RFC		
D902	Exhibit C2, Conjunction	Claim Chart n with RFC 9	- USP 7,418,504 R 20, Reed, and Bese	elative to Solana in View r	v of RFC 2504 and Further in		
D903	Exhibit C3, 920, Reed,	Claim Chart and Beser	– USP 7,418,504 R	elative to Provino, Alone	and in Conjunction with RFC		
D904	Exhibit C5, Conjunction	Claim Chart n with RFC 9	- USP 7,418,504 R 20, Reed and Beser	elative to Provino in Viev	w of RFC 2504 and in Further		
D905	Exhibit C6, and Reed	USP 7,418,5	i04 Relative to Bese	er, Alone and in Conjunc	tion with RFC 920, RFC 2401,		

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STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson	
(Use as many	/ sheets as necessary)	Art Unit	2405	
		Art Unit		
ļ		Examiner Name	Olanrewaju J. Bucknor	
		Docket Number	77580-196 (VRNK-0001CP3CNFT9)	
D906	Exhibit C7, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, and Beser	Relative to RFC 2230, Al	one and in Conjunction with	
D907	Exhibit C8, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, Beser, and RF	Relative to RFC 2538, Al C 2065	one and in Conjunction with	
D908	504 Request for Inter Partes Reexamination	n		
D909	Defendants' Supplemental Joint Invalidity C	Contentions		
D910	Exhibit 226, Securing Web Access with DC	E vs. Claims of the '135	Patent	
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D916	Exhibit 232, Understanding OSF DCE 1.1 f	or AIX and OS/2 vs. Cla	ims of the '504 Patent	
D917	Exhibit 233, Understanding OSF DCE 1.1 f	or AIX and OS/2 vs. Cla	ims of the '759 Patent	
D918	Exhibit 234, U.S. '648 vs. Claims of the '135	5 Patent		
D919	Exhibit 235, U.S. '648 vs. Claims of the '21'	l Patent		
D920	Exhibit 236, U.S. '648 vs. Claims of the '50	4 Patent		
D921	Exhibit 237, U.S. '648 vs. Claims of the '13	5 Patent		
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D938	Exhibit 254, U.S. Patent No.6,857,072 vs. 0	Claims of the '151 Paten	t	
D939	Exhibit A, Aventail Press Release, May 2, 1	997		
D940	Exhibit B, InfoWorld, "Aventail Delivers High 64D, (1997)	nly Secure, Flexible VPN	Solution," InfoWorld, page	
D941	Exhibit C, Aventail AutoSOCKS v2.1 Admin	istrator's Guide		
D942	Exhibit D, Aventail Press Release, October	12, 1998		
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D944	Exhibit H, Aventail Press Release, August S	9, 1999		
D945	Exhibit J, "Aventail ExtraNet Center 3.1: Se June 28, 1999	curity with Solid Manage	ment, Network Computing,	
D946	Petition in Opposition to Patent Owner's Pe Determination on Certain Prior Art	tition to Vacate Inter Par	tes ReExamination	
D <b>94</b> 7	Request for Inter Partes Reexamination Un	der 35 U.S.C. § 311		
D948	Exhibit B, Certificate of Service to Request	for Inter Partes Reexami	nation Under U.S.C. § 311	
D949	Exhibit C1, Claim Chart Aventail Connect v	3.1		
D950	Exhibit C2, Claim Chart Aventail Connect v	3.01		

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					Application Number	13/911.792	
INF	ORM/	ATION DI	SCLOSU	RE	Filing Date	06-06-2013	
ST			APPLICA	NT	Firet Named Inventor	Victor Larson	
(Use	as many	sheets as ne	cessary)			Victor Larson	
						2495	
					Examiner Name	Olanrewaju J. Bud	knor
					Docket Number	77580-196 (VRNK-00010	CP3CNFT9)
	D951	Exhibit C3,	Claim Char	t Aventail AutoSOC	KS	£	
	D952	Exhibit C4,	Claim Char	t Wang			
	D953	Exhibit C5,	Claim Charl	t Beser			
	D954	Exhibit C6,	Claim Char	t BINGO			
	D955	Exhibit X6,	U.S. Patent	6,496,867			
	D956	Exhibit X10	), U.S. Pater	1t 4,885,778			
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	D958	Exhibit Y3,	U.S. Patent	5,950,519			
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	D961	Exhibit D, v	/3.1 Adminis	trator's Guide			
	D962	Exhibit E-1	. Claim Char	ts Applying Kiuchi I	to Various Claims of the '	135 Patent	
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	D970	Exhibit C2	Claim Charl	t Aventail AutoSOC	KS		
	D971	Exhibit C3	Claim Char	BINGO			
	D972	Exhibit C4.	Claim Char	Beser			
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	D976	Exhibit B, C	Certificate of	Service to Request	for Inter Partes Reexam	ination Under 35 U.S.C. § 311	
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	D979	Exhibit E-3	, Claim Char	ts Applying Blum to	Claims of the '151 Pater	nt	
	D980	Exhibit E-4	, Claim Char	ts Applying Aziz an	d Edwards, and Aziz, Ed	wards, and Martin to Claims of	
		the '151 Pa	itent				
	D981	Exhibit E-5 of the '151	, Claim Char Patent	ts Applying Kiuchi a	and Edwards, and Kiuchi	, Edwards, and Martin to Claims	
	D982	Exhibit E-6 Claims of th	, Claim Char ne '151 Pate	ts Applying Wesing nt	er and Edwards, and We	esinger, Edwards, and Martin to	
	D983	Exhibit A, L	J.S. Patent 6	5,839,759			
	D984	Exhibit C-1	, U.S. Paten	t 6,502,135			
	D985	Exhibit E-1,	, Claim Char	ts Applying Kiuchi,	as Primary Reference to	the '759 Patent	
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ļļ	D987	Exhibit E-3,	, Claim Char	ts Applying Aziz as	a Primary Reference to	the '759 Patent	
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	D989	Request for	r Inter Partes	s Reexamination Tr	ansmittal Form		
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	D992	Certificate of	of Service to	Request for Inter P	artes Reexamination Un	der 35 U.S.C. § 311	
	D993	Request for	r Inter Partes	s Reexamination			
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ATEME	ENT BY APPLICANT	First Named Inventor	Victor Larson	)
e as many	sheets as necessary)	Art Unit	2495	
		Examiner Name	Olanrewaju J. Bud	knor
		Docket Number	77580-196 (VRNK-00010	CP3CNFT9)
	Exhibit C1 Claim Chart - USP 7 921 211	Relative to Solana, Alone	and in Conjunction with REC	1
D997	920, Reed and Beser			
D998	Exhibit C2, Claim Chart – USP 7,921,211 conjunction with RFC 920, Reed, and Bes	Relative to Solana in viev er	v of REC 2504 and Further in	
D999	Exhibit C3, Claim Chart – USP 7,921,211 920, Reed, and Beser	Relative to Provino, Alone	e and in Conjunction with RFC	
D1000	Exhibit C4, Claim Chart – USP 7,921,211 Conjunction with RFC 920, Reed and Best	Relative to Provino in vie er	w of RFC 2230 and Further in	
D1001	Exhibit C5, Claim Chart – USP 7,921,211 Conjunction with RFC 920, Reed and Bese	Relative to Provino in vie er	w of RFC 2504 and in Further	
D1002	Exhibit C6, Claim Chart – USP 7,921,211   920, RFC 2401, and Reed	Relative to Beser, Alone a	and in Conjunction with RFC	
D1003	Exhibit C7, Claim Chart – USP 7,921,211   RFC 920, RFC 2401, Reed, and Beser	Relative to RFC 2230, Ale	one and in Conjunction with	
D1004	Exhibit C8, Claim Chart – USP 7,921,211 I RFC 920, RFC 2401, Reed, Beser, and RF	Relative to RFC 2538, Ald FC 2065	one and in Conjunction with	
D1005	Exhibit D1, Asserted Claim and Infringeme Cisco Systems, Inc., Apple Inc., Aastra Te America and Aastra USA, Inc., Civ. Act 6:2	nt Contentions by Plainti chnologies Ltd, NEC Cor 2010cv00417 (E.D. Tex)	ff VirnetX, Inc. in <i>VimetX, Inc. v.</i> poration, NEC Corporation of	
D1006	Exhibit D2, Asserted Claims and Infringem based on 7,921,211 Patent	ent Contentions by Plaint	tiff VirnetX, Inc. against Apple	
D1007	Exhibit B1, File History of U.S. Patent 7,41	8,504		
D1008	Exhibit B2, File History of U.S. Patent Appl	ication No. 09/558,210		
D1009	Exhibit D-10, Gaspoz et al., "VPN on DCE: Bringing Telecommunication Services to th Intelligence in Broadband Services and Ne Computer Science, Vol. 998 (Springer, 199	From Reference Configu le People – IS&N '95, Thi htworks, October 1995 Pro 95)	uration to Implementation," ird International Conference on oceedings, Lecture Notes in	
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D1011	Exhibit D-11, Copy of U.S. Patent No. 6,56	0,634		
D1012	Exhibit D-13, Pallen, "The World Wide Wet	o," British Medical Journa	I, Vol. 311 at 1554 (Dec. 1995)	
D1013	Exhibit D-14, Rivest et al., "A Method for O Cryptosystems," Communications of the A	btaining Digital Signature CM, 21:120-126 (Feb. 19	es and Public-Key 78)	
D1014	Exhibit D-15, Copy of U.S. Patent No. 4,95	2,930		<u> </u>
D1015	Exhibit D-17, Pfaffenberger, Netscape Nav Academic Press (1996)	igator 3.0: Surfing the We	eb and Exploring the Internet,	
D1016	Exhibit D-18, Gittler et al., "The DCE Secur (Dec. 1995)	rity Service," Hewlett-Pac	kard Journal, pages 41-48	
D1017	Exhibit D-6, Copy of U.S. Patent No. 5,689	,641		
D1018	Exhibit D-9, Lawton, "New Top-Level Doma 1996	ains Promise Descriptive	Names," Sunworld Online,	
D1019	Exhibit E-1, Copy of Catalog Listing by IBM to the <i>Lendenmann</i> reference. The link to to on December 7, 1998 and retrieved by the	l for RS/6000 Redbooks ( the <i>Lendenmann</i> referenc Wayback Machine	Collection which includes a Link ce was archived at archive.org	
D1020	Exhibit E-10, copy of an Archived Version of February 19, 1999 and retrieved by the Wa	of the Lawton reference a syback Machine	rchived at archive.org on	
D1021	Exhibit E-11, Abstracts of the Proceedings Security, 1996, Archived at archive.org on A	of the Symposium on Ne April 10, 1997, and retriev	twork and Distributed System ved by the Wayback Machine	
D1022	Exhibit E-12, 1996 Symposium on Network archive.org (Apr. 10, 1997), Retrieved by th http://web.archive.org/web/1997041011485	and Distributed System the Wayback Machine at 53/http://computer.org/csp	Security, Website Archived by press/catalog/proc9.htm.	
D1023	Exhibit E-13, Copy of Search Results for IS www.isbnsearch.org	BN 0-12-553153-2 (Pfaff	enberger) from	
D1024	Exhibit F-1, Claim Charts applying Lendenr	nann as a Primary Refere	ence to the '504 Patent.	
D1025	Exhibit F-2, Claim Charts applying Aziz as	a Primary Reference to th	ne '504 Patent	

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STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson		
(Use as many	sheets as necessary)	Art Linit	2495		
		Examiner Name	Olanrewaiu I Buc	knor	
		Decket Number	77590 406 /\/DNK 00040	DICNETO)	
		Ducket Number	17580-198 (VRINK-0001C	FJUNFIJ	
D1026	Exhibit F-3, Claim Charts applying Kiuchi a Patent	nd Pfaffenberger as Prin	nary References to the '504		
D1027	Exhibit E-2, First Page of U.S. Patent No. 8 the Lendenmann reference as a prior art re	5,913,217 published June eference	e 15, 1999 and citing a portion of		
D1028	Exhibit E-3, Request for Comments 2026, 1996	"The Internet Standards	Process – Revision 3," October		
D1029	Exhibit E-4, First Page of U.S. 5,463,735, prior art Reference	oublished October 31, 19	95 and citing RFC 793 as a		
D1030	Exhibit E-5, Copy of catalog listing from Bo Martin reference with an issue date of Febr	oston University Digital C ruary 21, 1998	ommon Website, listing the		
D1031	Exhibit E-6, Copy of Technical Reports Arc Department which includes a link to the Ma archive.org on January 22, 1998 and Retrie	chive Listing from Boston artin paper. The link to th eved by the Wayback Ma	University Computer Science ne Martin paper was archived at achine		
D1032	Exhibit E-7, Boston University Computer S available at: http://www.cs.bu.edu/techrepo	cience Department Tech orts/INSTRUCTIONS	nical Reports Instructions,		
D1033	Exhibit E-8, U. Möller, "Implementation ein Diplomarbeit, Universität Hamburg (July 16	es Anonymisierungsverfa 5, 1999), citing to Martin a	ahrens für WWW-Zugriffe," at page 77.		
D1034	Exhibit E-9, First page of U.S. 5,737,423, p Reference	oublished April 7, 1998 ar	nd citing Schneier as Prior Art		
D1035	Request for Inter Partes ReExamination; U	.S. Patent 7,418,504			
D1036	Request for Inter Partes ReExamination Tr	ansmittal Form; U.S. Pat	tent 7,418,504		
D1037	PTO Form 1449				
D1038	Exhibit C1, Claim Chart – USP 7,921,211 r 920, Reed and Beser	elative to Solana, alone	and in conjunction with RFC		
D1039	Exhibit C2, Claim Chart – USP 7,921,211 r conjunction with RFC 920, Reed, and Bese	elative to Solana in view er	of RFC 2504 and further in		
D1040	Exhibit C3, Claim Chart – USP 7,921,211 r 920, Reed, and Beser	elative to Provino, alone	and in conjunction with RFC		
D1041	Exhibit C4, Claim Chart – USP 7,921,211 r conjunction with RFC 920, Reed and Bese	elative to Provino in view r	v of RFC 2230 and further in		
D1042	Exhibit C5, Claim Chart – USP 7,921,211 r conjunction with RFC 920, Reed and Bese	elative to Provino in view r	v of RFC 2504 and in further		
D1043	Exhibit C6, Claim Chart – USP 7,921,211re RFC 2401, and Reed	elative to Beser, Alone ar	nd in conjunction with RFC 920,		
D1044	Exhibit C7, Claim Chart – USP 7,921,211 r 2401, Reed, and Beser	elative to RFC 2230, alo	ne and in conjunction with RFC		
D1045	Exhibit C8, Claim Chart – USP 7,921,211 r 920, RFC 2401, Reed, Beser, and RFC 20	elative to RFC 2538, alo 65	ne and in conjunction with RFC	· · · · · · · · · · · · · · · · · · ·	
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D1048	Exhibit C2, Claim Chart – USP 7,418,504 r conjunction with RFC 920, Reed, and Bese	elative to Solana in view er	of RFC 2504 and further in		
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			Examiner Name	Olanrewaju J. Buo	knor
1	T		Docket Number	77580-196 (VRNK-00010	CP3CNFT9)
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		Examiner Name	Olanrewaju J. Bucknor				
		Docket Number	77580-196 (VRNK-0001CP3CNF19)				
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		Examiner Name	Olanrewaju J. Bucknor	
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		Examiner Name	Olanrewaju J. Bucl	knor		
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				Examiner Name	Olanrewaju J. Buc	knor
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			Application Number	13/911,792			
INFORMATION DISCLOSURE		Filing Date	06-06-2013				
	STATEMENT BY APPLICANT (Use as many sheets as necessary)		First Named Inventor	Victor Larsor	1		
(Use as many			Art Unit	2495			
			Examiner Name	Olanrewaju J. Bud	knor		
			Docket Number	77580-196 (VRNK-00010	CP3CNFT9)		
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D1411	Office Action dated December 13, 2012 from Corresponding Japanese Patent Application Number 2011-085052						
D1412	Office Action dated Dec 2011-083415	ember 13, 2012 fror	m Corresponding Japane	ese Patent Application Number			

Subst. for form 1449/PTO		Complete if Known			
	Application Number	13/911,792			
INFORMATION DISCLOSURE	Filing Date	06-06-2013			
STATEMENT BY APPLICANT	First Named Inventor	Victor Larson			
(Use as many sheets as necessary)	Art Unit	2495			
	Examiner Name	Olanrewaju J. Bucknor			
	Docket Number	77580-196 (VRNK-0001CP3CNFT9)			

#### **CERTIFICATION STATEMENT**

[X] Under 37 C.F.R. 1.98(d), copies of all patent, publication, pending U.S. application or other information that was previously submitted to, or cited by the USPTO in co-pending application No. 13/336,790 and are not required. Applicant will provide copies of the previously submitted references at the Examiner's request.

This application claims priority from U.S. Application No. 13/903,788, filed May 28, 2013, which claims priority from and is a continuation of co-pending U.S. Application No. 13/336,790, filed December 23, 2011, now U.S. Patent No. 8,458,341, which claims priority from and is a continuation of co-pending U.S. Application No. 13/049,552, filed March 16, 2011, which is a continuation of U.S. Application No. 11/840,560, filed August 17, 2007, now U.S. Patent No. 7,921,211, which is a continuation of U.S. Application No. 10/714,849, filed November 18, 2003, now U.S. Patent No. 7,418,504, which is a continuation of U.S. Application No. 09/558,210, filed April 26, 2000, now abandoned, which is a continuation-in-part of U.S. Application No. 09/504,783, filed on February 15, 2000, now U.S. Patent No. 6,502,135, issued December 31, 2002, which claims priority from and is a continuation-in-part patent application of previously-filed U.S. Application No. 09/429,643, filed on October 29, 1999, now U.S. Patent No. 7,010,604, issued March 07, 2006.

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

- [X] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$180.00, or further fees which may be due, to Deposit Account 50-1133.
- [ ] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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.

by the

Toby H. Kusmer;Reg. No.:26,418 McDermott Will & Emery L.L.P. 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

Date: 7/31/13

Electronic Acknowledgement Receipt				
EFS ID:	16465642			
Application Number:	13911792			
International Application Number:				
Confirmation Number:	7953			
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES			
First Named Inventor/Applicant Name:	Victor Larson			
Customer Number:	23630			
Filer:	Toby H. Kusmer.			
Filer Authorized By:				
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)			
Receipt Date:	01-AUG-2013			
Filing Date:	06-JUN-2013			
Time Stamp:	14:30:11			
Application Type:	Utility under 35 USC 111(a)			

# Payment information:

Submitted with Payment			no				
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#### New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

#### Docket No.: 77580-196 (VRNK1CP3CNFT10) (PATENT)

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

In re Application of: Victor Larson, et al.	:
Application No.: 13/911,792	Confirmation No. 7953
Filed: June 6, 2013	: Group Art Unit: 2495
Customer Number: 23630	Examiner: To Be Assigned

# For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

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

#### **PRELIMINARY AMENDMENT**

Commissioner:

Prior to examination on the merits, please amend the above-identified patent application as follows:

Amendments to the Claims are reflected in the listing of claims in this paper, beginning on page 2.

Remarks follow the claim amendments section.

#### AMENDMENTS TO THE CLAIMS

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

1-25. (Canceled)

26. (New) A network device, comprising:

a storage device storing an application program for a secure communications service; and at least one processor configured to execute the application program for the secure communications service so as to enable the network device to:

send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connect to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicate data with the second network device using the secure communications service via the encrypted communication link,

the network device being a device at which a user uses the secure communications service to access the encrypted communication link.

27. (New) The network device of claim 26, wherein the secure communications service includes an audio-video conferencing service, and the at least one processor is configured to execute the application program to communicate at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

28. (New) The network device of claim 26, wherein the secure communications service includes a telephony service.

29. (New) The system of claim 28, wherein the telephony service uses modulation.

30. (New) The network device of claim 29, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

31. (New) The network device of claim 26, wherein the network device is a mobile device.

32. (New) The network device of claim 26, wherein the identifier associated with the second network device is a domain name.

33. (New) The network device of claim 26, wherein the encrypted communication link is part of a virtual private network communication link.

34. (New) The network device of claim 33, wherein the virtual private network communication link is based on inserting into each data packet communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

35. (New) The network device of claim 26, wherein the indication that the second network device is available for the secure communications service is a function of the result of a domain name lookup.

36. (New) The network device of claim 26, wherein the encrypted communication link is an end-to-end link extending from the network device to the second network device.

37. (New) The network device of claim 26, wherein the interception of the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

38. (New) The network device of claim 26, wherein the interception of the DNS request occurs at another network device that is separate from the network device.

39. (New) A method executed by a first network device for communicating with a second network device, the method comprising:

sending a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receiving, following interception of the DNS request and a determination that the second network device is available for a secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connecting to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicating data with the second network device using the secure communications service via the encrypted communication link,

the first network device being a device at which a user uses the secure communications service to access the encrypted communication link.

40. (New) The method of claim 39, wherein the secure communications service includes a video conferencing service, and communicating includes communicating at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

41. (New) The method of claim 39, wherein the secure communications service includes a telephony service.

42. (New) The method of claim 39, wherein the telephony service uses modulation.

43. (New) The method of claim 42, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

4

44. (New) The method of claim 39, wherein the network device is a mobile device.

45. (New) The method of claim 39, wherein the identifier associated with the second network device is a domain name.

46. (New) The method of claim 39, wherein the encrypted communication link is part of a virtual private network communication link, and communicating with the second network device using the secure communications service includes inserting into data packets communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

47. (New) The method of claim 39, wherein the indication that the second network device is available for a secure communications service is a function of a domain name lookup.

48. (New) The method of claim 39, wherein the encrypted communication link is an endto-end link extending from the first network device to the second network device.

49. (New) The method of claim 39, wherein the intercepting the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

50. (New) The method of claim 39, wherein the intercepting the DNS request occurs at another network device that is separate from the first network device.

#### **REMARKS**

By the above amendments, Applicants cancel claims 1-25 without prejudice or disclaimer of subject matter, and add new claims 26-50. Thus, upon entry of the above amendments claims 26-50 will be pending in the application. Claims 26 and 39 are the only independent claims. Applicants respectfully request a prompt and favorable action on the merits, and invite the Examiner to contact Applicants' undersigned representative to address any issues required to place the application in condition for allowance.

Please grant any extensions of time required to enter this paper and charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 501133. Please also credit any excess fees to such deposit account.

Respectfully submitted,

#### McDERMOTT WILL & EMERY LLP

Date: August 14, 2013

/Toby H. Kusmer/ Toby H. Kusmer, P.C., Reg. No. 26,418 Customer No. 23630 28 State Street Boston, MA 02109-1775 Telephone: (617) 535-4000 Facsimile: (617)535-3800 E-mail: <u>tkusmer@mwe.com</u>

Electronic Acl	knowledgement Receipt
EFS ID:	16594226
Application Number:	13911792
International Application Number:	
Confirmation Number:	7953
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
First Named Inventor/Applicant Name:	Victor Larson
Customer Number:	23630
Filer:	Toby H. Kusmer./Kimila Carraway
Filer Authorized By:	Toby H. Kusmer.
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Receipt Date:	14-AUG-2013
Filing Date:	06-JUN-2013
Time Stamp:	21:24:14
Application Type:	Utility under 35 USC 111(a)

# Payment information:

Submitted wi	th Payment	no	no			
File Listin	g:					
Document Number	<b>Document Description</b>	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)	
1		077580-0196_Preliminary_Ame	104399	ves	6	
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	Multipart Description/PDF files in .zip description					
	Document Description	Start	End			
	Preliminary Amendment	1	1			
	Claims	2	5			
	Applicant Arguments/Remarks Made in an Amendment	6	6			
Warnings:						
Information:						
	Total Files Size (in bytes	): 1	04399			

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#### New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

#### National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

#### New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

P	ATENT APPL	Under the ICATION FE Substitute fo	Paperwork F EEDETE or Form P	eduction Act of 1995, ERMINATION	no persons are requi	red to respond Applicatio 13	to a collection of information n or Docket Number 3/911,792	n unless it displays a v Filing Date 06/06/2013	ralid OMB control number.
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M	BASIC FEE (37 CFR 1.16(a), (b),	or (c))	N/A		N/A		N/A		280
	SEARCH FEE (37 CFR 1.16(k), (i), (	or (m))	N/A		N/A		N/A		
	EXAMINATION FE	E or (g))	N/A		N/A		N/A		
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IND (37	EPENDENT CLAIM CFR 1.16(h))	S	mi	nus 3 = *			X \$ =		
	Image: State of the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 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).								
	MULTIPLE DEPEN		RESENT (3'	7 CFR 1.16(j))				_	
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	00/44/0040	(Column 1) CLAIMS REMAINING	1	(Column 2) HIGHEST NUMBER	(Column 3				
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* If ** If ***   The	** If the entry in column 1 is less than the entry in column 2, write "0" in column 3.       LIE         *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".       /TER JACKSON WOODRUFF/         *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".       /TER JACKSON WOODRUFF/         The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.       1.								
This of proce	collection of informations) an application. (	tion is required by Confidentiality is g	/ 37 CFR 1. joverned by	16. The information 35 U.S.C. 122 and	n is required to obt d 37 CFR 1.14. Th	aın or retain s collection i	a benetit by the public s estimated to take 12	which is to file (and minutes to complete	by the USPTO to e, 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.

Unit	ed States Paten	T AND TRADEMARK OFFICE	UNITED STATES DEPAR United States Patent and Address: COMMISSIONER I P.O. Box 1450 Alexandria, Virginia 22 www.uspto.gov	TTMENT OF COMMERCE Trademark Office FOR PATENTS 313-1450
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/911,792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT	10) 7953
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Washington, D	C 20001		ART UNIT	PAPER NUMBER
			2453	
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			08/30/2013	ELECTRONIC

#### 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

	Application No. 13/911,792	Applicant(s) LARSON ET AL.		
Office Action Summary	Examiner KRISNA LIM	Art Unit 2453	AIA (First Inventor to File) Status No	
The MAILING DATE of this communication ap	pears on the cover sheet with t	he corresponde	nce address	
A SHORTENED STATUTORY PERIOD FOR REPL WHICHEVER IS LONGER, FROM THE MAILING D - Extensions of time may be available under the provisions of 37 CFR 1.1 after SIX (6) MONTHS from the mailing date of this communication. - If NO period for reply is specified above, the maximum statutory period - Failure to reply within the set or extended period for reply will, by statute Any reply received by the Office later than three months after the mailin earned patent term adjustment. See 37 CFR 1.704(b).	Y IS SET TO EXPIRE <u>3</u> MON ATE OF THIS COMMUNICAT 36(a). In no event, however, may a reply l will apply and will expire SIX (6) MONTHS e, cause the application to become ABAND g date of this communication, even if timely	TH(S) OR THIF TON. be timely filed from the mailing date ONED (35 U.S.C. § - filed, may reduce an	RTY (30) DAYS, of this communication. 133). y	
Status				
1) Responsive to communication(s) filed on <u>08/1</u> A declaration(s)/affidavit(s) under <b>37 CFR 1</b> .	<u>4/2013</u> . <b>130(b)</b> was/were filed on	<u>.</u>		
2a) This action is <b>FINAL</b> . $2b)$ This	action is non-final.			
3) An election was made by the applicant in resp	onse to a restriction requireme	ent set forth dur	ing the interview on	
; the restriction requirement and election 4) Since this application is in condition for allowa closed in accordance with the practice under	n have been incorporated into nce except for formal matters, E <i>x parte Quayle</i> , 1935 C.D. 11	this action. prosecution as , 453 O.G. 213	to the merits is	
Disposition of Claims         5) ☐ Claim(s) <u>26-50</u> is/are pending in the application         5a) Of the above claim(s) is/are withdra         6) ☐ Claim(s) is/are allowed.         7) ☐ Claim(s) <u>26-50</u> is/are rejected.         8) ☐ Claim(s) is/are objected to.         9) ☐ Claim(s) are subject to restriction and/or         * If any claims have been determined allowable, you may be eleparticipating intellectual property office for the corresponding a         http://www.uspto.gov/patents/init_events/pph/index.jsp         01 The specification is objected to by the Examine         11) ☐ The drawing(s) filed on is/are: a) ☐ acc         Applicant may not request that any objection to the         Replacement drawing sheet(s) including the correct         Priority under 35 U.S.C. § 119         12) ☐ Acknowledgement in mode of a claim for foreign	n. wn from consideration. or election requirement. ligible to benefit from the <b>Patent</b> upplication. For more information, d an inquiry to <u>PPHfeedback@usp</u> er. septed or b) dojected to by t drawing(s) be held in abeyance. tion is required if the drawing(s) is	Prosecution Hig please see <u>oto.gov</u> . he Examiner. See 37 CFR 1.8 s objected to. See	9 <b>hway</b> program at a 5(a). a 37 CFR 1.121(d).	
<ul> <li>Acknowledgment is made of a claim for foreign</li> <li>Certified copies: <ul> <li>a)</li> <li>All</li> <li>b)</li> <li>Some * c)</li> <li>None of the: <ul> <li>1.</li> <li>Certified copies of the priority document</li> <li>2.</li> <li>Certified copies of the priority document</li> <li>3.</li> <li>Copies of the certified copies of the priority document</li> <li>application from the International Bureat</li> <li>* See the attached detailed Office action for a list of</li> </ul> </li> </ul></li></ul>	its have been received. Its have been received in Applority documents have been rec u (PCT Rule 17.2(a)). f the certified copies not received.	ication No ceived in this Na	 ational Stage	
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1) X Notice of References Cited (PTO-892)	3)  Interview Summ Paper No(s)/Ma	nary (PTO-413) ail Date		
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1. The present application is being examined under the pre-AIA first to invent provisions.

2. Claims 26-50 are pending for examination. Claims 1-25 were canceled. This action is in response to the original application filed 06/06/2013.

3. 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 double patenting rejection is appropriate where the claims at issue 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 reference 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. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more

information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

4. Claims 26-50 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 29-56 of copending Application No. 13/903, 788. Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network using the received look up network address of a second network device based on an identifier associated with the second network device and the information for a virtual network address. The difference is the current application clearly claimed that the request is a domain name service (DNS) request while the copending application just calls a request. And another difference is the current application just calls the network address while the copending application calls an internet protocol (IP) address. Another difference is the current application clearly states the connection to the second network device is over the encrypted communication link while the copending application does not. It would have been obvious to one of ordinary skilled in the art at the time the invention was made to recognize that such variation and clarification of the claimed language would not be patentably distinguishable.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 14-20 and 27-47 of copending Application No. 13/080,680.

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network using

the received look up network address of a second network device based on an identifier associated with the second network device and the information for a virtual network address. The difference is a variation of calling: For example, the current application calls "a domain name service (DNS) request to look up a network address of a second network device", the copending application calls "a query, generated by the client device, for a network address associated with the target device". Another difference is the current application clearly calls "the encrypted communication link" while the copending application calls "a secure communication link". It would have been obvious of one of ordinary skill in the art at the time the invention was made to recognize that such difference would have been a matter of calling.

In addition, the current application clearly cites <u>the storage device for storing application</u> <u>program for a secure communications service and a processor for executing the</u> <u>application program, and using an identifier associated with the second network device</u> <u>to look up for a second network device.</u> It would have been obvious to one of ordinary skilled in the art at the time the invention was made to recognize that such using of storage device for storing the application program and the processor for executing the application program are well known in the art and it is not patentably distinguishable.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

 Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-25, 27-40 and 68 of copending Application No. 13/049,552.

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network (an encrypted communication link) using the received look up network address of a second network device based on an identifier associated with the second network device and

the information for a virtual network address. The difference is a variation of calling: For example, the current application calls "a domain name service (DNS) request" while the copending application calls "a domain name service (DNS) request". Another example, the current application calls first and second network devices while the copending application calls "registers devices having a first device and second device and wherein the register devices is provided with application for performing audio video communication. It would have been obvious of one of ordinary skill in the art at the time the invention was made to recognize that such difference would have been a matter of calling and having an application to support audio video communications is well known in the art at the time the invention was made.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

7. Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6-8 and 10-15 of copending Application No. 13/342,795. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are directed to a network device using a communication link to communication among network devices based a determination or indication. For instance, the current application clearly cites that communicate with the second network device using the virtual private network communication link while the copending application does not but instead citing that at least one of video-audio data communicate with the target device using only the secure communication link. Such variation and clarification are cited in the dependent claims and thus they are obvious and they are not patentably distinguishable.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

 Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. 13/617,446, claims 1-42 of copending application 13/181,041, claims 1-3 of copending application 13/618,966, claims 1-13 of copending application 13/474,397, claims 1-30 of copending application 13/075,081, claims 1-38, 4-42 and 43-52 of copending application 13/075,081.

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network (an encrypted communication link, a virtual communication link) using the received look up network address (an Internet Protocol (IP) address) of a second network device (a target device) based on an identifier associated with the second network device and the information for a virtual network address. The difference is a variation of calling and clarification of the claimed language similarly as in paragraphs 4-7 above.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

9. Claims 26-50 are rejected on the ground of nonstatutory double patenting as being unpatentable over 1-17 claims of U.S. Patent No.6,502,135, claims 1-41 of U.S Patent No. 7,188,180, claims 1-60 of U.S Patent No. 7,418,504, claims 1-16 of U.S Patent No. 7,490,150, claims 1-60 of U.S Patent No. 7,921,211, claims 1-18 of U.S Patent No. 7,933,990, claims 1-13 of U.S Patent No. 7,945,654, claims 1-18 of U.S Patent No. 7,987,274, claims 1-29 of U.S Patent No. 8,051,181, claims 1-28 of U.S Patent No. 8,458,341, claims 1-30 of U.S Patent No. 8,504,696, claims 1-30 of U.S Patent No. 8,804,697, claims 1-19 of U.S Patent No. 8,516,117, claims1-27 of U.S Patent No. 8,516,131.

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network (an

encrypted communication link, a virtual communication link) using the received look up network address (an Internet Protocol (IP) address) of a second network device (a target device) based on an identifier associated with the second network device and the information for a virtual network address. The difference is a variation of calling and clarification of the claimed language similarly as in paragraphs 4-7 above.

Kiuchi discloses that the C-HTTP name server stores the IP address and public key of a particular computer in a data structure that maps the name of the particular computer to the corresponding IP address and public key. Kiuchi discloses that the client-side proxy sends a request to the C-HTTP, where the request is asking the C-HTTP server for permission to establish a connection with a server-side proxy.

Wesinger describes a system in which a configuration file is stored on a series of firewalls. The configuration files store security information by domain name and use the domain name to determine if a particular request is to be allowed.

Moreover, Wesinger discloses the following sequence: (i) a request is received by the firewall/DNS server, (ii) the domain name in the request is looked up in the configuration file, (iii) if the connection is allowed, then the firewall/DNS server may invoke code that performs channel processing, which includes encryption.

Wesinger discloses that DNS propagation happens in a normal manner, but also teaches that the DNS propagation happens through the firewall servers, and the DNS propagation is subject to allow or deny connection rules.

## In Examiner's opinion, both Kiuchi and Wesinger may not clearly disclose the feature of "intercepting a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device and determining whether or not to establish a secure communication connection over the encrypted communication link". Moreover, both

Kiuchi and Wesinger may not clearly disclose "send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device; receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link".

Moreover, in Examiner's opinion, Examiner believes that the requested is intercepted and determined before the request reached the firewall/DNS server.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The references are cited in the Form PTO-892 for the applicant's review.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) days from the mail date of this letter.

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).

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) If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (In USA or Canada) or 571-272-100.

Kl August 25, 2013

/Krisna Lim/ Primary Examiner Art Unit 2453

Petitioner Apple Inc. - Ex. 1004, p. 239

Notice of References Cited	13/911,792 Examiner KRISNA LIM	Art Unit 2453	Page 1 of 1	
	Application/Control No.	Applicant(s)/Patent Under		

#### **U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	А	US-7,225,249	05-2007	Barry et al.	709/227
	В	US-			
	С	US-			
	D	US-			
	Е	US-			
	F	US-			
	G	US-			
	н	US-			
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	М	US-			

#### FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Ν					
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#### NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).) Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Part of Paper No. 20130822

Subst.	for form 14	449/PTO		(	Comp	lete if Known
IN IN -	<b></b>			Application Number		13/911,792
INFC	RMAT	ION DISCLOSU	RE	Filing Dates		06-06-2013
STA	TEMEN	NT BY APPLICAN	IT	First Named Inventor		Victor Larson
(Use as	s many sh	ieets as necessary)		Art Unit		2495
				Examiner Name		Olanrowaiu I Buoknor
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EXAMI NER'S INITIA LS	CITE NO.	Patent Number	Publication/Pat ent Date	Name of Patentee or Applic Cited Document	ant of	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	09/399.753	09/22/1998	Graig Miller et al		
	A2	60/151.563	08/31/1999	Bryan Whittles		
	A3	60/134,547	05/17/1999	Victory Sheymov		
	A4	2,895,502	07/21/1959	Roper et al.		
	A5	4,761,334	08/1988	Sagoi et al.		
	A6	4,885,778	12/5/1989	Weiss, Kenneth		
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		5 204 961	04/20/1003	Radow		
		5 276 735	04/20/1993	Boobert et al		
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	A18	5,367,643	11/22/1994	Chang et al		
	A19	5,384,848	01/24/1995	Kikuchi		
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D596	Exhibit X7: BinGO! User's Guide Incorporat Reference.	ting by Reference BinGO	Extended Feature	
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ATEME	ENT BY APPLICANT	First Named Inventor	Victor Larson		
e as many	sheets as necessary)	Art Unit	2495		
		Examiner Name	Olanrewaju J. Bucknor		
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D598	Exhibit X8: Copy of U.S. Patent No. 6,182	2,741			
D599	Exhibit X9: BinGO! User's Guide V1.6 (19)	99). Heriointentente Christe			
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D613	Exhibit Y2: Goldschlag et al., "Hiding Rout	ing Information" (1996).			
D614	Exhibit Y3: Copy of U.S. Patent No. 5,950,	,519			
D615	Exhibit Y4: Ferguson, P. and Huston, G., " No. 1 (June 1998 ("Ferguson").	What Is a VPN", The Inte	rnet Protocol Journal, Vol 1.,		
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D622	Form PTO/SB/42, Listing Each Patent and New Question of Patentability (Patent No. 6	Printed Publication Reliev 3,502,135)	d Upon to Provide a Substantial		
D623	Form PTO/SB/42, Listing Each Patent and New Question of Patentability (Patent No. 7	Printed Publication Relied 7,490,151)	d Upon to Provide a Substantial		
D624	Request for Inter Partes Reexamination (Pa	atent No. 6,502,135)			
D625	Request for Inter Partes Reexamination Tra	ansmittal Form (PTO/SB/	58) (Patent No. 6,502,135)		
D626	Request for Inter Partes Reexamination Tra	ansmittal Form (PTO/SB/	58) (Patent No. 7,490,151)		
D620	Request for Inter Partes Reexamination Un	der 35 U.S.C. § 311 (Pati	ent No. 7,400,154)		
	Request for inter Partes Reexamination Un	uer 35 U.S.C. § 311 (Pati	ent NO. 7,490,151)		
D630	Transmittal Letter (Patent No. 0,502,135)				
D631	Joint Claim Construction and Prehearing St	atement			
D632	Exhibit A: Agreed Upon Terms: P.R. 4-3. Ini	int Claims Construction a	nd Prehearing Statement		

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			Examiner Name	Olanrewaju J. Buck	nor		
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0634	Exhibit C: VirnetX's I	Proposed Constru	iction of Claim Terms and Sun				
0635	Exhibit D; Defendant	s' Intrinsic and Ex	trinsic Support; P.R. 4-3 Joint	Claim Construction and			
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0637	Exhibit B-4; VirnetX, Summary Judgment	Inc. v. Microsoft ( of Invalidity of U.	Corp., Case No. 6:07-cv-80, M S. Patent No. 6,839,759 (E.D.	icrosoft's Motion for Partial Tex. Dec. 18, 2009)			
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647	Exhibit E-2; Claim Ch	arts Applying Ke	nt as a Primary Reference to t	he '759 Patent			
648	Exhibit E-3; Claim Ch	arts Applying Azi	z as a Primary Reference to th	ne '759 Patent			
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652	Exhibit E-3; Claim Ch	arts Applying Blu	m to Claims of the '151 Patent	t			
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655	Exhibit E-2, Claim Ch	arts Applying We	singer, and Wesinger and Ma	rtin to Claims of the '151 Patent			
656	Exhibit E-4, Claim Ch the '151 Patent	arts Applying Azi	z and Edwards, and Aziz, Edw	vards, and Martin to Claims of			
657	Exhibit E-6, Claim Ch Claims of the '151 Pa	arts Applying We tent	singer and Edwards, and Wes	inger, Edwards, and Martin to			
658	VirnetX Inc., V. Mitel	Networks Corp.; [	Defendants' Joint Invalidity Co	ntentions	·		
659	Exhibit 37, RFC 2661	vs. Claims of the	135 Patent				
660	Exhibit 38, RFC 2661	vs. Claims of the	'211 Patent				
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665	Exhibit 43, SFS-HTT	vs. Claims of the	e '135 Patent				
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STATEM	IENT BY APPLICA	NT	First Named Inventor	Victor Larso	n
(Use as man	y sheets as necessary)		Art Unit	2495	
			Examiner Name	Olantowsiu, I. Pu	aknar
T	T	r	Dookot Number		
				77580-196 (VRNK-0001	CP3CNF19)
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<b>FATEME</b>	ENT BY APPLICANT	First Named Inventor	Victor Larson	
e as many	sheets as necessary)	Art Unit	2495	
		Examiner Name	Olanrewaju J. Bucknor	
1		Docket Number	77580.196 (V/PNK 0001CP3CNET0)	
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s many	/ sheets as necessary)	Art Unit	2495
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********		Docket Number	77580-196 (VRNK-0001CP3CNET9)
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0766	Exhibit 223, U.S. Patent No. 6,557,037 Vs.	Claims of the 504 Paten	IL NE va. Claima of the 1125 Datast
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				Application Number	13/911,792	
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IEME	ENT BY	APPLICA	NI.	First Named Inventor	Victor Larso	n
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				Examiner Name	Olanrewaju J. Bu	cknor
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)814	Exhibit 130 135 Paten	), Overview t	of Access VPNs and	d Tunneling Technologie	s ("Overview") vs. Claims of the	
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)817	Exhibit 149	), Atkinson v	s. Claims of the '13	5 Patent		
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1830	6,496,867	vs. Claims o	f the '135 Patent			
1831		Filing Ack	ams of the 135 Pa	leni	······	
1032	Exhibit A 1	LS Datent				
1033	Exhibit R1	File History	of US Patent 7.18	8 180		
1835	Exhibit B2	File History	of U.S. Patent Ann	ication No. 09/588 209		
)836	Exhibit B3,	File History	of Reexamination (	Control No. 95/001,270, F	Reexamination of U.S. 7,188,180	
837	Exhibit D1,	"Lendenma al Technical	nn": Rolf Lendenma Support Organizati	in, Understanding OSF E on (Oct. 1995).	OCE 1.1 For AIX and OS/2, IBM	
0838	Exhibit D5,	"Schneier":	Bruce Schneier, Ap	plied Cryptography (199	6)	-
839	Exhibit D6, Internet Pre	RFC 793; li ogram Spec	nformation Sciences ification RFC 793 (S	s Institute, "Transmission Sept. 1981)	Control Protocol," DARPA	
)840	Exhibit D7, and Distrib	"Schimpf"; I uted System	Brian C. Schimpf, "S Security (Feb. 10-	Securing Web Access wit 1, 1997)	h DCE," Presented at Network	
)841	Exhibit D8, (1993)	"Rosenberr	y"; Ward Rosenberr	y, David Kenney, and Ge	erry Fisher, Understanding DCE	
)842	Exhibit D9, Computers Florida (No	Masys; Dar : The PCAS v. 7-11, 199	niel R. Masys & Dixi SO Approach," Pro 8)	e B. Baker, "Protecting C ceedings of the AMIA '98	linical Data on Web Client Annual Symposium, Orlando,	
)843	Exhibit E1,	Claim Char	ts Applying Lenden	nann as a Primary Refer	ence to the '180 Patent.	
)844	Exhibit E2,	Claim Char	ts Applying Kiuchi a	s a Primary Reference to	the '180 Patent	
)845	Exhibit E3,	Claim Charl	ts Applying Solana	as a Primary Reference t	o the '180 Patent	
)846	Exhibit E4, Patent	Claim Charl	ts Applying Schimpf	and Rosenberry as a Pr	imary Reference to the '180	
1047	Request fo	r Inter Parte	s Reexamination of	Patent No. 7,188,180		
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			~ <b>F</b>	Application Number	13/911,792	
FORM	ATION DI	SCLOSU	KE	Filing Date	06-06-2013	
ATEM	ENTBY	APPLICA	NI	First Named Inventor	Victor Larson	
e as many	sneets as m	ecessary)		Art Unit	2495	
				Examiner Name	Olanrewaju J. Buc	knor
				Docket Number	77580-196 (VRNK-0001C	P3CNFT9)
D850	Exhibit A;	U.S. Patent	7,921,211 with Term	ninal Disclaimer		Ī
D851	Exhibit B, ( (Patent No	Certificate of	Service to Request	For Inter Partes Reexam	ination Under 35 U.S.C. § 311	
D852	Exhibit C1 920, Reed	, Claim Char and Beser	t – USP 7,921,211 f	Relative to Solana, Alone	and in Conjunction with RFC	
D853	Exhibit C2 conjunctio	, Claim Char h with RFC ទ	t – USP 7,921,211 F 20, Reed, and Bese	Relative to Solana in view er	of RFC 2504 and Further in	
D854	Exhibit C3 920, Reed	, Claim Char , and Beser)	t – USP 7,921,211 f	Relative to Provino, Alone	and in Conjunction with RFC	
D855	Exhibit C4 Conjunctio	, Claim Char n with RFC !	t – USP 7,921,211 F 920, Reed and Bese	Relative to Provino in view er	of RFC 2230 and Further in	
D856	Exhibit C5 Conjunctio	, Claim Char n with RFC !	t – USP 7,921,211 F 920, Reed and Bese	Relative to Provino in view er	of RFC 2504 and in Further	
D857	Exhibit C6 920, RFC 3	, Claim Char 2401, and R	t – USP 7,921,211 F eed	Relative to Beser, Alone a	nd in Conjunction with RFC	
D858	Exhibit C7 RFC 920,	, Claim Char RFC 2401, F	t – USP 7,921,211 F Reed, and Beser	Relative to RFC 2230, Alo	ne and in Conjunction with	
D859	Exhibit C8 RFC 920,	, Claim Char RFC 2401, F	t – USP 7,921,211 F Reed, Beser, and RF	Relative to RFC 2538, Alo FC 2065	ne and in Conjunction with	
D860	Exhibit D1 Cisco Syst America ai	, Asserted C ems, Inc., A nd Aastra US	aim and Infringeme ople Inc., Aastra Teo SA, Inc., Civ. Act 6:2	nt Contentions by Plaintiff chnologies Ltd, NEC Corp 010cv00417 (E.D. Tex)	VirnetX, Inc. in VirnetX, Inc. v. poration, NEC Corporation of	
D861	Exhibit D2 based on 7	, Asserted C 7,921,211 Pa	aims and Infringem Itent	ent Contentions by Plainti	ff VirnetX, Inc. against Apple	
D862	Exhibit X1, Domains"	Solana, E. e	et al. "Flexible Interr	net Secure Transactions B	ased on Collaborative	
D863	Exhibit X2,	U.S. Patent	6,557,037			
D864	Exhibit X4, (Novembe	Atkinson, R r 1997)	., IETF RFC 2230, "	Key Exchange Delegation	n Record for the DNS"	
D865	Exhibit X6, 1998) Is Ad	Kent, et al., ccessible at:	IETF RFC 2401, "S http://www.ietf.org/r	ecurity Architecture for the fc/rfc2401.txt	e Internet Protocol" (November	
D866	Exhibit X7, (January 1	Eastlake, D 997) Is Acce	. et al., IETF RFC 2 ssible at: http://www	065, "Domain Name Syste v.ietf.org/rfc/rfc2065.txt	em Security Extensions"	
D867	Exhibit X9, Accessible	Guttman, E At: http://wv	. et al., IETF RFC 2 w.ietf.org/rfc/rfc250	504, "Users' Security Han )4.txt	dbook" (February 1999) Is	
D868	Exhibit Y3, October 19	Braden, R., 989 ("RFC11	RFC 1123, "Require 23").	ements for Internet Hosts	- Application and Support,"	
D869	Exhibit Y4, Accessible	Atkinson, R At: http://wv	., RFC 1825, "Secur /w.ietf.org/rfc/rfc182	rity Architecture for the Inte 5.txt	ernet Protocol (August 1995) Is	
D870	Exhibit Y5, CRL Profile	Housley, R. e" (January 1	et al., RFC 2459, "I 999) Is accessible /	nternet X.509 Public Key At: http://www.ietf.org/rfc/r	Infrastructure Certificate and fc2459.txt	
D871	Exhibit A, I	J.S. Patent 7	,418,504			
D872	Exhibit B, ( (Patent No	Certificate of . 7,418,504)	Service to Request	For Inter Partes Reexami	nation Under 35 U.S.C. § 311	
D873	Exhibit C1, 920, Reed	Claim Char and Beser	: – USP 7,418,504 F	Relative to Solana, Alone a	and in Conjunction with RFC	
D874	Exhibit C2, Conjunctio	Claim Char n with RFC §	: – USP 7,418,504 F 920, Reed, and Bese	Relative to Solana in view er	of RFC 2504 and Further in	
D875	Exhibit C3, 920, Reed,	Claim Chan and Beser	: – USP 7,418,504 F	Relative to Provino, Alone	and in Conjunction with RFC	
D876	Exhibit C4, Conjunctio	Claim Char n with RFC §	- USP 7,418,504 F 20, Reed and Bese	Relative to Provino in View r	of RFC 2230 and Further in	
D877	Exhibit C5, Conjunctio	Claim Char n with RFC 9	: – USP 7,418,504 F 20, Reed, and Bes	Relative to Provino in View er	of RFC 2504 and in Further	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( <i>Uke as many sheets as necessary</i> )         Application Number         13911/192           Pring Date         06-06-2013         First Named Inventor         Victor Larson           Art Unit         2495           20075         Exhibit CC, Claim Chart – USP 7.418,054 Rolative to Baser, Alone and in Conjunction with RFC 200, RFC 201, and Reed         Docket Number         77580-196 (VRNK-0001CP3CNFT9)           D673         Exhibit CC, Claim Chart – USP 7.418,054 Rolative to Baser, Alone and in Conjunction with RFC 2020, RFC 201, and Reed         Description         Docket Number         77580-196 (VRNK-0001CP3CNFT9)           D673         Exhibit CC, Claim Chart – USP 7.418,054 Rolative to RFC 230, Alone and in Conjunction with RFC 2020, RFC 2401, Reed, Baser and RFC 2005         Description         Description         Description           D880         Exhibit CL, Asserted Claims and Infingement Contentions by Plaintiff VirnetX Inc. in WinetX, Inc. v Class Systems, Inc., Applee, Inc., Askar Technologies Ltl., NEC Corporation, NEC Corporation of America and Astara USA, Inc., Civi Act B 2010bc/00417 (ED T ex)         Description         Description         Description         Description           D881         Exhibit CL, Saster B, DIET RFC 2010, Security Architecture for the Internet Protocol, (Novembari 1999)         Description         Description         Description         Description         Description         Description         Description         Description         Descrip	Subst. for forn	n 1449/PTO		Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)         Filing Date         96-06-2013           Trist Named Inventor         Victor Larson         Art Unit         2495           Examiner Name         Olanrewaju J. Buckhor         7560-196 (VRNK-0001CP3CNFF9)           D678         Exhibit C6. Claim Chart - USP 7.418,504 Relative to Beser, Alone and in Conjunction with RFC 520, RFC 2401, and Read         Docket Number         77580-196 (VRNK-0001CP3CNFF9)           D678         Exhibit C6. Claim Chart - USP 7.418,504 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Read, Beser, and RFC 2085         Exhibit C3, Same Chart - USP 7.418,504 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Read, Beser, and RFC 2085           D881         Exhibit C3, Same Cd Claims and Infringement Contentions by Plaintiff VirnetX Inc. in VirnetX, Inc. v Caso Systems, Inc. Apple on the 2010 (Contentions by Plaintiff VirnetX Inc. agarnst Apple Inc. Back on the 7.418,604           D881         Exhibit C3, Sametod Claims and Infringement Contentions by Plaintiff VirnetX Inc. agarnst Apple Inc. Back on the 7.418,604           D881         Exhibit C3, Eastlake, D, et al., IETF RFC 2303, "Storing Certificates in the Domain Name System (DN)" (Match 1994) (Match			Application Number	13/911,792	
STATEMENT BY APPLICANT ( <i>Use as many sheets as necessary</i> )       First Named Inventor       Victor Larson         Ar Unit       2495         D578       Exhibit C6, Claim Chart – USP 7.418,504 Relative to Beser. Alone and in Conjunction with RFC 920, RFC 2401, and Reed       Docket Number       77580-198 (VRNK-0001CP3CNFT9)         D678       Exhibit C7, Claim Chart – USP 7.418,504 Relative to Beser. Alone and in Conjunction with RFC 920, RFC 2401, Reed, and Beser       Exhibit C6, Claim Chart – USP 7.418,504 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2066         D881       Exhibit C1, Asserted Claims and Infringement Contentions by Plaintff VinetX Inc., in <i>VinetX, Inc. V Cost Systems, Inc., Applob, Inc., Astar Technologies L1J, NEC Corpariton, NEC Corpariton, VEC Corporation, VEC Corporation, VEC Corpariton, VEC Corporation, VEC Corpariton, VEC VIC, VEC VEC VEC VEC VEC VEC VEC VEC VEC VE</i>	INFORM	ATION DISCLOSURE	Filing Date	06-06-2013	
Item         Item<	STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson	
Instrume         Data Provide State           Examiner Name         Olanrewaju J. Bucknor           DS78         Exhibit C6, Claim Chart – USP 7.418.504 Relative to Beser, Alone and in Conjunction with RFC           DS79         Exhibit C7, Claim Chart – USP 7.418.504 Relative to RFC 2230. Alone and in Conjunction with RFC           DS79         Exhibit C3, Claim Chart – USP 7.418.504 Relative to RFC 2230. Alone and in Conjunction with RFC 5920. RFC 2401, Reed, and Beser           DS81         Exhibit C3, Claim Chart – USP 7.418.504 Relative to RFC 2238. Alone and in Conjunction with RFC 5920. RFC 2401, Reed, Jeser, and RFC 2538.           DB81         Exhibit D1, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. in VirnetX, Inc. v           America and Asster USA. Inc., On Asster 26:300:040417 (ED. Tex)         Cooperation. NEC Corporation of America and Asster USA. Inc., On Asster 26:300:040417 (ED. Tex)           D882         Exhibit D2, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. against Apple Inc. Based on the 7.418,994         Inc. Based on the 7.418,994           D883         Exhibit X0, Reed, Med Al. (FRC 2201). "Socially Architecture for the Internet Protocol, (November 1996) http://www.ief.org/toc/fc201.bt         Internet Engineeron 20: CR. Dec. e-13. 1996.           D885         Exhibit X0, Reed, Med Al. "Proxies for Anonymous Routing." 12th Annual Computer Security Applications Conference. San Diego, CA, Dec. e-13. 1996.         Internet Engineeron 20: CR. Dece. e-13. 1996.           D886         Teansmital Letter </th <th>(Use as many</th> <th>y sheets as necessary)</th> <th>Art   Init</th> <th>2495</th> <th></th>	(Use as many	y sheets as necessary)	Art   Init	2495	
Detailed Number         Outstread         Detailed Number           Deck         Exhibit C6. Claim Chart. USP 7.418.504 Relative to Beser. Alone and in Conjunction with RFC           D876         Exhibit C7. Claim Chart. USP 7.418.504 Relative to RFC 230. Alone and in Conjunction with RFC 920. RFC 2401, Reed, and Beser           D880         Exhibit C1. Scalim Chart. USP 7.418.504 Relative to RFC 2538. Alone and in Conjunction with RFC 920. RFC 2401, Reed, Beser. and RFC 2405.           D881         Exhibit C1. Scalim Chart. USP 7.418.504 Relative to RFC 2538. Alone and in Conjunction with RFC 920. RFC 2401. Reed, Beser. and RFC 2405.           D881         Exhibit C1. Scalim Chart. USP 7.418.504 Relative to RFC 2538. Alone and in Conjunction with RFC 920. RFC 2401. Rect. 2010.0000171 (ED. 1000.000171 (ED. 1000.0000171 (ED. 1000.0000171 (ED. 1000.0000171 (ED. 1000.0000171 (ED. 1000.0000171 (ED. 1000.00000171 (ED. 1000.00000000000000000000000000000000			Evominor Namo		Lung
Decket Number         // SBO-196 (VFNK-RUC 230, Alone and in Conjunction with RFC 320, RFC 2401, and Reed           0878         Exhibit C7, Claim Chart – USP 7,418,504 Relative to BSeer, Alone and in Conjunction with RFC 320, RFC 2401, Reed, and Beser           D880         Exhibit C7, Claim Chart – USP 7,418,504 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, and Beser, and RFC 2306, Rect Beser, and RFC 2306           D881         Exhibit C1, Claim Chart – USP 7,418,504 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2306 (Corporation, RFC Corporation, RFC Corporation, RFC 200, RFC 2401, Reed, Beser, and RFC 2307, RFC 200, RFC 2401, Reed, Beser, and RFC 2302, RFC 2401, Security Architecture for the Intermet Protocol, (November1988) http://www.ieff.org/rfc/rfc2401.txt           D882         Exhibit C1, Security Architecture for the Intermet Protocol, (November1988) http://www.ieff.org/rfc/rfc2401.txt           D885         Exhibit C1, Inter Partes Recammenus Routing, "2th Annual Computer Security Applications conference, San Diego, CA, Dec, 9-13, 1986           D886         Transmittal Letter           D887         Request for Inter Partes Reexamination fransmittal form           D889         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D889         Transmittal Letter           D889         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D889         Request for Inter Partes Reexamination Under 35 U.S.C. § 212           D889         Request for In					RIO
DP78         Exhibit C6, Claim Chart – USP 7.418.504 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed Beser           DP79         Exhibit C7, Claim Chart – USP 7.418.504 Relative to RFC 230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, and Beser           DP80         Exhibit C9, Claim Chart – USP 7.418.504 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2005           D811         Exhibit C9, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. In <i>VirnetX, Inc. v Class Systems, Inc. Applice, Inc. Asstar Technologies L1, NEC Corporation, NEC Corporation of America and Asstar USA, Inc. (DK Act, B 2010004017 (ED - Tex)           D822         Exhibit D1, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. against Apple Inc.           Lased on the 7.418,504         Act, B 2010004017 (ED - Tex)           D832         Exhibit D3, Sestered Claims and Infringement Contentions by Plaintiff VirnetX Inc. against Apple Inc.           USN3 (March 1999)         D844         Exhibit XA, Kent, S. IETF RFC 2401, "Security Architecture for the Internet Protocol, (November 1998) http://www.ietf.org/rthcfr/d5201.txt           D845         Exhibit XA, Read, M. et al. "ETF RFC 2401, "Security Architecture for the Internet Protocol, (November 1998) intp://www.ietf.org/rthcfr/d5201.txt           D846         Exhibit XA, Read, M. et al. "Protes for Anonymous Routing." 12th Annual Computer Security Applications Conference, San Diego, CA, Dec, 9-13, 1996.           D847         Teansmittal Letter           D</i>			Docket Number	77580-196 (VRNK-0001C	(P3CNF19)
<ul> <li>D879 Exhibit C7, Claim Chart – USP 7,418,504 Relative to RFC 2230, Alone and in Conjunction with RFC 202, RFC 201, Rect, and Beser</li> <li>D880 Exhibit C3, Claim Chart – USP 7,418,504 Relative to RFC 2538, Alone and in Conjunction with RFC 292, RFC 201, Rect, Beser, and RFC 2055</li> <li>D881 Exhibit D1, Asserted Claims and Infringement Contentions by Plaintff VirneX. Inc. in <i>VirneX. Inc. v. Caso Systems, inc. Apples. Inc. Astarta Technologies Ltd., Net CC Corporation, NEC Corporation of America and Aastra USA, Inc., Cu. Act. 6:2010:c00417 (E.D. Tex)</i></li> <li>D882 Exhibit D2, Asserted Claims and Infringement Contentions by Plaintff VirneX. Inc. against Apple Inc. Based on the 7,418,504</li> <li>D883 Exhibit D5, Eastlake, D., et al., IETF RFC 2538, "Storing Certificates in the Domain Name System (DNS)" (March 1999)</li> <li>D884 Exhibit X8, Rostel, J. et al., IETF RFC 203, "Domain Requirements" (October 1984) is Accessible at http://www.iet/org/rich/fc2301.txd</li> <li>D885 Exhibit X8, Postel, J. et al., IETF RFC 202, "Domain Requirements" (October 1984) is Accessible at http://www.iet/org/rich/fc2301.txd</li> <li>D886 Exhibit X10, Reed, M. et al. "Provise for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 913, 1996.</li> <li>D887 Request for Inter Partes Reexamination Under 35 U.S.C. § 311</li> <li>D888 Transmittal Letter</li> <li>D890 Exhibit D-7, "Thomas." Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov-Dec. 1997)</li> <li>D891 Exhibit C1, Claim Chart – USP 7,921.211 Relative to Solana, Alone and in Conjunction with RFC 920, Rec and Beser (Dame from Invial, Cleac did 11/19/11)</li> <li>D893 Exhibit C1, Claim Chart – USP 7,921.211 Relative to Provino, In View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser</li> <li>D894 Exhibit C3, Claim Chart – USP 7,921.211 Relative to Provino in View of RFC 2200 and Further in Conjunction with RFC 920, Reed, and Beser</li></ul>	D878	Exhibit C6, Claim Chart – USP 7,418,504 F 920, RFC 2401, and Reed	Relative to Beser, Alone a	and in Conjunction with RFC	
D880         Exhibit C8, Claim Chart – USP 7418.04 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2017, RFC 2017, RFC 2017, and Canada Santa Technologies Ltd., NEC Comparison, NEC Comparison of America and Aastra USA, Inc., Civ. Act. 8:2010ex0417 (E.D. Tex)           D881         Exhibit D1, Asserted Claims and Infringement Contentions by Plaintiff VirneX. Inc. against Apple Inc. Based on the 7418.04           D883         Exhibit D2, Asserted Claims and Infringement Contentions by Plaintiff VirneX. Inc. against Apple Inc. Based on the 7418.04           D884         Exhibit X5, Esstlake, D., et al., IETF RFC 2538, "Storing Certificates in the Domain Name System (DNS)" (March 1999)           D884         Exhibit X6, Kent, S. IETF RFC 2401, "Security Architecture for the Internet Protocol, November1998) http://www.iet.org/rtc/rtd201.td           D885         Exhibit X8, Read, M. et al., IETF RFC 920, "Domain Requirements" (October 1984) Is Accessible at http://www.iet.org/rtc/rtd201.td           D886         Transmital Letter         Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996.           D887         Request for Inter Partes Reexamination Transmital form           D888         Transmital Letter           D889         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D891         Definition Chart – USP 7.921.211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)           D892         Exhibit C3, Claim Chart – USP 7.921.211 R	D879	Exhibit C7, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, and Beser	Relative to RFC 2230, Ale	one and in Conjunction with	
D881         Exhibit D1, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. in VinetX. Inc. vinetX. Inc. vinetX. Inc. Astra USA. Inc. Civ. Act. 6:2010ex/0417 (E.D. Tex).           D882         Exhibit D2, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. against Apple Inc. Based on the 7.418.504           D883         Exhibit X5, Eastlake, D., et al., IETF RFC 2538, "Storing Certificates in the Domain Name System (DNS)" (March 1999)           D844         Exhibit X5, Eastlake, D., et al., IETF RFC 2401, "Security Architecture for the Internet Protocol, (November1998) http://www.ietf.org/tfo/fc320.bt           D865         Exhibit X6, Featel, J. et al., IETF RFC 2920, "Domain Requirements" (October 1984) Is Accessible at http://www.ietf.org/tfo/fc320.bt           D866         Exhibit X8, Postel, J. et al., IETF RFC 920, "Domain Requirements" (October 1984) Is Accessible at http://www.ietf.org/tfo/fc320.bt           D867         Request for Inter Partes Reasonination Transmittal form           D868         Transmittal Letter           D868         Transmittal Letter           D869         Request for Inter Partes Reasonination Transmittal form           D861         Exhibit X0, Fort Partes Reasonination Transmittal form           D862         Exhibit X0, Thomas", Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov-Dec. 1997)           D861         Exhibit C2, Claim Chart – USP 7.921.211 Relative to Solana, Alone and in Conjunction with RFC 200, Reed, and Beser           D862	D880	Exhibit C8, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, Beser, and RF	Relative to RFC 2538, Alo C 2065	one and in Conjunction with	
D822         Exhibit D2, Asserted Claims and Infringement Contentions by Plaintiff VirnetX Inc. against Apple           D833         Exhibit X5, Eastake, D., et al., IETF RFC 2538, "Storing Certificates in the Domain Name System (DNS)" (March 1999)           D844         Exhibit X5, Eastake, D., et al., IETF RFC 2401, "Security Architecture for the Internet Protocol, (November1998) http://www.ietf.org/rfc/rfc2401.txt           D845         Exhibit X6, Pastel, J. et al., IETF RFC 920, "Domain Requirements" (October 1984) Is Accessible at http://www.ietf.org/rfc/rfc240.bxt           D846         Exhibit X10, Reed, M. et al. "Proteis for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996.           D847         Request for Inter Partes Reexamination Transmittal form           D848         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D849         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D849         Exhibit D-7, "Thomas:" Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)           D841         Exhibit D-7, "Inomas:" Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)           D841         Exhibit D-7, "Inomas:" Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)           D842         Exhibit D-7, "Inomas:" Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)           D843         Exhibit C1, Claim Chart – USP 7, 921, 211 Relative to Solana, Alon	D881	Exhibit D1, Asserted Claims and Infringeme Cisco Systems, Inc., Applce, Inc, Aastra Te America and Aastra USA, Inc., Civ. Act. 6:2	ent Contentions by Plain echnologies Ltd., NEC Co 2010cv00417 (E.D. Tex)	tiff VirnetX Inc. in VimetX, Inc. v. orporation, NEC Corporation of	
D833         Exhibit X5, Eastlake, D, et al., IETF RFC 2538, "Storing Certificates in the Domain Name System (DNS)" (March 1999)           D844         Exhibit X6, Kent, S. IETF RFC 2401, "Security Architecture for the Internet Protocol, (November1989) http://www.ietf.org/ftc/rfc220.txt           D865         Exhibit X8, Postel, J et al., IETF RFC 2920, "Domain Requirements" (October 1984) Is Accessible at http://www.ietf.org/ftc/rfc320.txt           D866         Exhibit X10, Reed, M. et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996.           D887         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D888         Transmittal Letter           D889         Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov- Dec. 1997)           D891         Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov- Dec. 1997)           D891         Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov- Dec. 1997)           D891         Exhibit C P, "Kent II". Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)           D892         Exhibit C 2, Claim Chart - USP 7.921.211 Relative to Solana, Alone and in Conjunction with RFC 920, Reced, and Beser           D893         Exhibit C 3, Claim Chart - USP 7.921.211 Relative to Provino in View of RFC 2504 and Further in Conjunction with RFC 920, Reed and Beser	D882	Exhibit D2, Asserted Claims and Infringeme Inc. Based on the 7,418,504	ent Contentions by Plaint	tiff VirnetX Inc. against Apple	
D84       Exhibit X6, Kent, S. IETF RFC 2401, "Security Architecture for the Internet Protocol, (November1998) http://www.ietf.org/rfc/rfc201.st         D885       Exhibit X8, Postel, J. et al., IETF RFC 220, "Domain Requirements" (October 1984) Is Accessible at http://www.ietf.org/rfc/rfc201.st         D886       Exhibit X10, Reed, M. et al., "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996.         D887       Request for Inter Partes Reexamination Transmittal form         Transmittal Letter       Transmittal Letter         D890       Exhibit X10, Thomas: "Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov- Dec. 1997)         D891       Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, Reed, and Beser         D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, Reed, and Beser<	D883	Exhibit X5, Eastlake, D., et al., IETF RFC 2 (DNS)" (March 1999)	538, "Storing Certificates	s in the Domain Name System	
D885         Exhibit X8, Postel. J. et al., IETF RFC 920, "Domain Requirements" (October 1984) Is Accessible at http://www.ief.org/tfc/ffc920.txt           D886         Exhibit X10, Reed, M. et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec, 9-13, 1996.           D887         Request for Inter Partes Reexamination Transmittal form           D888         Transmittal Letter           D889         Request for Inter Partes Reexamination Under 35 U.S.C. § 311           D890         Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)           D891         Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)           D892         Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)           D893         Exhibit C2, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser           D894         Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2204 and Further in Conjunction with RFC 920, Reed and Beser           D895         Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser           D896         Exhibit C3, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, and Reed <t< td=""><td>D884</td><td>Exhibit X6, Kent, S. IETF RFC 2401, "Secu (November1998) http://www.ietf.org/rfc/rfc2</td><td>rity Architecture for the li 401.txt</td><td>nternet Protocol,</td><td></td></t<>	D884	Exhibit X6, Kent, S. IETF RFC 2401, "Secu (November1998) http://www.ietf.org/rfc/rfc2	rity Architecture for the li 401.txt	nternet Protocol,	
D886       Exhibit X10, Reed, M. et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996.         D887       Request for Inter Partes Reexamination Transmittal form         D889       Request for Inter Partes Reexamination Under 35 U.S.C. § 311         D890       Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov- Dec. 1997)         D811       Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D896       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C6, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in C	D885	Exhibit X8, Postel, J. et al., IETF RFC 920, http://www.ietf.org/rfc/rfc920.txt	"Domain Requirements"	(October 1984) Is Accessible at	
D887       Request for Inter Partes Reexamination Transmittal form         D889       Transmittal Letter         D889       Request for Inter Partes Reexamination Under 35 U.S.C. § 311         D890       Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov-Dec. 1997)         D891       Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C.1, Claim Chart – USP 7, 921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed, and Beser         D893       Exhibit C.2, Claim Chart – USP 7, 921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C.3, Claim Chart – USP 7, 921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed and Beser         D895       Exhibit C.4, Claim Chart – USP 7, 921,211 Relative to Provino in View of RFC 2504 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C.5, Claim Chart – USP 7, 921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C.7, Claim Chart – USP 7, 921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C.7, Claim Chart – USP 7, 921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 4401, and Reed         D898       Exhibit C.8, Claim Chart – USP 7, 921,211 Relative to RFC	D886	Exhibit X10, Reed, M. et al. "Proxies for An Applications Conference, San Diego, CA, D	onymous Routing," 12th Dec. 9-13, 1996.	Annual Computer Security	
D888       Transmittal Letter         D889       Request for Inter Partes Reexamination Under 35 U.S.C. § 311         D890       Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)         D891       Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2200 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser         D899       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser	D887	Request for Inter Partes Reexamination Tra	ansmittal form		
D889       Request for Inter Partes Reexamination Under 35 U.S.C. § 311         D890       Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov- Dec. 1997)         D891       Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C2, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C6, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2005         D899       Exhibit C6, Claim Chart – USP 7,418,504 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser         D8901       Exhibit C1, Claim Chart – USP	D888	Transmittal Letter			
D890       Exhibit D-7, "Thomas": Brian Thomas, "Recipe for E-Commerce, IEEE Internet Computing, (Nov Dec. 1997)         D891       Exhibit D-9, "Kent II". Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C2, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2203 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D897       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser         D900       211 Request for Inter Partes Reexamination         D901       Exhibit C2, Claim Chart – USP 7,418,504 Relative to Sol	D889	Request for Inter Partes Reexamination Un	der 35 U.S.C. § 311		
D891       Exhibit D-9, "Kent II": Stephen Kent & Randall Atkinson, "IP Encapsulating Security Payload (ESP)," Internet Engineering Task Force, Internet Draft (Feb. 1998)         D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C2, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2203 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed, and Beser         D898       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 4401, Reed, Beser         D899       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed, and Beser         D900       211 Request for Inter Partes Reexamination         D910       Exhibit C3, Claim Chart – USP	D890	Exhibit D-7, "Thomas": Brian Thomas, "Rec Dec. 1997)	ipe for E-Commerce, IEE	EE Internet Computing, (Nov	
D892       Exhibit C1, Claim Chart – USP 7,921,211 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser (Came from Inval. Cisco dtd 11/18/11)         D893       Exhibit C2, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2230 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2530, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2055         D890       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, Reed and Beser         D890       Exhibit C1, Claim Chart – USP 7,418,504 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser         D900       211 Request for Inter Partes Reexamination         D901       Exhibit C1, Claim Chart – USP 7,418,504 Relative to Solana in	D891	Exhibit D-9, "Kent II": Stephen Kent & Rand Internet Engineering Task Force, Internet D	lall Atkinson, "IP Encaps traft (Feb. 1998)	ulating Security Payload (ESP),"	
D893       Exhibit C2, Claim Chart – USP 7,921,211 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D894       Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2230 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, Reed, and Beser         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2065         D900       211 Request for Inter Partes Reexamination         D901       Exhibit C1, Claim Chart – USP 7,418,504 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser         D902       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D903       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser	D892	Exhibit C1, Claim Chart – USP 7,921,211 R 920, Reed and Beser (Came from Inval. Cis	Relative to Solana, Alone sco dtd 11/18/11)	and in Conjunction with RFC	
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D895       Exhibit C4, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2230 and Further in Conjunction with RFC 920, Reed and Beser         D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, Reed, and Beser         D898       Exhibit C8, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2065         D900       211 Request for Inter Partes Reexamination         D901       Exhibit C1, Claim Chart – USP 7,418,504 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser         D902       Exhibit C2, Claim Chart – USP 7,418,504 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D903       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Furthe	D894	Exhibit C3, Claim Chart – USP 7,921,211 R 920, Reed, and Beser	elative to Provino, Alone	e and in Conjunction with RFC	
D896       Exhibit C5, Claim Chart – USP 7,921,211 Relative to Provino in View of RFC 2504 and in Further         Conjunction with RFC 920, Reed and Beser         D897       Exhibit C6, Claim Chart – USP 7,921,211 Relative to Beser, Alone and in Conjunction with RFC         920, RFC 2401, and Reed         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2230, Alone and in Conjunction with RFC 920, Reed, and Beser         D898       Exhibit C7, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, Reed, and Beser         D899       Exhibit C8, Claim Chart – USP 7,921,211 Relative to RFC 2538, Alone and in Conjunction with RFC 920, RFC 2401, Reed, Beser, and RFC 2065         D900       211 Request for Inter Partes Reexamination         D901       Exhibit C1, Claim Chart – USP 7,418,504 Relative to Solana, Alone and in Conjunction with RFC 920, Reed and Beser         D902       Exhibit C2, Claim Chart – USP 7,418,504 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D903       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D904       Exhibit C5, Claim Chart – US	D895	Exhibit C4, Claim Chart – USP 7,921,211 R Conjunction with RFC 920, Reed and Bese	elative to Provino in Viev r	w of RFC 2230 and Further in	
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D901       Exhibit C1, Claim Chart – USP 7,418,504 Relative to Solana, Alone and in Conjunction with RFC         920, Reed and Beser         D902       Exhibit C2, Claim Chart – USP 7,418,504 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D903       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D905       Exhibit C6, USP 7,418,504 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed	D900	211 Request for Inter Partes Reexamination	٦		
D902       Exhibit C2, Claim Chart – USP 7,418,504 Relative to Solana in View of RFC 2504 and Further in Conjunction with RFC 920, Reed, and Beser         D903       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D905       Exhibit C6, USP 7,418,504 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed	D901	Exhibit C1, Claim Chart – USP 7,418,504 R 920, Reed and Beser	elative to Solana, Alone	and in Conjunction with RFC	
D903       Exhibit C3, Claim Chart – USP 7,418,504 Relative to Provino, Alone and in Conjunction with RFC 920, Reed, and Beser         D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D905       Exhibit C6, USP 7,418,504 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed	D902	Exhibit C2, Claim Chart – USP 7,418,504 R Conjunction with RFC 920, Reed, and Bese	elative to Solana in View er	of RFC 2504 and Further in	
D904       Exhibit C5, Claim Chart – USP 7,418,504 Relative to Provino in View of RFC 2504 and in Further Conjunction with RFC 920, Reed and Beser         D905       Exhibit C6, USP 7,418,504 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed	D903	Exhibit C3, Claim Chart – USP 7,418,504 R 920, Reed, and Beser	elative to Provino, Alone	and in Conjunction with RFC	
D905 Exhibit C6, USP 7,418,504 Relative to Beser, Alone and in Conjunction with RFC 920, RFC 2401, and Reed	D904	Exhibit C5, Claim Chart – USP 7,418,504 R Conjunction with RFC 920, Reed and Beser	elative to Provino in Viev	v of RFC 2504 and in Further	
	D905	Exhibit C6, USP 7,418,504 Relative to Bese and Reed	er, Alone and in Conjunct	tion with RFC 920, RFC 2401,	

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		Application Number	13/911,792
INFORM	ATION DISCLOSURE	Filing Date	06-06-2013
STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson
(Use as many	γ sheets as necessary)	Art I Init	2495
		Examinar Nama	Olaproviciu I Bucknor
		Docket Number	77580-196 (VRNK-0001CP3CNF19)
D906	Exhibit C7, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, and Beser	Relative to RFC 2230, Al	one and in Conjunction with
D907	Exhibit C8, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, Beser, and RF	Relative to RFC 2538, Al	one and in Conjunction with
D908	504 Request for Inter Partes Reexaminatio	n	
D909	Defendants' Supplemental Joint Invalidity C	Contentions	
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D916	Exhibit 232, Understanding OSF DCE 1.1 f	or AIX and OS/2 vs. Cla	ims of the '504 Patent
D917	Exhibit 233, Understanding OSF DCE 1.1 f	or AIX and OS/2 vs. Cla	ims of the '759 Patent
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D922	Exhibit 238, Gauntlet System vs. Claims o	f the '211 Patent	
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D938	Exhibit 254, U.S. Patent No.6,857,072 vs. 0	Claims of the '151 Paten	t
D939	Exhibit A, Aventail Press Release, May 2, 1	997	
D940	Exhibit B, InfoWorld, "Aventail Delivers High 64D, (1997)	hly Secure, Flexible VPN	I Solution," InfoWorld, page
D941	Exhibit C, Aventail AutoSOCKS v2.1 Admin	istrator's Guide	
D942	Exhibit D, Aventail Press Release, October	12, 1998	
D943	Exhibit G, Aventail Press Release, May 26,	1999	
D944	Exhibit H, Aventail Press Release, August S	9, 1999	
D945	Exhibit J, "Aventail ExtraNet Center 3.1: Se June 28, 1999	curity with Solid Manage	ement, Network Computing,
D946	Petition in Opposition to Patent Owner's Pe Determination on Certain Prior Art	tition to Vacate Inter Par	tes ReExamination
D <b>94</b> 7	Request for Inter Partes Reexamination Un	der 35 U.S.C. § 311	
D948	Exhibit B, Certificate of Service to Request	for Inter Partes Reexami	ination Under U.S.C. § 311
D949	Exhibit C1, Claim Chart Aventail Connect v	3.1	
D950	Exhibit C2, Claim Chart Aventail Connect v	3.01	

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		Application Number	13/911.792
<b>FORM</b>	ATION DISCLOSURE	Filing Date	06-06-2013
ГАТЕМІ	ENT BY APPLICANT	First Named Inventor	Victor Larson
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		Examinar Nama	
		Docket Number	77580-196 (VRNK-0001CP3CNF19)
D951	Exhibit C3, Claim Chart Aventail AutoSC	DCKS	
D952	Exhibit C4, Claim Chart Wang		
D953	Exhibit C5, Claim Chart Beser		
D954	Exhibit C6, Claim Chart BINGO		
D955	Exhibit X6, U.S. Patent 6,496,867		
D956	Exhibit X10, U.S. Patent 4,885,778		
D957	Exhibit X11, U.S. Patent 6,615,357		
D958	Exhibit Y3, U.S. Patent 5,950,519		
D959	Request for Inter Partes Reexamination	Transmittal Form	
D960	Transmittal Letter		
D961	Exhibit D, v3.1 Administrator's Guide		
D962	Exhibit E-1, Claim Charts Applying Kluc	hi to Various Claims of the '1	35 Patent
D963	Exhibit E-2, Claim Charts Applying Wes	inger to Various Claims of the	
D964	Exhibit E-3, Claim Charts Applying Sola	na to Various Claims of the	
D965	Exhibit E-4, Claim Charts Applying Aziz	Transmittel Form	
D966	Request for Inter Partes Reexamination	Transmittai Form	
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D968	Fubilit C1 Claim Chart Aventail Canna	ot v2 01	
D909	Exhibit C1, Claim Chart Avental Conner		
D970	Exhibit C2, Claim Chart RINGO		
	Exhibit C4, Claim Chart Beser		
D972	Exhibit C5, Claim Chart Wang		
D974	Transmittal Letter		
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D976	Exhibit B. Certificate of Service to Requ	est for Inter Partes Reexamir	nation Under 35 U.S.C. § 311
D977	Exhibit E-1, Claim Charts Applying Kiuc	hi, and Kiuchi and Martin to C	Claims of the '151 Patent
D978	Exhibit E-2, Claim Charts Applying Wes	inger, and Wesinger and Mai	rtin to Claims of the '151 Patent
D979	Exhibit E-3, Claim Charts Applying Blum	to Claims of the '151 Patent	
D980	Exhibit E-4, Claim Charts Applying Aziz the '151 Patent	and Edwards, and Aziz, Edw	vards, and Martin to Claims of
D981	Exhibit E-5, Claim Charts Applying Kiuc of the '151 Patent	hi and Edwards, and Kiuchi, I	Edwards, and Martin to Claims
D982	Exhibit E-6, Claim Charts Applying Wes Claims of the '151 Patent	inger and Edwards, and Wes	inger, Edwards, and Martin to
D983	Exhibit A, U.S. Patent 6,839,759		
D984	Exhibit C-1, U.S. Patent 6,502,135		
D985	Exhibit E-1, Claim Charts Applying Kiuc	hi, as Primary Reference to the	he '759 Patent
D986	Exhibit E-2, Claim Charts Applying Kent	as a Primary Reference to th	1759 Patent
D987	Exhibit E-3, Claim Charts Applying Aziz	as a Primary Reference to th	e 759 Patent
D988	Exhibit E-4, Claim Charts Applying Kent References to the '759 Patent	In View of Caronni as a Prim	
D989	Request for Inter Partes Reexamination	I ransmittal Form	
D990	Request for Inter Partes Reexamination		
D991	PTU Form 1449	- Dankas Drammania - 12 - 14 - 1	
D992	Centricate of Service to Request for Inte	r Partes Reexamination Und	er 55 U.S.U. § 311
D004	Request for inter Partes Reexamination	Transmittal Form	
D994	Request for inter Partes Reexamination	Tanshillar FUHH	
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EXCEPT WHERE LINED THROUGH. /K.L./ Petitioner Apple Inc. - Ex. 1004, p. 274

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		Application Number	13/911,792	
	ATION DISCLOSURE	Filing Date	06-06-2013	
		First Named Inventor	Victor Larson	
as many	sneets as necessary	Art Unit	2495	
		Examiner Name	Olanrewaju J. Bucknor	
		Docket Number	77580-196 (VRNK-0001CP3CNFT9)	
D997	Exhibit C1 Claim Chart – USP 7.921.21	1 Relative to Solana, Alone	and in Conjunction with REC	
5000	920, Reed and Beser			
D998	Exhibit C2, Claim Chart – USP 7,921,21 conjunction with RFC 920, Reed, and Be	1 Relative to Solana in view eser	of RFC 2504 and Further in	
D999	Exhibit C3, Claim Chart – USP 7,921,21 920, Reed, and Beser	1 Relative to Provino, Alone	and in Conjunction with RFC	
D1000	Exhibit C4, Claim Chart – USP 7,921,21 Conjunction with RFC 920, Reed and Be	1 Relative to Provino in viev eser	v of RFC 2230 and Further in	
D1001	Exhibit C5, Claim Chart – USP 7,921,21 Conjunction with RFC 920, Reed and Be	1 Relative to Provino in viev eser	v of RFC 2504 and in Further	
D1002	Exhibit C6, Claim Chart – USP 7,921,21 920, RFC 2401, and Reed	1 Relative to Beser, Alone a	ind in Conjunction with RFC	
D1003	Exhibit C7, Claim Chart – USP 7,921.21	1 Relative to RFC 2230, Alc	one and in Conjunction with	
	RFC 920, RFC 2401, Reed, and Beser		-	
D1004	Exhibit C8, Claim Chart – USP 7,921,21 RFC 920, RFC 2401, Reed, Beser, and	1 Relative to RFC 2538, Alc RFC 2065	one and in Conjunction with	
D1005	Exhibit D1, Asserted Claim and Infringer	nent Contentions by Plaintif	f VirnetX, Inc. in VimetX, Inc. v.	
	Cisco Systems, Inc., Apple Inc., Aastra America and Aastra USA, Inc., Civ. Act 6	Technologies Ltd, NEC Corr 3:2010cv00417 (E.D. Tex)	poration, NEC Corporation of	
D1006	Exhibit D2, Asserted Claims and Infringe based on 7,921,211 Patent	ement Contentions by Plaint	iff VirnetX, Inc. against Apple	
D1007	Exhibit B1, File History of U.S. Patent 7,4	418,504		
D1008	Exhibit B2, File History of U.S. Patent Ap	oplication No. 09/558,210		
D1009	Exhibit D-10, Gaspoz et al., "VPN on DC Bringing Telecommunication Services to Intelligence in Broadband Services and I Computer Science, Vol. 998 (Springer, 1	E: From Reference Configu the People – IS&N '95, Thi Networks, October 1995 Pro 995)	ration to Implementation," rd International Conference on oceedings, Lecture Notes in	
D1010	Exhibit D-11, Copy of U.S. Patent No. 6,	269,099		
D1011	Exhibit D-11, Copy of U.S. Patent No. 6,	560,634		
D1012	Exhibit D-13, Pallen, "The World Wide W	/eb," British Medical Journal	, Vol. 311 at 1554 (Dec. 1995)	
D1013	Exhibit D-14, Rivest et al., "A Method for Cryptosystems," Communications of the	Obtaining Digital Signature ACM, 21:120-126 (Feb. 197	s and Public-Key 78)	
D1014	Exhibit D-15, Copy of U.S. Patent No. 4,	952,930		
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D1018	Exhibit D-9, Lawton, "New Top-Level Do 1996	mains Promise Descriptive I	Names," Sunworld Online,	
D1019	Exhibit E-1, Copy of Catalog Listing by IE to the <i>Lendenmann</i> reference. The link t on December 7, 1998 and retrieved by the	BM for RS/6000 Redbooks C to the <i>Lendenmann</i> referenc te Wayback Machine	Collection which includes a Link e was archived at archive.org	
D1020	Exhibit E-10, copy of an Archived Version February 19, 1999 and retrieved by the V	n of the Lawton reference ar Vayback Machine	chived at archive.org on	
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D1023	Exhibit E-13, Copy of Search Results for www.isbnsearch.org	ISBN 0-12-553153-2 (Pfaffe	enberger) from	
D1024	Exhibit F-1, Claim Charts applying Lende	enmann as a Primary Refere	nce to the '504 Patent.	
D1025	Exhibit F-2, Claim Charts applying Aziz a	is a Primary Reference to th	e '504 Patent	
	ALL REFERENCES CON	SHAFREDEXCEI	PT WHERE LINED THROUGH	

NFORMAT STATEMEN Use as many sh D1026 E P D1027 E 1 D1028 E 1 D1029 E P D1030 E M D1031 E C a D1032 E	FION DISCLOSURE         NT BY APPLICANT         heets as necessary)         Exhibit F-3, Claim Charts applying Kiuchi a         Patent         Exhibit E-2, First Page of U.S. Patent No. 5         he Lendenmann reference as a prior art refexhibit E-3, Request for Comments 2026, "         1996         Exhibit E-4, First Page of U.S. 5,463,735, p         prior art Reference         Exhibit E-5, Copy of catalog listing from Bo         Martin reference with an issue date of Febr         Exhibit E-6, Copy of Technical Reports Arc         Department which includes a link to the Ma         archive.org on January 22, 1998 and Retried         Exhibit E-7, Boston University Computer Sc         Exhibit E-8, U. Möller, "Implementation eine         Diplomarbeit, Universität Hamburg (July 16         Exhibit E-9, First page of U.S. 5,737,423, p	Application Number Filing Date First Named Inventor Art Unit Examiner Name Docket Number nd Pfaffenberger as Prin 5,913,217 published June ference 'The Internet Standards I bublished October 31, 19 ston University Digital Co ruary 21, 1998 hive Listing from Boston artin paper. The link to the eved by the Wayback Mac cience Department Tech orts/INSTRUCTIONS es Anonymisierungsverfa 5, 1999), citing to Martin a	13/911,792         06-06-2013         Victor Larson         2495         Olanrewaju J. Bucknor         77580-196 (VRNK-0001CP3CN         nary References to the '504         e 15, 1999 and citing a portion of         Process – Revision 3," October         95 and citing RFC 793 as a         common Website, listing the         University Computer Science         Nartin paper was archived at         achine         nical Reports Instructions,         ahrens für WWW-Zugriffe,"	(FT9)
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D1032 E	Exhibit E-7, Boston University Computer So available at: http://www.cs.bu.edu/techrepo Exhibit E-8, U. Möller, "Implementation eine Diplomarbeit, Universität Hamburg (July 16 Exhibit E-9, First page of U.S. 5,737,423, p	cience Department Tech orts/INSTRUCTIONS es Anonymisierungsverfa 5, 1999), citing to Martin a	nical Reports Instructions, ahrens für WWW-Zugriffe,"	
	Exhibit E-8, U. Möller, "Implementation eine Diplomarbeit, Universität Hamburg (July 16 Exhibit E-9, First page of U.S. 5,737,423, p	es Anonymisierungsverfa 5, 1999), citing to Martin a	ahrens für WWW-Zugriffe,"	
D1033 E	Exhibit E-9, First page of U.S. 5,737,423, p		at page 77.	
D1034 E	Velerence	ublished April 7, 1998 ar	nd citing Schneier as Prior Art	
D1035 F	Request for Inter Partes ReExamination; U	.S. Patent 7,418,504		
D1036 R	Request for Inter Partes ReExamination Tr	ansmittal Form; U.S. Pat	ent 7,418,504	
D1037 P	PTO Form 1449			
D1038 E	Exhibit C1, Claim Chart – USP 7,921,211 ru 20, Reed and Beser	elative to Solana, alone a	and in conjunction with RFC	
D1039 E	Exhibit C2, Claim Chart – USP 7,921,211 reconjunction with RFC 920, Reed, and Bese	elative to Solana in view er	of RFC 2504 and further in	
D1040 E	Exhibit C3, Claim Chart – USP 7,921,211 ru 20, Reed, and Beser	elative to Provino, alone	and in conjunction with RFC	
D1041 E	Exhibit C4, Claim Chart – USP 7,921,211 re conjunction with RFC 920, Reed and Beser	elative to Provino in view r	of RFC 2230 and further in	
D1042 E	Exhibit C5, Claim Chart – USP 7,921,211 re conjunction with RFC 920, Reed and Beser	elative to Provino in view r	of RFC 2504 and in further	
D1043 E	Exhibit C6, Claim Chart – USP 7,921,211re RFC 2401, and Reed	elative to Beser, Alone ar	nd in conjunction with RFC 920,	
D1044 E	Exhibit C7, Claim Chart – USP 7,921,211 ro 2401, Reed, and Beser	elative to RFC 2230, alor	ne and in conjunction with RFC	
D1045 E 9	Exhibit C8, Claim Chart – USP 7,921,211 r 20, RFC 2401, Reed, Beser, and RFC 206	elative to RFC 2538, alor 65	ne and in conjunction with RFC	
D1046 R	Request for Inter Partes Reexamination un	der 35 U.S.C. § 311		
D1047 E	Exhibit C1, Claim Chart – USP 7,418,504 m 20, Reed and Beser	elative to Solana, alone a	and in conjunction with RFC	
D1048 E	Exhibit C2, Claim Chart – USP 7,418,504 re conjunction with RFC 920, Reed, and Bese	elative to Solana in view er	of RFC 2504 and further in	
D1049 E	Exhibit C3, Claim Chart – USP 7,418,504 ro 20, Reed, and Beser	elative to Provino, alone	and in conjunction with RFC	
D1050 E	Exhibit C5, Claim Chart – USP 7,418,504 re conjunction with RFC 920, Reed and Beser	elative to Provino in view	of RFC 2504 and in further	
D1051 E	Exhibit C6, USP 7,418,504 relative to Bese and Reed	r, alone and in conjunction	on with RFC 920, RFC 2401,	
D1052 E	Exhibit C7, Claim Chart – USP 7,418,504 ro 20, RFC 2401, Reed, and Beser	elative to RFC 2230, alor	ne and in conjunction with RFC	
D1053 E	Exhibit C8, Claim Chart – USP 7,418,504 r 220, RFC 2401, Reed, Beser, and RFC 206	elative to RFC 2538, alor 65	ne and in conjunction with RFC	
D1054 R	Request for Inter Partes Reexamination un	der 35 U.S.C. § 311		

Subst. for form 1449/PTO		Complete if Known		
	Application Number	Application Number 13/911,792		
INFORMATION DISCLOSURE	Filing Date	06-06-2013		
STATEMENT BY APPLICANT	First Named Inventor	Victor Larson		
(Use as many sheets as necessary)	Art Unit	240E		
	Art Onit	2455		
	Examiner Name	Olanrewaju J. Buc	knor	
	Docket Number	77580-196 (VRNK-0001C	P3CNFT9)	
D1055 Exhibit 226. Securina Web Access w	vith DCE vs. Claims of the '135	Patent		
D1056 Exhibit 227, Securing Web Access w	vith DCE vs. Claims of the '151	Patent		
D1057 Exhibit 228, Understanding OSF DC	E 1.1 for AIX and OS/2 vs. Cla	ims of the '135 Patent		
D1058 Exhibit 229 Understanding OSF DC	E 1.1 for AIX and OS/2 vs. Cla	ims of the '151 Patent		
D1059 Exhibit 230, Understanding OSF DC	E 1.1 for AIX and OS/2 vs. Cla	ims of the '180 Patent		
D1060 Exhibit 231 Understanding OSF DC	E 1.1 for AIX and OS/2 vs. Cla	ims of the '211 Patent		
D1061 Exhibit 232 Understanding OSE DC	E 1 1 for AIX and OS/2 vs. Cla	ims of the '504 Patent		
D1062 Exhibit 233 Understanding OSE DC	E 1 1 for AIX and OS/2 vs. Cla	ims of the '759 Patent		
D1063 Exhibit 234 U.S. 648 vs. Claims of t	he '135 Patent			
D1064 Exhibit 235 U.S. 648 vs. Claims of t	he '211 Patent			
D1065 Evhibit 236 U.S. 648 vs. Claims of t	he '504 Patent			
D1066 Exhibit 237 11 S 1072 vs. Claims of t	he '135 Patent			
D1067 Exhibit 229 Gauntlet System vs. Cl	aims of the '211 Patent			
D1068 Exhibit 230 Gauntlet System vs. Cl	aims of the '504 Patent			
D1000 Exhibit 240 Counter System VS. Cla	aims of the '135 Detont		<u> </u>	
D1009 Exhibit 240, Gauntier System VS. Cl	the '211 Datent		<u> </u>	
D1070 Exhibit 241, U.S. 588 VS. Claims of	the '504 Detent			
D10/1 Exhibit 242, U.S. 588 Vs. Claims of	ine 504 Patent			
D10/2 Exhibit 243, Microsoft VPN VS. Claim	ns of the 135 Patent			
D1073 Exhibit 244, Microsoft VPN Vs. Clain	ns of the 211 Patent			
D1074 Exhibit 245, Microsoft VPN vs. Clain	ns of the 504 Patent	Detest		
D1075 Exhibit 246, ITU-1 Standardization A	Activities vs. Claims of the 135	Patent		
D1076 Exhibit 247, U.S. '393 vs. Claims of t	he 135 Patent			
D1077 Exhibit 248, The Miller Application vs	s. Claim 13 of the 135 Patent			
D1078 Exhibit 249, Gauntlet System vs. Cla	aims of the 151 Patent			
D1079 Exhibit 250, ITU-T Standardization A	Activities vs. Claims of the 151	Patent		
D1080 Exhibit 251, U.S. Patent No. 5,940,3	93 vs. Claims of the 151 Pate	nt		
D1081 Exhibit 252, Microsoft VPN vs. Clain	ns of the '151 Patent			
D1082 Exhibit 253, U.S. Patent No.6,324,64	48 vs. Claims of the '151 Pater	it		
D1083 Exhibit 254, U.S. Patent No.6,857,07	72 vs. Claims of the '151 Pater			
D1084 Petition in Opposition to Patent Own	er's Petition to Vacate Inter Pa	rtes Reexamination		
D1085 Petition in Opposition to Patent Own	er's Petition to Vacate Inter Pa	rtes Reexamination		
D1086 Petition in Opposition to Patent Own	er's Petition to Vacate Inter Pa	rtes Reexamination		
D1087 Exhibit B1, File History of U.S. Pater	nt 7,921,211			
D1088 Exhibit B2, File History of U.S. Pater	t Application No. 10/714,849			
D1089 Exhibit B4, VimetX, Inc. v. Microsoft	<i>Corp.</i> , Case No. 6:07-cv-80, M	emorandum Opinion on Claim		
Construction (E.D. Tex. Jul. 30, 2009	J)			
D1090 Exhibit D15, U.S. Patent 4,952,930				
D1091 Exhibit F1, Claim Charts Applying Le	endenmann as a Primary Refer	ence to the '211 Patent		
D1092 Exhibit F2, Claim Charts Applying Az	ziz as a Primary Reference to the	ne '211 Patent		
D1093 Exhibit F3, Claim Charts Applying Ki	uchi and Pfaffenberger as Prim	ary References to the '211		
Patent				
D1094 Exhibit 2, Letter and attachment from Counsel for Cisco Systems (June 23	n Ramzi Khazen, Counsel for V , 2011)	irnetX, to Dmitriy Kheyfits,		
D1095 Exhibit P, Malkin, "Dial-In Virtual Priv	vate Networks Using Layer 3 Tu	unneling"		
D1096 Exhibit Q, Ortiz, "Virtual Private Netw	vorks: Leveraging the Internet"			
D1097 Exhibit R, Keromytix, "Creating Effici	ent Fail-Stop Cryptographic Pre	otocols"		
D1098 Transcript of Markman Hearing Date	d January 5, 2012			
D1099 Declaration of John P. J. Kellv. Ph.D				
D1100 Defendants' Responsive Claim Cons	struction Brief; Exhibits A-P and	d 1-7		
D1101 Joint Claim Construction and Prehea	aring Statement Dated 11/08/11			
ALL REFERENCES CO	ONSIDEBEREXCE	PT WHERE I INED TI	HROUGH /K	

Petitioner Apple Inc. - Ex. 1004, p. 277

t. for form	1449/PTO		Complete if Known
		Application Number	13/911,792
	TION DISCLOSURE	Filing Date	06-06-2013
ATEME		First Named Inventor	Victor Larson
as many	sneets as necessary)	Art Unit	2495
		Examiner Name	Olanrewaju J. Bucknor
		Docket Number	77580-196 (VRNK-0001CP3CNFT
D1102	Exhibit A: Agreed Upon Terms Dated 11/0		
D1103	Exhibit B: Disputed Claim Terms Dated 11	/08/11	
D1104	Exhibit C: VirnetX's Proposed Construction 11/08/11	n of Claim Terms and Sup	porting Evidence Dated
D1105	Exhibit D: Defendant's Intrinsic and Extrins	sic Support Dated 11/08/1	1
D1106	Declaration of Austin Curry in Support of V	/irnetX Inc.'s Opening Clai	m Construction Brief
D1107	Declaration of Mark T. Jones Opening Cla	ims Construction Brief	
D1108	VirnetX Opening Claim Construction Brief		
D1109	VirnetX Reply Claim Construction Brief	-	
D1110	European Search Report from correspond 0142)	ing EP Application Numbe	er 11005789 (Our Ref.: 077580-
D1111	European Search Report from correspond 0143)	ing EP Application Numbe	r 11005792 (Our Ref.: 077580-
D1112	IIU-I Recommendation H.323, "Infrastruc Equipment for Audiovisual Services. Pack International Telecommunications Union, p	ture of Audiovisual Service et-Based Multimedia Com pages 1-128, February 199	es – Systems and Terminal Imunications System," 98
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		Art Unit	2495
		Docket Number	77580-196 (VRNK-0001CP3CNET9
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D1133	Exhibit 118A, Altiga VPN System vs. Clain	ns of the 135 Patent	
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D1167 Exhibit 9, The Schulzrinne I	Presentation ¹ vs. Claims of the '211 Pa	itent		
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D1176 Exhibit 18. Kiuchi ¹ vs. Claim	s of the '135 Patent			
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D1182 Exhibit 24 U.S. Patent No	5 119 234 (hereinafter "Aziz") and RF(	C 2401 ² vs. Claims of the '135		
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D1183 Exhibit 25, U.S. Patent No. Patent	3,119,234 (hereinafter "Aziz") and RFC	C 2401 ² vs. Claims of the '504		
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D1202 Exhibit B-1 Kiuchi ¹ vs. Claims of the '211	Patent ²							
D1203 Exhibit C-1 Kiuchi ¹ vs. Claims of the '504	Patent ²							
D1204 Exhibit D Materials Considered	while D Materials Considered							
D1205 Exhibit E Expert Report of Study C Study	alahina PhD							
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/Krisna Lim/

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INFORMATION DISCLOSURE	Filing Date	06-06-2013				
STATEMENT BY APPLICANT	First Named Inventor	Victor Larson				
(Use as many sheets as necessary)	Art Unit	2495				
	Examiner Name	Olanrewaju J. Bucknor				
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## **CERTIFICATION STATEMENT**

[X] Under 37 C.F.R. 1.98(d), copies of all patent, publication, pending U.S. application or other information that was previously submitted to, or cited by the USPTO in co-pending application No. 13/336,790 and are not required. Applicant will provide copies of the previously submitted references at the Examiner's request.

This application claims priority from U.S. Application No. 13/903,788, filed May 28, 2013, which claims priority from and is a continuation of co-pending U.S. Application No. 13/336,790, filed December 23, 2011, now U.S. Patent No. 8,458,341, which claims priority from and is a continuation of co-pending U.S. Application No. 13/049,552, filed March 16, 2011, which is a continuation of U.S. Application No. 11/840,560, filed August 17, 2007, now U.S. Patent No. 7,921,211, which is a continuation of U.S. Application No. 10/714,849, filed November 18, 2003, now U.S. Patent No. 7,418,504, which is a continuation of U.S. Application No. 09/558,210, filed April 26, 2000, now abandoned, which is a continuation-in-part of U.S. Application No. 09/504,783, filed on February 15, 2000, now U.S. Patent No. 6,502,135, issued December 31, 2002, which claims priority from and is a continuation-in-part patent application of previously-filed U.S. Application No. 09/429,643, filed on October 29, 1999, now U.S. Patent No. 7,010,604, issued March 07, 2006.

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

- [X] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
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- [] The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$180.00, or further fees which may be due, to Deposit Account 50-1133.
- [] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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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Toby H. Kusmer;Reg. No.:26,418 McDermott Will & Emery L.L.P. 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

Date: 7/31/13

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		RUL	E									
APPLICANTS VIRNETX, INC., Zephyr Cove, NV, Assignee (with 37 CFR 1.172 Interest); Victor Larson, Fairfax, VA; Robert Dunham Short III, Lexington, VA; Edmund Colby Munger, Tarpon Springs, FL; Michael Williamson, South Riding, VA;												
This application is a CON of 13/903,788 05/28/2013 which is a CON of 13/336,790 12/23/2011 PAT 8458341 which is a CON of 13/049,552 03/16/2011 which is a CON of 11/840,560 08/17/2007 PAT 7921211 which 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												
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EXAMINER 'S INITIALS	CITE NO.	Include name of the author (book, magazine, journal, se city and/or country where pu	(in CAPITAL LE erial, symposiun ublished.	n, c	ERS), title of the article (w atalog, etc.), date, page(s	vhen appropriate s), volume-issue	), title of number(s	the item s), publisher,	
	D1413	Notice of Allowance date 13/474,397	ed August 9, 20	013	3 from Corresponding l	J.S. Applicatio	n Numbe	er	
	D1414	Office Action dated Augu	ist 19, 2013 fro	om	Corresponding U.S. A	pplication Num	nber 13/9	903,788	
		EXAMINER			I	DATE CONSIE	ERED		

*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.

Complete if Known		
Application Number	13/911,792	
Filing Date	06-06-2013	
First Named Inventor	Victor Larson	
Art Unit	2453	
Examiner Name	Krisna Lim	
Docket Number	77580-196 (VRNK1CP3CNFT10)	
	Application Number Filing Date First Named Inventor Art Unit Examiner Name Docket Number	

#### CERTIFICATION STATEMENT

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

- [] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
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- [X] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is hereby authorized to charge any required fees to Deposit Account 50-1133.
- [] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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.

Date: September 27, 2013

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 45367118-1.077580.0196

Electronic Acknowledgement Receipt				
EFS ID:	16974554			
Application Number:	13911792			
International Application Number:				
Confirmation Number:	7953			
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES			
First Named Inventor/Applicant Name:	Victor Larson			
Customer Number:	23630			
Filer:	Toby H. Kusmer./Kerrie Jones			
Filer Authorized By:	Toby H. Kusmer.			
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)			
Receipt Date:	27-SEP-2013			
Filing Date:	06-JUN-2013			
Time Stamp:	12:54:49			
Application Type:	Utility under 35 USC 111(a)			

# Payment information:

Submitted with Payment no			no			
File Listing:						
Document Number	Document Description		File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS)	:losure Statement (IDS)	196IDS.pdf	121217	no	2
	Form (SB08)			ef514dd52786223ec193c582f8460e2277d d7559		
Warnings:						
Information:						

This is not an U		ang	itted, the pages will be resi				
	SPTO supplied IDS fillable form						
2	Non Patent Literature	NOA892from164.pdf	409716	20	9		
-			2f3206bdf597c1747caacec3dcf4ed31ba6f8 2f0				
Warnings:							
Information:		I					
3	Non Patent Literature	OAdated81913from195.pdf	893586	no	24		
			f952b4a4d2fc2493749c6ceffc35d9a8db3a d1a2				
Warnings:							
Information:							
		Total Files Size (in bytes)	142	4519			
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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.							
New Internat If a new inter an internatio and of the Int national secu the applicatio	ional Application Filed with the Unational application is being filed national application is being filed nal filing date (see PCT Article 11 a ternational Filing Date (Form PCT/ prity, and the date shown on this A on.	SPTO as a Receiving Office and the international applicat and MPEP 1810), a Notificatior (RO/105) will be issued in due o cknowledgement Receipt will	ion includes the neces of the International A ourse, subject to prese establish the internati	e course. sary comp pplication criptions co onal filing	onents for Number oncerning date of		

Subst. for fo	ubst. for form 1449/PTO			Complete if Known						
INCODM				Ap	pplication Number	13/911,79		1,792		
APPLICA	NT	SCLOSURE STATEM		Fi	Filing Date		06-06-2013			
(Use as ma	ny sheets a	s necessary)		Fi	rst Named Inventor	Victor Larson 2453				
				Ar	rt Unit					
				E>	xaminer Name			Krisr	na Lim	
				D	ocket Number		77580-19	6 (VRN	IK1CP3CI	VFT10)
			U.S	5. PA	ATENTS					
EXAMINER' S INITIALS	CITE NO.	Patent Number	Publication Da	ite	Name of Patentee o Cited Docu	or Appl iment	licant of	Page Relev	s, Columns, Li ant Passages Figures App	nes, Where or Relevant æar
	A172	6,011,579	01/04/2000	0	Newlir	in		İ		
	A173	8,504,696	08/06/2013	3	Larson e	t al.				
	A174	8,504,697	08/06/2013	3	Larson et	t al.				
	A175	6,335,966	01/01/200	2	Toyoda	la				
	A176	6,195,677	02/27/200	1	Utsum	ni				
	A177	6,959,184	10/25/200	5	Byers et	Byers et al.				
		U.S.	PATENT APPI	LIC	ATION PUBLICATI	IONS	5			
EXAMINER' S INITIALS	CITE NO.	Patent Number	Publication Da	Date Name of Patentee or Applicant of Pages, Columns, Cited Document Figures A		s, Columns, Lii ant Passages Figures App	nes, Where or Relevant ear			
			FOREIGN PA	TE	NT DOCUMENTS					
EXAMINER' S INITIALS	CITE NO.	Foreign Patent Document Country Codes-Number 4-Kind Codes (if known)	Publication Dat	Date Name of Patentee or Applicant of Cited Document Pages, Columns, Lines Where Relevant Figures Appear		Translation				
									Yes	No
		OTHER ART (In	cluding Autho	or, ⁻	Title, Date, Pertine	ent P	ages, Et	c.)		
EXAMINER 'S INITIALS	AMINER         Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item           NITIALS         CITE NO.         Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item           VITIALS         CITE NO.         Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item           VITIALS         CITE NO.         Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item           vitial content 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.									
	D1415	Office Action dated Oc 13/911,813 (077580-0	tober 1, 2013 fro 197)	om (	Corresponding U.S. F	aten	t Applicatio	on Numl	ber	
EXAMINER						DAT	ECONSIE	DERED		

*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.

Complete if Known		
Application Number	13/911,792	
Filing Date	06-06-2013	
First Named Inventor	Victor Larson	
Art Unit	2453	
Examiner Name	Krisna Lim	
Docket Number	77580-196 (VRNK1CP3CNFT10)	
	Application Number Filing Date First Named Inventor Art Unit Examiner Name Docket Number	

#### CERTIFICATION STATEMENT

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

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- [X] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is hereby authorized to charge any required fees to Deposit Account 50-1133.
- [] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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.

Date: October 1, 2013

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 45428473-1.077580.0196

Electronic Acknowledgement Receipt				
EFS ID:	17016322			
Application Number:	13911792			
International Application Number:				
Confirmation Number:	7953			
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES			
First Named Inventor/Applicant Name:	Victor Larson			
Customer Number:	23630			
Filer:	Toby H. Kusmer./Kerrie Jones Kejones@mwe.com			
Filer Authorized By:	Toby H. Kusmer.			
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)			
Receipt Date:	02-OCT-2013			
Filing Date:	06-JUN-2013			
Time Stamp:	14:49:53			
Application Type:	Utility under 35 USC 111(a)			

# Payment information:

Submitted with Payment no			no					
File Listing:								
Document Number	Document Description		File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)		
1	Information Disclosure Statement (IDS) Form (SB08)		196.pdf	119073 c8768e9a6a2d0fb5471e6e1074d3d3ffc18c ac96	no	2		
Warnings:								
Information:								

	n the PDF is too large. The pages should pper and may affect subsequent process	be 8.5 x 11 or A4. If this PDF is submi ing	tted, the pages will be resi:	zed upon er	ntry into the	
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2	Non Patent Literature	197 officesction dtd 100113 pdf	541010	no	14	
2	Nonrachtenerature	157 officeactionata root r5.par	f580579d465e664f5d124fc7b816db70a54a 33e6	110	17	
Warnings:						
Information						
		Total Files Size (in bytes)	. 660	083		
<u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u>						
1.53(b)-(d) a Acknowledg	ication is being filed and the appli nd MPEP 506), a Filing Receipt (37 ement Receipt will establish the fi ge of an International Application	cation includes the necessary c CFR 1.54) will be issued in due ling date of the application. <u>under 35 U.S.C. 371</u>	components for a filing course and the date sh	) date (see own on th	37 CFR is	

United Stat	ies Patent and Tradem	ARK OFFICE UNITED STA United State Address: COMMI PC Box Alexandr www.uspi	TES DEPARTMENT OF COMMERCE s Patent and Trademark Office (SSIONER FOR PATENTS ia, Virginia 22313-1450 logov
APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/911,792	06/06/2013	Victor Larson	77580- 196(VRNK1CP3CNFT10) CONFIRMATION NO. 7953
23630 McDermott Will & Emery The McDermott Building 500 North Capitol Street, N	.W.		

**Title:**SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

Publication No.US-2013-0268683-A1 Publication Date:10/10/2013

Washington, DC 20001

# NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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

page 1 of 1

Subst. for form 1449/PTO				Complete if Known					
INFORMA	INFORMATION DISCLOSURE STATEMENT BY			1	Application Number		13/91	1,792	
APPLICA	APPLICANT				Filing Date	06-06-2013			
(Use as many sheets as necessary)				First Named Inventor V		Victor	Victor Larson		
				7	Art Unit 2453				
					Examiner Name		Krisn	a Lim	<u></u>
[				1	Docket Number	77580-196 (VRNK1CP3CNFT10)			IFT10)
			Ľ	J.S. I	PATENTS				
EXAMINER' CITE NO. Patent Number Pub S INITIALS		Publication	n Date	Name of Patentee or Applicant of Cited Document		Pages, Columns, Lines, Wr Relevant Passages or Rele Figures Appear		nes, Where or Relevant ear	
	A178	6,058,250	05/02/2	000	Harwood	et al.	†		
	1	L	I.S. PATENT AF	PLI	CATION PUBLICAT	IONS	L		
EXAMINER' CITE NO. Patent Number S INITIALS		Publication	n Date	Name of Patentee or Applicant of Cited Document		Pages, Columns, Lines, Wr Relevant Passages or Rele Figures Appear		nes, Where or Relevant ear	
			FOREIGN	ΡΑΤ	ENT DOCUMENTS				
EXAMINER' Foreign Patent Document Publication S INITIALS CITE NO. Country Codes -Number 4 -Kind Codes (if known)		ment Publication ₄∝Kind	Date	Name of Patentee or Applicant of Cited Docume	Pages, Columns, Line ent Where Relevant Figures Appear		s Translation		
								Yes	No
	<u> </u>								
		OTHER ART	「(Including Au	thor	r, Title, Date, Pertine	ent Pages, El	t <b>c</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.									
	D1416 Office Action dated October 10, 2013 from Corresponding U.S. Patent Application Number 13/950,877 (077580-0198)								
EXAMINER					DATE CONSIDERED				

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO	Complete if Known			
INFORMATION DISCLOSURE STATEMENT BY	Application Number	13/911,792		
APPLICANT	Filing Date	06-06-2013		
(Use as many sheets as necessary)	First Named Inventor	Victor Larson		
	Art Unit	2453		
	Examiner Name	Krisna Lim		
	Docket Number	77580-196 (VRNK1CP3CNFT10)		
AFATIFI	OATION OTATEMENT			

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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.

Date: October 10, 2013

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 45878214-1.077580.0196

Subst. for form 1449/PTO				Complete if Known					
INFORMA	INFORMATION DISCLOSURE STATEMENT BY			1	Application Number		13/91	1,792	
APPLICA	APPLICANT				Filing Date	06-06-2013			
(Use as many sheets as necessary)				First Named Inventor V		Victor	Victor Larson		
				7	Art Unit 2453				
					Examiner Name		Krisn	a Lim	<u></u>
[				1	Docket Number	77580-196 (VRNK1CP3CNFT10)			IFT10)
			Ľ	J.S. I	PATENTS				
EXAMINER' CITE NO. Patent Number Pub S INITIALS		Publication	n Date	Name of Patentee or Applicant of Cited Document		Pages, Columns, Lines, Wr Relevant Passages or Rele Figures Appear		nes, Where or Relevant ear	
	A178	6,058,250	05/02/2	000	Harwood	et al.	†		
	1	L	I.S. PATENT AF	PLI	CATION PUBLICAT	IONS	L		
EXAMINER' CITE NO. Patent Number S INITIALS		Publication	n Date	Name of Patentee or Applicant of Cited Document		Pages, Columns, Lines, Wr Relevant Passages or Rele Figures Appear		nes, Where or Relevant ear	
			FOREIGN	ΡΑΤ	ENT DOCUMENTS				
EXAMINER' Foreign Patent Document Publication S INITIALS CITE NO. Country Codes -Number 4 -Kind Codes (if known)		ment Publication ₄∝Kind	Date	Name of Patentee or Applicant of Cited Docume	Pages, Columns, Line ent Where Relevant Figures Appear		s Translation		
								Yes	No
	<u> </u>								
		OTHER ART	「(Including Au	thor	r, Title, Date, Pertine	ent Pages, El	t <b>c</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.									
	D1416 Office Action dated October 10, 2013 from Corresponding U.S. Patent Application Number 13/950,877 (077580-0198)								
EXAMINER					DATE CONSIDERED				

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO	Complete if Known			
INFORMATION DISCLOSURE STATEMENT BY	Application Number	13/911,792		
APPLICANT	Filing Date	06-06-2013		
(Use as many sheets as necessary)	First Named Inventor	Victor Larson		
	Art Unit	2453		
	Examiner Name	Krisna Lim		
	Docket Number	77580-196 (VRNK1CP3CNFT10)		
AFATIFI	OATION OTATEMENT			

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Date: October 10, 2013

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 45878214-1.077580.0196

Electronic Acknowledgement Receipt					
EFS ID:	17125176				
Application Number:	13911792				
International Application Number:					
Confirmation Number:	7953				
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES				
First Named Inventor/Applicant Name:	Victor Larson				
Customer Number:	23630				
Filer:	Toby H. Kusmer./Kerrie Jones				
Filer Authorized By:	Toby H. Kusmer.				
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)				
Receipt Date:	15-OCT-2013				
Filing Date:	06-JUN-2013				
Time Stamp:	14:32:11				
Application Type:	Utility under 35 USC 111(a)				

# Payment information:

Submitted with Payment			no				
File Listing:							
Document Number	Document Description		File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)	
1	Information Disclosure Statement (IDS) Form (SB08)		196.pdf	107872 5811bc15201ba473f090fbd6dbb7a25eda2 7ec99	no	2	
Warnings:							
Information:							

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								
This is not an USPTO supplied IDS fillable form								
2	Non Patent Literature	OAdtd101013from198 pdf	786611	no	22			
2	Nonracine Enclatare		d56153c9d55e745fc982c7e8ebe2743382f4 7380	110				
Warnings:								
Information:								
		Total Files Size (in bytes)	89	94483				
Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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.								
If a new internation an internation and of the In national second the application	<u>New International Application Filed with the USPTO as a Receiving Office</u> 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							

### IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Victor Larson, et al.	:	
Application No.: 13/911,792	Confirmation No. 7953	
Filed: June 6, 2013	: Group Art Unit: 2453	
Customer Number: 23630	Examiner: Krisna Lim	

# For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

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

# AMENDMENT

Commissioner:

In response to the Office Action dated August 30, 2013, please enter and consider the following:

A Listing of the Claims is provided on page 2 of this paper.

**Remarks** begin on page 7 of this paper.

DM_US 46941656-1.077580.0196

# IN THE CLAIMS

This listing of claims is provided for the sole convenience of the Examiner. No claims have been amended herein.

### LISTING OF CLAIMS:

1-25. (Canceled)

26. (Previously Presented) A network device, comprising:

a storage device storing an application program for a secure communications service; and at least one processor configured to execute the application program for the secure communications service so as to enable the network device to:

send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connect to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicate data with the second network device using the secure communications service via the encrypted communication link,

the network device being a device at which a user uses the secure communications service to access the encrypted communication link.

27. (Previously Presented) The network device of claim 26, wherein the secure communications service includes an audio-video conferencing service, and the at least one processor is configured to execute the application program to communicate at least one of

encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

28. (Previously Presented) The network device of claim 26, wherein the secure communications service includes a telephony service.

29. (Previously Presented) The system of claim 28, wherein the telephony service uses modulation.

30. (Previously Presented) The network device of claim 29, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

31. (Previously Presented) The network device of claim 26, wherein the network device is a mobile device.

32. (Previously Presented) The network device of claim 26, wherein the identifier associated with the second network device is a domain name.

33. (Previously Presented) The network device of claim 26, wherein the encrypted communication link is part of a virtual private network communication link.

34. (Previously Presented) The network device of claim 33, wherein the virtual private network communication link is based on inserting into each data packet communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

35. (Previously Presented) The network device of claim 26, wherein the indication that the second network device is available for the secure communications service is a function of the result of a domain name lookup.

36. (Previously Presented) The network device of claim 26, wherein the encrypted communication link is an end-to-end link extending from the network device to the second network device.

37. (Previously Presented) The network device of claim 26, wherein the interception of the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

38. (Previously Presented) The network device of claim 26, wherein the interception of the DNS request occurs at another network device that is separate from the network device.

39. (Previously Presented) A method executed by a first network device for communicating with a second network device, the method comprising:

sending a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receiving, following interception of the DNS request and a determination that the second network device is available for a secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connecting to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicating data with the second network device using the secure communications service via the encrypted communication link,

the first network device being a device at which a user uses the secure communications service to access the encrypted communication link.

40. (Previously Presented) The method of claim 39, wherein the secure communications service includes a video conferencing service, and communicating includes

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communicating at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

41. (Previously Presented) The method of claim 39, wherein the secure communications service includes a telephony service.

42. (Previously Presented) The method of claim 39, wherein the telephony service uses modulation.

43. (Previously Presented) The method of claim 42, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

44. (Previously Presented) The method of claim 39, wherein the network device is a mobile device.

45. (Previously Presented) The method of claim 39, wherein the identifier associated with the second network device is a domain name.

46. (Previously Presented) The method of claim 39, wherein the encrypted communication link is part of a virtual private network communication link, and communicating with the second network device using the secure communications service includes inserting into data packets communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

47. (Previously Presented) The method of claim 39, wherein the indication that the second network device is available for a secure communications service is a function of a domain name lookup.

48. (Previously Presented) The method of claim 39, wherein the encrypted communication link is an end-to-end link extending from the first network device to the second network device.

49. (Previously Presented) The method of claim 39, wherein the intercepting the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

50. (Previously Presented) The method of claim 39, wherein the intercepting the DNS request occurs at another network device that is separate from the first network device.

### **REMARKS**

After entry of the foregoing amendments, claims 26-50 are pending, with claims 26 and 39 being the independent claims. No art-based rejections were made by the Office Action. No claims are amended herein. Favorable reconsideration and allowance of the subject application is respectfully requested.

### **Double Patenting Rejections**

Claims 26-50 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 29-56 of copending Application No. 13/903,788. Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 14-20 and 27-47 of copending Application No. 13/080,680. Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-25, 27-40, and 68 of copending Application No. 13/049,552 (now U.S. Patent No. 8,572,247, issued October 29, 2013). Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6-8, and 10-15 of copending Application No. 13/342,795 (now U.S. Patent No. 8,560,705, issued October 15, 2013). Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. 13/617,446, claims 1-42 of copending Application No. 13/181,041, claims 1-3 of copending Application No. 13/618,966, claims 1-13 of copending Application No. 13/474,397 (now U.S. Patent No. 8,554,899, issued October 8, 2013), claims 1-30 of copending Application No. 13/075,081 (now abandoned), and claims 1-38, 4-42, and 43-52 of copending Application No. 13/075,081 (now abandoned).

Claims 26-50 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 6,502,135, claims 1-41 of U.S. Patent No. 7,188,180, claims 1-60 of U.S. Patent No. 7,418,504, claims 1-16 of U.S. Patent No. 7,490,150, claims 1-60 of U.S. Patent No. 7,921,211, claims 1-18 of U.S. Patent No. 7,933,990, claims 1-13 of U.S. Patent No. 7,945,654, claims 1-18 of U.S. Patent No. 7,987,274, claims 1-29 of U.S. Patent No. 8,051,181, claims 1-28 of U.S. Patent No. 8,458,341, claims 1-30 of U.S. Patent No.

8,504,696, claims 1-30 of U.S. Patent No. 8,804,697, claims 1-19 of U.S. Patent No. 8,516,117, claims 1-27 of U.S. Patent No. 8,516,131.

Claims 1-13 of Application No. 13/474,397 (now U.S. Patent No. 8,554,899, issued October 8, 2013) are generally directed to registering a secure domain name, and are seen as patentably distinct from claims 26-50 of the present application. Accordingly, Applicants respectfully submit that a terminal disclaimer is not required with regard to Application No. 13/474,397. Further, the Office Action lacks an explanation of how the claims of the present application and the claims of U.S. Patent No. 8,554,899 are allegedly patentably indistinct. Applicants respectfully request the double patenting rejection be substantiated should the rejection is maintained.

U.S. Application No. 13/075,081 is abandoned, rendering the double patenting rejections moot as to that application. Accordingly, Applicants respectfully submit that a terminal disclaimer is not required with regard to U.S. Application No. 13/075,081.

Claims 1-13 of U.S. Patent No. 7,945,654 are generally directed to registering a secure domain name, and are seen as patentably distinct from claims 26-50 of the present application. Accordingly, Applicants respectfully submit that a terminal disclaimer is not required with regard to U.S. Patent No. 7,945,654. Further, the Office Action lacks an explanation of how the claims of the present application and the claims of U.S. Patent No. 7,945,654 are allegedly patentably indistinct. Applicants respectfully request the double patenting rejection be substantiated should the rejection be maintained.

U.S. Patent No. 7,490,150 is assigned to Hitachi, LTD (*See* Reel 017013, Frame 0817) and does not have a common inventor with the present application. Accordingly, Applicants respectfully request withdrawal of the rejection based on U.S. Patent No. 7,490,150.

Applicants have conducted a search for and have been unable to locate U.S. Patent 8,804,697. Applicants respectfully request confirmation that U.S. Patent No. 8,804,697 is correctly identified as being an issued patent that is the subject of the current rejection, or withdrawal of the double patenting rejection.

Without addressing the merits or conceding the correctness of the double patenting rejections, terminal disclaimers with respect to Application Nos. 13/903,788, 13/080,680, 13/617,446, 13/181,041, and 13/618,966 are being filed concurrently with this response. Without addressing the merits or conceding the correctness of the double patenting rejections, terminal disclaimers with respect to U.S. Patent Nos. 8,572,247, 8,560,705, 6,502,135, 7,418,504, 7,921,211, 7,933,990, 7,987,274, 8,051,181, 8,458,341, 8,504,696, 8,516,117, 7,188,180, 8,516,131 are being filed concurrently with this response.

Accordingly, reconsideration and withdrawal of the double patenting rejections are respectfully requested.

Applicants note that the filing of a terminal disclaimer to obviate a rejection based on nonstatutory double patenting is not an admission of the propriety of the rejection. M.P.E.P. § 804.02, *citing Quad Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 20 USPQ2d 1392 (Fed. Cir. 1991).

Applicants thank the Examiner for his thoughtful examination of claims 26-50 in view of *Kiuchi*, "C-HTTP The Development of a Secure, Closed HTTP-Based Network on the Internet," Department of Epidemiology and Biostatistics, Faculty of Medicine, University of Tokyo, Japan (submitted as citation No. D1223 in the Information Disclosure Statement of August 1, 2013, and marked as considered by the Examiner on August 30, 2013), and in view of U.S. Patent No. 5,898,830 to *Wesinger, Jr. et al.* (submitted as citation No. A50 in the same Information Disclosure Statement). (*See* OA at 7-8.) While Applicants agree with the Office Action that *Kiuchi* and *Wesinger* do not disclose the subject matter of the claims (*see id.*), Applicants disagree with the Office Action's specific characterizations of *Kiuchi, Wesinger* and the claims, (*id.*), and assert that the claims are allowable because *Kiuchi* and/or *Wessinger* do not disclose or suggest the combinations of elements recited in the claims.

Since the double patenting rejections are the only remaining issues in the Office Action, the application is believed to be in condition for allowance, and such action is respectfully requested.

### CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance. Applicants respectfully invite the Examiner to contact the undersigned attorney to promptly address any questions or issues regarding the allowability of the pending claims.

Any absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because Applicants' remarks are not intended to be exhaustive, as there may be other reasons for patentability of any or all claims that have not been expressed. Moreover, nothing in this response should be construed as an intent to concede any issue with regard to any claim.

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 501103 and please credit any excess fees to such deposit account.

#### Respectfully submitted,

#### McDERMOTT WILL & EMERY LLP

Date: November 18, 2013

/Toby H. Kusmer/ Toby H. Kusmer, P.C., Reg. No. 26,418 Customer No. 23630 28 State Street Boston, MA 02109-1775 Telephone: (617) 535-4000 Facsimile: (617) 535-3800 E-mail: tkusmer@mwe.com

	Docket Number (Optional)				
REJECTION OVER A "PRIOR" PATENT	77580-196(VRNK1CP3CNFT10)				
In re Application of: Victor Larson, et al.					
Application No.: 13/911,792					
Filed: June 6, 2013					
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE CO DOMAIN NAMES	MMUNICATIONS USING SECURE				
The owner*, <u>VirnetX, inc.</u> , of <u>100</u> percent interest except as provided below, the terminal part of the statutory term of any patent granted on the instant the expiration date of the full statutory term of <b>prior</b> patent No. <u>8,572,247</u> as the term of by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant appli- during such period that it and the <b>prior</b> patent are commonly owned. This agreement runs with any and is binding upon the grantee, its successors or assigns.	in the instant application hereby disclaims, it application which would extend beyond f said <b>prior patent</b> is presently shortened ication shall be enforceable only for and patent granted on the instant application the instant application that				
would extend to the expiration date of the full statutory term of the prior patent, "as the term of said terminal disclaimer," in the event that said prior patent later: expires for failure to pay a maintenance fee; is held unenforceable; is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate; is reissued; or is in any manner terminated prior to the expiration of its full statutory term as presently sho	prior patent is presently shortened by any				
Check either box 1 or 2 below, if appropriate.					
<ul> <li>For submissions on behalf of a business/organization (e.g., corporation, partnership, universe etc.), the undersigned is empowered to act on behalf of the business/organization.</li> <li>I hereby declare that all statements made herein of my own knowledge are true and that all business helice between between the terms and the terms and the statements.</li> </ul>	sity, government agency, I statements made on information and				
made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United S statements may jeopardize the validity of the application or any patent issued thereon.	States Code and that such willful false				
2. The undersigned is an attorney or agent of record. Reg. No. 26,418					
/Toby H. Kusmer/	November 18, 2013				
Signature	Date				
Toby H. Kusmer					
Typed or printed name					
	(617) 535-4000 Telephone Number				
Terminal disclaimer fee under 37 CFR 1.20(d) included.					
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.					
*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.					
This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collecti including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depe on the amount of time you require to complete th is form and/or suggestions for reducing this burden, should be s and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SE ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.	by the public which is to file (and by the USPTO on is estimated to take 12 minutes to complete, nding upon the individual case. Any comments ent to the Chief Information Officer, U.S. Patent ND FEES OR COMPLETED FORMS TO THIS				

- 41- - 12

	Docket Number (Ontional)				
TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	77580-196(VRNK1CP3CNFT10)				
In re Application of: Victor Larson, et al.					
Application No.: 13/911,792					
Filed: June 6, 2013					
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COM DOMAIN NAMES	MUNICATIONS USING SECURE				
The owner*, <u>VirnetX. Inc.</u> , of <u>100</u> percent interest in except as provided below, the terminal part of the statutory term of any patent granted on the instant the expiration date of the full statutory term of <b>prior patent</b> No. <u>6,502,135</u> as the term of s by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application during such period that it and the <b>prior patent</b> are commonly owned. This agreement runs with any pand is binding upon the grantee, its successors or assigns.	the instant application hereby disclaims, application which would extend beyond said <b>prior patent</b> is presently shortened ation shall be enforceable only for and atent granted on the instant application				
In making the above disclaimer, the owner does not disclaim the terminal part of the term of any pate would extend to the expiration date of the full statutory term of the <b>prior patent</b> , "as the term of said <b>prior patent</b> later: expires for failure to pay a maintenance fee; is held unenforceable; is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate; is reissued; or is in any manner terminated prior to the expiration of its full statutory term as presently short.	nt granted on the instant application that <b>for patent</b> is presently shortened by any ened by any terminal disclaimer.				
Check either box 1 or 2 below, if appropriate					
<ul> <li>For submissions on behalf of a business/organization (e.g., corporation, partnership, universit etc.), the undersigned is empowered to act on behalf of the business/organization.</li> </ul>	y, government agency,				
belief are believed to be true; and further that these statements were made with the knowledge that we made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United St statements may jeopardize the validity of the application or any patent issued thereon.	illful false statements and the like so ates Code and that such willful false				
2. The undersigned is an attorney or agent of record. Reg. No. 26,418					
/Toby H Kusmer/	November 18, 2013				
Signature	Date				
Toby H. Kusmar					
Typed or printed name					
	(047) 505 (000				
	(617) 535-4000 Telephone Number				
✓ Terminal disclaimer fee under 37 CFR 1.20(d) included.					
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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING	Docket Number (Optional)					
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In re Application of: Victor Larson, et al.						
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For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMI DOMAIN NAMES	MUNICATIONS USING SECURE					
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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 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: expires for failure to pay a maintenance fee; is held unenforceable; is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate; is reissued; or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.						
Check either box 1 or 2 below, if appropriate.						
1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university etc.), the undersigned is empowered to act on behalf of the business/organization.	y, government agency,					
I hereby declare that all statements made herein of my own knowledge are true and that all s belief are believed to be true; and further that these statements were made with the knowledge that w made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United Statements may jeopardize the validity of the application or any patent issued thereon.	tatements made on information and illful false statements and the like so ates Code and that such willful false					
2. The undersigned is an attorney or agent of record. Reg. No. 26,418						
/Toby H. Kusmer/ Signature	November 18, 2013 Date					
Toby H. Kusmer						
Typed or printed name						
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1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university etc.), the undersigned is empowered to act on behalf of the business/organization.	/, government agency,						
I hereby declare that all statements made herein of my own knowledge are true and that all statements made herein of my own knowledge are true and that all statements were made with the knowledge that with made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United Statements may jeopardize the validity of the application or any patent issued thereon.	tatements made on information and Ilful false statements and the like so Ites Code and that such willful false						
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/Toby H. Kusmer/	November 18, 2013 Date						
o,girada o	Batt						
Toby H. Kusmer							
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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 77580-196(VRNK1CP3CNFT10)			
In re Application of: Victor Larson, et al.				
Application No.: 13/911,792				
Filed: June 6, 2013				
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES				
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 of <b>prior patent</b> No. <u>7,921,211</u> 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.				
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 of the <b>prior</b> patent, "as the term of said <b>prior</b> patent is presently shortened by any terminal disclaimer," in the event that said <b>prior</b> patent later: expires for failure to pay a maintenance fee; is held unenforceable; is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate; is reissued; or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.				
Check either box 1 or 2 below, if appropriate.				
1. 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.				
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.				
2. The undersigned is an attorney or agent of record. Reg. No. 26,418				
/Toby H_Kusmer/	November 18, 2013			
Signature	Date			
Toby H. Kusmer				
Typed or printed name				
	(617) 535-4000 Telephone Number			
Terminal disclaimer fee under 37 CFR 1.20(d) included.				
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/Toby H_Kusmer/	November 18, 2013			
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In re Application of: Victor Larson, et al.		
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/Toby H. Kusmer/ Signature	<u>November 18, 2013</u> Date	
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For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COM DOMAIN NAMES	MUNICATIONS USING SECURE	
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In making the above disclaimer, the owner does not disclaim the terminal part of the term of any pate would extend to the expiration date of the full statutory term of the <b>prior patent</b> , "as the term of said <b>prior patent</b> later: expires for failure to pay a maintenance fee; is held unenforceable; is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate; is reissued; or is in any manner terminated prior to the expiration of its full statutory term as presently short	nt granted on the instant application that <b>rior patent</b> is presently shortened by any	
Check either box 1 or 2 below, if appropriate.		
1 For submissions on behalf of a business/organization (e.g. corporation partnership universit	v government agency	
etc.), the undersigned is empowered to act on behalf of the business/organization.	, <u>.</u> ,	
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 made not patent issued thereon.		
2. The undersigned is an attorney or agent of record. Reg. No. 26,418		
/Toby H. Kusmer/	November 18, 2013	
Signature	Dale	
Toby H. Kusmer		
Typed or printed name		
	(617) 535-4000 Telephone Number	
Terminal disclaimer fee under 37 CFR 1.20(d) included		
WARNING: Information on this form may become nublic. Credit cord inform	nation should not	
be included on this form. Provide credit card information and authorization	n on PTO-2038.	
-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.		
This collection of information is required by 37 CFR 1.321. 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 1.11 and 1.14. This collection including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depend on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be ser and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEN ADDRESS. <b>SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.</b>	n is estimated to take 12 minutes to complete, ding upon the individual case. Any comments in to the Chief Information Officer, U.S. Patent D FEES OR COMPLETED FORMS TO THIS	

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a conection of information	Dockot Number (Options!)
I ERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	77580-196(VRNK1CP3CNFT10)
In re Application of: Victor Larson, et al.	
Application No.: 13/911,792	
Filed: June 6, 2013	
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COM DOMAIN NAMES	MUNICATIONS USING SECURE
The owner*, <u>VirnetX. Inc.</u> , of <u>100</u> percent interest in except as provided below, the terminal part of the statutory term of any patent granted on the instant is the expiration date of the full statutory term of <b>prior patent</b> No. <u>8,516,131</u> as the term of so by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application during such period that it and the <b>prior patent</b> are commonly owned. This agreement runs with any part and is binding upon the grantee, its successors or assigns.	the instant application hereby disclaims, application which would extend beyond said <b>prior patent</b> is presently shortened ation shall be enforceable only for and atent granted on the instant application
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I hereby declare that all statements made herein of my own knowledge are true and that all s belief are believed to be true; and further that these statements were made with the knowledge that w made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United Sta statements may jeopardize the validity of the application or any patent issued thereon.	statements made on information and villful false statements and the like so ates Code and that such willful false
2. The undersigned is an attorney or agent of record. Reg. No. 26,418	
/Toby H Kusmer/	November 18, 2013
Signature	Date
Tabult Kurner	
Typed or printed name	
	(617) 535-4000 Telephone Number
Terminal disclaimer fee under 37 CER 1 20(d) included	
warning: information on this form may become public. Credit card inform be included on this form. Provide credit card information and authorization	nation should not n on PTO-2038.
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Electronic Patent Application Fee Transmittal					
Application Number:	13911792				
Filing Date:	06	-Jun-2013			
Title of Invention:	SY SE	STEM AND METHOL CURE COMMUNICA	D EMPLOYING AN TIONS USING SE	N AGILE NETWORK CURE DOMAIN NA	SPROTOCOL FOR MES
First Named Inventor/Applicant Name:	Vic	tor Larson			
Filer:	То	by H. Kusmer./Kimil	a Carraway		
Attorney Docket Number:	77	580-196(VRNK1CP3	CNFT10)		
Filed as Large Entity					
Utility under 35 USC 111(a) Filing Fees					
Description Fee Code Quantity Amount USD(\$)			Sub-Total in USD(\$)		
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Statutory or Terminal Disclaimer	1814	18	160	2880
	Tot	al in USD	)(\$)	2880

Electronic Acknowledgement Receipt		
EFS ID:	17436553	
Application Number:	13911792	
International Application Number:		
Confirmation Number:	7953	
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES	
First Named Inventor/Applicant Name:	Victor Larson	
Customer Number:	23630	
Filer:	Toby H. Kusmer./Kimila Carraway	
Filer Authorized By:	Toby H. Kusmer.	
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)	
Receipt Date:	18-NOV-2013	
Filing Date:	06-JUN-2013	
Time Stamp:	22:17:39	
Application Type:	Utility under 35 USC 111(a)	

## Payment information:

Submitted with Payment	yes	
Payment Type	Deposit Account	
Payment was successfully received in RAM	\$2880	
RAM confirmation Number	9761	
Deposit Account 501133		
Authorized User		
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:		
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Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)		

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File Listin	g:				
Document Number	<b>Document Description</b>	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		077590 0106 Amondmontad	9592408	Var	77
I		077580-0196_Amenament.par	a81dce8fe385422f9b5f2f40553f4982e9de3 8b9	yes	27
	Multip	part Description/PDF files in .:	zip description		
	Document Description		Start	E	nd
	Amendment/Req. Reconsiderati	ion-After Non-Final Reject	1		1
	Claims		2	6	
	Applicant Arguments/Remarks	Made in an Amendment	7	1	0
	Terminal Disclai	mer Filed	11	1	1
	Terminal Disclaimer Filed		12	12	
	Terminal Disclaimer Filed		13	13	
	Terminal Disclaimer Filed		14	14	
	Terminal Disclaimer Filed		15	1	5
	Terminal Disclai	mer Filed	16	1	6
	Terminal Disclai	mer Filed	17	1	7
	Terminal Disclai	mer Filed	18	1	8
	Terminal Disclaimer Filed		19	1	9
	Terminal Disclaimer Filed		20	2	20
	Terminal Disclai	mer Filed	21	2	21
	Terminal Disclai	mer Filed	22	2	22
	Terminal Disclai	mer Filed	23	2	23

	Terminal Disclai	24	:	24		
	Terminal Disclaimer Filed		25		25	
	Terminal Disclai	mer Filed	26	:	26	
	Terminal Disclai	mer Filed	27	27		
Warnings:						
Information	:					
2	Terminal Disclaimer Filed	077580-0196_Amendment_pt_	502075	no	1	
		2.pat	4fb67cdc09342752f7759babbbde8fc00d73 f473			
Warnings:	1	II			1	
Information	:					
з	Fee Worksheet (SB06)	fee-info.pdf	30796	no	2	
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Warnings:						
Information	:					
		Total Files Size (in bytes):	<b>1</b> 0 ⁻	125279		
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 of the International Application Number an 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.						

TEDMINAL DISCLAMATED TO ODVIATE A DROVIDIONAL DOUDLE DATENTING	Bocket Number (Ontional)				
REJECTION OVER A PENDING "REFERENCE" APPLICATION	77580-196(VRNK1CP3CNFT10)				
In re Application of: Victor Larson, et al.					
Application No.: 13/911,792					
Filed: June 6, 2013					
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNIC DOMAIN NAMES	ATIONS USING SECURE				
The owner*, <u>VirnetX, Inc.</u> , of <u>100</u> percent interest in the instant except as provided below, the terminal part of the statutory term of any patent granted on the instant application the expiration date of the full statutory term of any patent granted on pending reference Application Number <u>May 28, 2013</u> , as the term of any patent granted on said reference application may be shorter prior to the grant of any patent on the pending reference application. The owner hereby agrees that any pater application shall be enforceable only for and during such period that it and any patent granted on the reference owned. This agreement runs with any patent granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application application and is binding upon the granted on the instant application appli	nt application hereby disclaims, ation which would extend beyond <u>13/903,788</u> , filed red by any terminal disclaimer filed nt so granted on the instant se application are commonly e, its successors or assigns.				
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said <b>reference</b> application, "as the term of any patent granted on said <b>reference</b> application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending <b>reference</b> application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.					
Check either box 1 or 2 below, if appropriate.					
1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, gove etc.), the undersigned is empowered to act on behalf of the business/organization.	rnment agency,				
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 isopardize the validity of the application or any patent issued thereon.					
2. 🖌 The undersigned is an attorney or agent of record. Reg. No. <u>26,418</u>					
/Toby H. Kusmer/	November 18, 2013				
Signature	Date				
Toby H. Kusmer					
	(047) 505 4000				
	(617) 535-4000 Telephone Number				
Terminal disclaimer fee under 37 CFR 1.20(d) is included.					
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.					
*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 statement. See MPEP § 324.					
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	Docket Number (Optional)				
REJECTION OVER A PENDING "REFERENCE" APPLICATION	77580-196(VRNK1CP3CNFT10)				
In re Application of: Victor Larson, et al.					
Application No.: 13/911,792					
Filed: June 6, 2013					
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNIC DOMAIN NAMES	ATIONS USING SECURE				
The owner*, VirnetX, Inc, of percent interest in the instant except as provided below, the terminal part of the statutory term of any patent granted on the instant application the expiration date of the full statutory term of any patent granted on pending reference Application Number <u>April 6, 2011</u> , as the term of any patent granted on said reference application may be shorter prior to the grant of any patent on the pending reference application. The owner hereby agrees that any pater application shall be enforceable only for and during such period that it and any patent granted on the reference owned. This agreement runs with any patent granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application application and is binding upon the granted on the instant application applicatio	nt application hereby disclaims, ation which would extend beyond <u>13/080,680</u> , filed red by any terminal disclaimer filed nt so granted on the instant application are commonly e, its successors or assigns.				
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said <b>reference</b> application, "as the term of any patent granted on said <b>reference</b> application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending <b>reference</b> application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by any terminal disclaimer filed prior to its grant.					
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/Toby H_Kusmer/	November 18, 2013				
Signature	Date				
Toby H. Kusmer					
Typed of printed name					
	(617) 535-4000 Telephone Number				
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	November 10, 2012			
Signature	Date			
Toby H. Kusmer				
Typed or printed name				
	(617) 535-4000 Telephone Number			
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TERMINAL DISCLAIMER TO ORVIATE A DROVISIONAL DOUBLE DATENTING	Docket Number (Optional)				
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For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNIC DOMAIN NAMES	ATIONS USING SECURE				
The owner*, <u>VirnetX</u> , Inc, of <u>100</u> percent interest in the instant except as provided below, the terminal part of the statutory term of any patent granted on the instant application the expiration date of the full statutory term of any patent granted on pending reference Application Number <u>July 12, 2011</u> , as the term of any patent granted on said reference application may be shorter prior to the grant of any patent on the pending reference application. The owner hereby agrees that any pater application shall be enforceable only for and during such period that it and any patent granted on the reference owned. This agreement runs with any patent granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application application and is binding upon the granted on the instant application applicat	nt application hereby disclaims, ation which would extend beyond 13/181,041 , filed hed by any terminal disclaimer filed nt so granted on the instant c application are commonly he, its successors or assigns.				
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that: any such patent: granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.					
Check either box 1 or 2 below, if appropriate.					
1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, gove etc.), the undersigned is empowered to act on behalf of the business/organization.	rnment agency,				
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.					
2. The undersigned is an attorney or agent of record. Reg. No. 26,418					
/Toby H Kusmer/	November 18, 2013				
Signature	Date				
Toby H. Kusmer					
l yped or printed name					
	(617) 535-4000 Telephone Number				
Terminal disclaimer fee under 37 CFR 1 20(d) is included					
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.					
*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 statement. See MPEP § 324.					
This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the put to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estin including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon	olic which is to file (and by the USPTO nated to take 12 minutes to complete, the individual case. Any comments on				

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to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 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.

	Docket Number (Ontional)			
REJECTION OVER A PENDING "REFERENCE" APPLICATION	77580-196(VRNK1CP3CNFT10)			
In re Application of: Victor Larson, et al.				
Application No.: 13/911,792				
Filed: June 6, 2013				
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNIC DOMAIN NAMES	ATIONS USING SECURE			
The owner*, <u>VirnetX, Inc.</u> , of <u>100</u> percent interest in the instant except as provided below, the terminal part of the statutory term of any patent granted on the instant application the expiration date of the full statutory term of any patent granted on pending reference Application Number <u>September 14, 2012</u> , as the term of any patent granted on said reference application may be shorter prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent application shall be enforceable only for and during such period that it and any patent granted on the reference owned. This agreement runs with any patent granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application and is binding upon the granted on the instant application application and is binding upon the granted on the instant application	nt application hereby disclaims, ation which would extend beyond <u>13/618,966</u> , filed ned by any terminal disclaimer filed nt so granted on the instant ce application are commonly de, its successors or assigns.			
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said <b>reference</b> application, "as the term of any patent granted on said <b>reference</b> application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending <b>reference</b> application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.				
Check either box 1 or 2 below, if appropriate.				
1. For submissions on behalf of a business/organization (e.g., corporation, partnership, university, gove etc.), the undersigned is empowered to act on behalf of the business/organization.	rnment agency,			
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 isopardize the validity of the application or any patent issued thereon.				
2. The undersigned is an attorney or agent of record. Reg. No. 26,418				
(Toby H. Kuomar)	November 18, 2013			
Signature	Date			
Toby H. Kusmer				
Typed or printed name				
	(617) 535-4000 Telephone Number			
Terminel disclaimer foe under 27 CEP 1 20(4) is included				
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.				
*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 statement. See MPEP § 324.				
This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the put to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estim including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon	olic which is to file (and by the USPTO nated to take 12 minutes to complete, the individual case. Any comments on			

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to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 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.

Application Number	Application/Control No.		Applicant(s)/Patent under Reexamination	
	13/911,792		LARSON ET AL.	
Document Code - DISQ		Internal D	) ocument – DC	NOT MAIL

TERMINAL DISCLAIMER		
Date Filed : 11/18/13	This patent is subject to a Terminal Disclaimer	

## Approved/Disapproved by:

ANDRE ROBINSON

13 TDS WEREN'T APPRVD.:

[X] PLEASE USE PTO AIA26 (4-13) FORM FOR TERMINAL DISCLAIMERS FILED AFTER SEPTEMBER 16, 2012

U.S. Patent and Trademark Office

Application Number	Application/Control No.		Applicant(s)/Patent under Reexamination	
	13/911,792		LARSON ET AL.	
Document Code - DISQ		Internal D	ocument – DC	NOT MAIL

TERMINAL DISCLAIMER		
Date Filed : 11/18/13	This patent is subject to a Terminal Disclaimer	

### Approved/Disapproved by:

ANDRE ROBINSON 5 TDS WEREN'T APPRVD.

- [X] PLEASE USE PTO AIA25 (4-13) FORM FOR TERMINAL DISCLAIMERS FILED AFTER SEPTEMBER 16, 2012
- * NO ADDITIONAL FEES REQUIRED

U.S. Patent and Trademark Office

Unit	ed States Patent	AND TRADEMARK OFFICE	UNITED STATES DEPAR United States Patent and Address: COMMISSIONER I P.O. Box 1450 Alexandria, Virginia 22 www.uspto.gov	TTMENT OF COMMERCE Trademark Office FOR PATENTS 313-1450
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/911,792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT1	10) 7953
23630 McDermott Wil	7590 01/17/2014		EXAN	IINER
The McDermot	t Building		LIM, K	RISNA
Washington, D	$\mathbb{C}$ 20001		ART UNIT	PAPER NUMBER
			2453	
			NOTIFICATION DATE	DELIVERY MODE
			01/17/2014	ELECTRONIC

#### 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

	Application 13/911,79	<b>on No.</b> 92	Applicant(s) LARSON ET	<b>Applicant(s)</b> ₋ARSON ET AL.						
Office Action Summary	Examiner KRISNA L	IM	Art Unit 2453	AIA (First Inventor to File) Status No						
The MAILING DATE of this communication appears on the cover sheet with the correspondence address Period for Reply										
<ul> <li>A SHORTENED STATUTORY PERIOD FOR REPLY</li> <li>THIS COMMUNICATION.</li> <li>Extensions of time may be available under the provisions of 37 CFR 1.1 after SIX (6) MONTHS from the mailing date of this communication.</li> <li>If NO period for reply is specified above, the maximum statutory period V</li> <li>Failure to reply within the set or extended period for reply will, by statute Any reply received by the Office later than three months after the mailing earned patent term adjustment. See 37 CFR 1.704(b).</li> </ul>	Y IS SET T 36(a). In no ev will apply and w , cause the app g date of this co	O EXPIRE <u>3</u> MONTHS ent, however, may a reply be tim ill expire SIX (6) MONTHS from lication to become ABANDONE mmunication, even if timely filed	S FROM THE hely filed the mailing date of D (35 U.S.C. § 133 , may reduce any	MAILING DATE OF						
Status										
1) Responsive to communication(s) filed on <u>11/18</u>	<u>8/2013</u> .									
A declaration(s)/affidavit(s) under <b>37 CFR 1.1</b>	1 <b>30(b)</b> was	/were filed on								
2a) This action is <b>FINAL</b> . 2b) This	action is r	ion-final.								
3) An election was made by the applicant in resp	onse to a r	estriction requirement	set forth durir	ng the interview on						
; the restriction requirement and election	have beei	n incorporated into this	action.							
4) Since this application is in condition for allowar	nce except	for formal matters, pro	secution as t	o the merits is						
closed in accordance with the practice under E	ex parte Ql	<i>layle</i> , 1935 C.D. 11, 45	3 O.G. 213.							
Disposition of Claims*										
5) Claim(s) <u>26-50</u> is/are pending in the application	n.									
5a) Of the above claim(s) is/are withdraw	wn from co	nsideration.								
6) Claim(s) is/are allowed.										
7) Claim(s) $26-50$ is/are rejected.										
8) Claim(s) Is/are objected to.	r alaatian r	auiromont								
9) Clain(s) are subject to restriction and/o	ligible to bor	equirement.	socution High	way program at a						
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Application Papers $10\sqrt{10}$ The approximation is objected to by the Examine	\r									
11) The drawing(s) filed on is/are: a)	n. Anted or h		Evaminer							
Applicant may not request that any objection to the	drawing(s) h	beld in abevance. See	-74111101. 37 CEB 1 85	(a)						
Replacement drawing sheet(s) including the correct	tion is requir	ed if the drawing(s) is obi	ected to. See	37 CFB 1.121(d).						
	lion to roqui									
Priority under 35 U.S.C. § 119	aviavity		(d) or (f)							
Cortified copies:	phonty un	uer 55 0.5.0. § 119(a)	-(u) or (i).							
a) All b) Some** c) None of the:										
1. Certified copies of the priority documen	ts have be	en received.								
2. Certified copies of the priority documen	ts have be	en received in Applicat	ion No.							
3. Copies of the certified copies of the price	ority docum	ents have been receiv	ed in this Nat	- ional 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) LI Notice of References Cited (PTO-892)		3) Interview Summary	(PTO-413)							
2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SPAper No(s)/Mail Date	SB/08b)	Paper No(s)/Mail Da 4)	ate							
U.S. Patent and Trademark Office PTOL-326 (Rev. 11-13) Office Action	Summary		Part of Paper No	./Mail Date 20140108						

1. The present application is being examined under the pre-AIA first to invent provisions.

2. Claims 26-50 are pending for examination. Claims 1-25 were canceled. This action is in response to the original application filed 06/06/2013.

3. 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 double patenting rejection is appropriate where the claims at issue 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 reference 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. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more

information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

4. Claims 26-50 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 29-56 of copending Application No. 13/903, 788. Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network using the received look up network address of a second network device based on an identifier associated with the second network device and the information for a virtual network address. The difference is the current application clearly claimed that the request is a domain name service (DNS) request while the copending application just calls a request. And another difference is the current application just calls the network address while the copending application calls an internet protocol (IP) address. Another difference is the current application clearly states the connection to the second network device is over the encrypted communication link while the copending application does not. It would have been obvious to one of ordinary skilled in the art at the time the invention was made to recognize that such variation and clarification of the claimed language would not be patentably distinguishable.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of copending application **13/618,966.** 

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service

(DNS) system) configured to be connected to a secure communication network (an encrypted communication link, a virtual communication link) using the received look up network address (an Internet Protocol (IP) address) of a second network device (a target device) based on an identifier associated with the second network device and the information for a virtual network address. The difference is a variation of calling and clarification of the claimed language similarly as in paragraphs 4-7 above.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. Claims 26-50 are rejected on the ground of nonstatutory double patenting as being unpatentable over, claims 1-41 of U.S Patent No. 7,188,180, claims 1-18 of U.S Patent No. 7,933,990, and claims 1-29 of U.S Patent No. 8,051,181.

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network (an encrypted communication link, a virtual communication link) using the received look up network address (an Internet Protocol (IP) address) of a second network device (a target device) based on an identifier associated with the second network device and the information for a virtual network address. The difference is a variation of calling and clarification of the claimed language similarly as in paragraphs 4-7 above.

Kiuchi discloses that the C-HTTP name server stores the IP address and public key of a particular computer in a data structure that maps the name of the particular computer to the corresponding IP address and public key. Kiuchi discloses that the client-side proxy sends a request to the C-HTTP, where the request is asking the C-HTTP server for permission to establish a connection with a server-side proxy.

Wesinger describes a system in which a configuration file is stored on a series of firewalls. The configuration files store security information by domain name and use the domain name to determine if a particular request is to be allowed.

Moreover, Wesinger discloses the following sequence: (i) a request is received by the firewall/DNS server, (ii) the domain name in the request is looked up in the configuration file, (iii) if the connection is allowed, then the firewall/DNS server may invoke code that performs channel processing, which includes encryption.

Wesinger discloses that DNS propagation happens in a normal manner, but also teaches that the DNS propagation happens through the firewall servers, and the DNS propagation is subject to allow or deny connection rules.

In Examiner's opinion, both Kiuchi and Wesinger may not clearly disclose the

feature of *"intercepting a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device* and determining whether or not to establish a secure communication connection over the encrypted communication link". Moreover, both Kiuchi and Wesinger may not clearly disclose "send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device; receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link".

Moreover, in Examiner's opinion, Examiner believes that the requested is intercepted and determined before the request reached the firewall/DNS server.

7. In response to the above rejection, applicants have submitted Terminal Disclaimers; however those Terminal Disclaimers have not been approved because wrong forms were used. Applicants are once again requested to submit the TD.

8. THIS ACTION IS MADE FINAL. 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 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 mailing date of this final action.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) days from the mail date of this letter.

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).

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) If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (In USA or Canada) or 571-272-100.

KI January 8, 2014

/Krisna Lim/ Primary Examiner Art Unit 2453

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Search Notes	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

CPC- SEARCHED							
Symbol	Date	Examiner					

CPC COMBINATION SETS - SEARCHED							
Symbol	Date	Examiner					

US CLASSIFICATION SEARCHED							
Class	Subclass	Date	Examiner				
709	227-228	08/25/2013	kl				

SEARCH NOTES						
Search Notes	Date	Examiner				
Inventors	08/25/2013	kl				

INTERFERENCE SEARCH								
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner					

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U.S. Patent and Trademark Office

Part of Paper No. : 20140108

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F	inal	Original	08/25/2	2013	01/08/2014									
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		38	<ul> <li>✓</li> </ul>		✓									
		39	<ul> <li>✓</li> </ul>		√									
		40	<ul> <li>✓</li> </ul>		√									
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Part of Paper No.: 20140108

#### RESPONSE UNDER 37 CFR 1.116 - EXPEDITED PROCEDURE TECHNOLOGY CENTER 2400

Docket No.: 077580-0196 (VRNK1CP3CNFT10)

#### PATENT

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

In re Application of: Victor Larson, et al.	
Application No.: 13/911,792	Confirmation No. 7953
Filed: June 6, 2013	: Group Art Unit: 2453
Customer Number: 23630	: Examiner: Krisna Lim

# For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

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#### RESPONSE AFTER FINAL REJECTION UNDER 37 CFR § 1.116

Commissioner:

In response to the final Office Action dated January 17, 2014, please enter and consider the following:

A Listing of the Claims is provided on page 2 of this paper.

Remarks begin on page 7 of this paper.

DM_US 49229593-1.077580.0196

#### **IN THE CLAIMS**

This listing of claims is provided for the sole convenience of the Examiner. No claims have been amended herein.

LISTING OF CLAIMS:

1-25. (Canceled)

26. (Previously Presented) A network device, comprising:

a storage device storing an application program for a secure communications service; and at least one processor configured to execute the application program for the secure communications service so as to enable the network device to:

send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connect to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicate data with the second network device using the secure communications service via the encrypted communication link,

the network device being a device at which a user uses the secure communications service to access the encrypted communication link.

27. (Previously Presented) The network device of claim 26, wherein the secure communications service includes an audio-video conferencing service, and the at least one processor is configured to execute the application program to communicate at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

28. (Previously Presented) The network device of claim 26, wherein the secure communications service includes a telephony service.

29. (Previously Presented) The system of claim 28, wherein the telephony service uses modulation.

30. (Previously Presented) The network device of claim 29, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

31. (Previously Presented) The network device of claim 26, wherein the network device is a mobile device.

32. (Previously Presented) The network device of claim 26, wherein the identifier associated with the second network device is a domain name.

33. (Previously Presented) The network device of claim 26, wherein the encrypted communication link is part of a virtual private network communication link.

34. (Previously Presented) The network device of claim 33, wherein the virtual private network communication link is based on inserting into each data packet communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

35. (Previously Presented) The network device of claim 26, wherein the indication that the second network device is available for the secure communications service is a function of the result of a domain name lookup.

36. (Previously Presented) The network device of claim 26, wherein the encrypted communication link is an end-to-end link extending from the network device to the second

network device.

37. (Previously Presented) The network device of claim 26, wherein the interception of the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

38. (Previously Presented) The network device of claim 26, wherein the interception of the DNS request occurs at another network device that is separate from the network device.

39. (Previously Presented) A method executed by a first network device for communicating with a second network device, the method comprising:

sending a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receiving, following interception of the DNS request and a determination that the second network device is available for a secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connecting to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicating data with the second network device using the secure communications service via the encrypted communication link,

the first network device being a device at which a user uses the secure communications service to access the encrypted communication link.

40. (Previously Presented) The method of claim 39, wherein the secure communications service includes a video conferencing service, and communicating includes communicating at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

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41. (Previously Presented) The method of claim 39, wherein the secure communications service includes a telephony service.

42. (Previously Presented) The method of claim 39, wherein the telephony service uses modulation.

43. (Previously Presented) The method of claim 42, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

44. (Previously Presented) The method of claim 39, wherein the network device is a mobile device.

45. (Previously Presented) The method of claim 39, wherein the identifier associated with the second network device is a domain name.

46. (Previously Presented) The method of claim 39, wherein the encrypted communication link is part of a virtual private network communication link, and communicating with the second network device using the secure communications service includes inserting into data packets communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

47. (Previously Presented) The method of claim 39, wherein the indication that the second network device is available for a secure communications service is a function of a domain name lookup.

48. (Previously Presented) The method of claim 39, wherein the encrypted communication link is an end-to-end link extending from the first network device to the second network device.

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Application No. 13/911,792

49. (Previously Presented) The method of claim 39, wherein the intercepting the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

50. (Previously Presented) The method of claim 39, wherein the intercepting the DNS request occurs at another network device that is separate from the first network device.

### **REMARKS**

After entry of the foregoing amendments, claims 26-50 are pending, with claims 26 and 39 being the independent claims. No art-based rejections were made by the Office Action. No claims are amended herein. Favorable reconsideration and allowance of the subject application is respectfully requested.

### **Double Patenting Rejections**

Claims 26-50 are provisionally rejected on the ground of obviousness-type nonstatutory double patenting as being unpatentable over claims 29-56 of copending Application No. 13/903,788. (OA at 3.) Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of copending Application No. 13/618,966. (*Id.*)

Claims 26-50 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-41 of U.S. Patent No. 7,188,180, claims 1-18 of U.S. Patent No. 7,933,990, and claims 1-29 of U.S. Patent No. 8,051,181. (OA at 4.)

Without addressing the merits or conceding the correctness of the provisional double patenting rejections, terminal disclaimers with respect to Application Nos. 13/903,788 and 13/618,966 are being filed concurrently with this response. Without addressing the merits or conceding the correctness of the nonstatutory double patenting rejections, terminal disclaimers with respect to U.S. Patent Nos. 7,188,180, 7,933,990, and 8,051,181 are being filed concurrently with this response.

Accordingly, reconsideration and withdrawal of the double patenting rejections are respectfully requested.

Applicants note that the filing of a terminal disclaimer to obviate a rejection based on nonstatutory double patenting is not an admission of the propriety of the rejection. M.P.E.P. § 804.02, *citing Quad Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 20 USPQ2d 1392 (Fed. Cir. 1991).

The foregoing terminal disclaimers and corresponding fees were previously submitted in connection with Applicants' Response filed November 18, 2013. However, the terminal disclaimers were disapproved by the Office because they were filed using an incorrect form. (OA

at 6.) Accordingly, no additional fees are believed to be required for resubmission of the terminal disclaimers. (*See* Terminal Disclaimer Review Decision, December 6, 2013.)

Applicants thank the Examiner for his thoughtful examination of claims 26-50 in view of *Kiuchi*, "C-HTTP The Development of a Secure, Closed HTTP-Based Network on the Internet," Department of Epidemiology and Biostatistics, Faculty of Medicine, University of Tokyo, Japan (submitted as citation No. D1223 in the Information Disclosure Statement of August 1, 2013, and marked as considered by the Examiner on August 30, 2013), and in view of U.S. Patent No. 5,898,830 to *Wesinger, Jr. et al.* (submitted as citation No. A50 in the same Information Disclosure Statement). (*See* OA at 4-5.) While Applicants agree with the Office Action that *Kiuchi* and *Wesinger* do not disclose the subject matter of the claims (*see id.*), Applicants disagree with the Office Action's specific characterizations of *Kiuchi, Wesinger* and the claims, (*id.*), and assert that the claims are allowable because *Kiuchi* and/or *Wessinger* do not disclose or suggest the combinations of elements recited in the claims.

Since the double patenting rejections are the only remaining issues in the Office Action, the application is believed to be in condition for allowance, and such action is respectfully requested.

## CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance. Applicants respectfully invite the Examiner to contact the undersigned attorney to promptly address any questions or issues regarding the allowability of the pending claims.

Any absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because Applicants' remarks are not intended to be exhaustive, as there may be other reasons for patentability of any or all claims that have not been expressed. Moreover, nothing in this response should be construed as an intent to concede any issue with regard to any claim.

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 501133 and please credit any excess fees to such deposit account.

Respectfully submitted, McDERMOTT WILL & EMERY LLP

Date: January 27, 2014

/Toby H. Kusmer/ Toby H. Kusmer, P.C., Reg. No. 26,418 Customer No. 23630 28 State Street Boston, MA 02109-1775 Telephone: (617) 535-4000 Facsimile: (617) 535-3800 E-mail: tkusmer@mwe.com

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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING	Docket Number (Optional) 077580-0196 (VRNK1CP3CNFT10)
In re Application of: Victor LARSON, et al.	
Application No.: 13/911,792	
Filed: June 6, 2013	
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMI DOMAIN NAMES	MUNICATIONS USING SECURE
The applicant, <u>VirnetX, Inc.</u> , owner of <u>100</u> percent in disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the beyond the expiration date of the full statutory term of <b>prior patent</b> No. <u>8,051,181</u> as the terminal disclaimer. The applicant hereby agrees that any patent so granted on the i only for any during such period that it and the <b>prior patent</b> are commonly owned. This agreement runs application and is binding upon the grantee, its successors or assigns.	terest in the instant application hereby ne instant application which would extend erm of said <b>prior patent</b> is presently nstant application shall be enforceable s with any patent granted on the instant
In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any pa that would extend to the expiration date of the full statutory term of the <b>prior patent</b> , "as the term of sai any terminal disclaimer," in the event that said <b>prior patent</b> later: expires for failure to pay a maintenance fee; is held unenforceable.	tent granted on the instant application d <b>prior patent</b> is presently shortened by
is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate;	
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I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by than five (5) years, or both.	fine or imprisonment of not more
2. ✓ The undersigned is an attorney or agent of record. Reg. No. <u>26,418</u>	
/Toby H. Kusmer/	January 27, 2014
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Toby H. Kusmer	
l yped or printed name	
Attorney for Assignee	(617) 535-4000
Title	Telephone Number
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EFS ID:	18040077
Application Number:	13911792
International Application Number:	
Confirmation Number:	7953
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES
First Named Inventor/Applicant Name:	Victor Larson
Customer Number:	23630
Filer:	Toby H. Kusmer./Kimila Carraway
Filer Authorized By:	Toby H. Kusmer.
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)
Receipt Date:	27-JAN-2014
Filing Date:	06-JUN-2013
Time Stamp:	22:27:06
Application Type:	Utility under 35 USC 111(a)

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File Listin	g:				
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	Response After Final Action	1	1		
	Claims	2	6		
	Applicant Arguments/Remarks Made in an Amendment	7	9		
	Terminal Disclaimer Filed	10	10		
	Terminal Disclaimer Filed	11	11		
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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.

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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.

TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING	Docket Number (Optional)
<b>REJECTION OVER A PENDING "REFERENCE" APPLICATION</b>	077580-0196 (VRNK1CP3CNFT
In re Application of: Victor LARSON, et al.	
Application No.: 13/911,792	
Filed: June 6, 2013	
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNIC DOMAIN NAMES	ATIONS USING SECURE
The applicant, <u>VirnetX, Inc.</u> , owner of percent interest in the disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instat beyond the expiration date of the full statutory term of any patent granted on pending reference Application N filed, <u>May 28, 2013</u> , as the term of any patent granted on said reference application may be shorted filed prior to the grant of any patent on the pending reference application. The applicant hereby agrees that an application shall be enforceable only for and during such period that it and any patent granted on the reference owned. This agreement runs with any patent granted on the instant application and is binding upon the granted on the iset to the expiration date of the full statutory term of any patent granted on said reference application, "as said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent or application," in the event that: any such patent granted on the pending reference application, is statutoring in the is found invalid by a court of competent jurisdiction, is statutorid by any terminal disclaimer filed prior to is in any manner terminated or statutory term as shortened by any terminal disclaimer filed prior to its grant.	le instant application hereby ant application which would extend lumber 13/903.788 ened by any terminal disclaimer y patent so granted on the instant e application are commonly e, its successors or assigns. Instant application that would the term of any patent granted on the pending reference to pay a maintenance fee, is minally disclaimed under 37 prior to the expiration of its full
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2. <b>Y</b> The undersigned is an attorney of agent of record. Reg. No. 20,416	
/Toby H Kusmer/	January 27, 2014
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Attorney for Assignee	(617) 535-4000
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is reissued; or is in any manner terminated prior to the expiration of its full statutory term as presently shorted	ened by any terminal disclaimer.
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I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by than five (5) years, or both.	fine or imprisonment of not more
2. V The undersigned is an attorney or agent of record. Reg. No. 20,410	
/Toby H. Kusmer/ Signature	January 27, 2014 Date
Toby H. Kusmer	
Attorney for Assignee	(617) 535-4000
Title	l elephone Number
✓ Terminal disclaimer fee under 37 CFR 1.20(d) included.	
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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION	Docket Number (Optional) 077580-0196 (VRNK1CP3CNFT
In re Application of: Victor LARSON, et al.	
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	lanuary 27, 2014
Signature	
Toby H. Kusmer Typed or printed name	
Attorney for Assignee	(617) 535-4000
Title	Telephone Number
Terminal disclaimer fee under 37 CFR 1.20(d) is included.           WARNING: Information on this form may become public. Credit card information be included on this form. Provide credit card information and authorization on formation on formation.	should not ≥TO-2038.
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Application No.: 13/911,792	
Filed: June 6, 2013	
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMI DOMAIN NAMES	MUNICATIONS USING SECURE
The applicant, <u>VirnetX, Inc.</u> , owner of <u>100</u> percent in disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the beyond the expiration date of the full statutory term of <b>prior patent</b> No. <u>7,188,180</u> as the terminal disclaimer. The applicant hereby agrees that any patent so granted on the i only for any during such period that it and the <b>prior patent</b> are commonly owned. This agreement runs application and is binding upon the grantee, its successors or assigns.	terest in the instant application hereby ne instant application which would extend erm of said <b>prior patent</b> is presently nstant application shall be enforceable s with any patent granted on the instant
In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any pa that would extend to the expiration date of the full statutory term of the <b>prior patent</b> , "as the term of sai any terminal disclaimer," in the event that said <b>prior patent</b> later: expires for failure to pay a maintenance fee; is held unenforceable:	tent granted on the instant application d <b>prior patent</b> is presently shortened by
is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; has all claims canceled by a reexamination certificate;	
is reissued, or is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shorted	ened by any terminal disclaimer.
Check either box 1 or 2 below if appropriate	
1 The undersigned is the applicant. If the applicant is an assigned, the undersigned is authorized	d to act on bobalf of the accience
	or to abi on benañ or tre assignee.
I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by than five (5) years, or both.	fine or imprisonment of not more
2. ✓ The undersigned is an attorney or agent of record. Reg. No. 26,418	
/Toby H. Kusmer/ Signature	January 27, 2014 Date
Toby H. Kusmer	
i yped or printed name	
Attorney for Assignee	(617) 535-4000
Title	Telephone Number
✓ Terminal disclaimer fee under 37 CFR 1.20(d) included.	
WARNING: Information on this form may become public. Credit card inform be included on this form. Provide credit card information and authorization	nation should not on PTO-2038.
This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection	the public which is to file (and by the USPTO is estimated to take 12 minutes to complete
including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depend on the amount of time you require to complete th is form and/or suggestions for reducing this burden, should be sen and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENI ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.	ing upon the individual case. Any comments t to the Chief Information Officer, U.S. Patent D FEES OR COMPLETED FORMS TO THIS

		Under t	he Paperwork F	Reduction Act of 1995.	, no persons are requi	red to respond t	to a collection of informati	on unless it displays a v	alid OMB control number
Ρ/	PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						n or Docket Number /911,792	Filing Date 06/06/2013	To be Mailed
ENT						ENTITY: 🛛 I	_arge 🗌 sma		
	APPLICATION AS FILED – PART I								
			(Column 1	)	(Column 2)				
	FOR		NUMBER FIL	.ED	NUMBER EXTRA		RATE (\$)	F	FEE (\$)
	BASIC FEE (37 CFR 1.16(a), (b),	or (c))	N/A		N/A		N/A		
	SEARCH FEE (37 CFR 1.16(k), (i), (	or (m))	N/A		N/A		N/A		
	EXAMINATION FE (37 CFR 1.16(o), (p),	E or (q))	N/A		N/A		N/A		
TOT (37 )	ΓAL CLAIMS CFR 1.16(i))		min	us 20 = *			X \$ =		
IND (37	EPENDENT CLAIM CFR 1.16(h))	S	mi	nus 3 = *			X \$ =		
	APPLICATION SIZE (37 CFR 1.16(s))	FEE fo fra fra CI	the specification paper, the a r small entity action thereous FR 1.16(s).	ation and drawing application size f /) for each additi of. See 35 U.S.C	gs exceed 100 s ee due is \$310 ( ional 50 sheets c : 41(a)(1)(G) and	heets \$155 or 1 37			
	MULTIPLE DEPEN	IDENT CLAIM	PRESENT (3	7 CFR 1.16(j))					
* lf t	he difference in colu	umn 1 is less th	ian zero, ente	r "0" in column 2.			TOTAL		
		(Column 1)		(Column 2)	ION AS AMEN (Column 3	IDED – PA	ART II		
ENT	01/27/2014	AFTER	IT	NUMBER PREVIOUSLY PAID FOR	PRESENT EX	TRA	RATE (\$)	ADDITI	ONAL FEE (\$)
Σ	Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0		× \$80 =		0
Z	Independent	* 2	Minus	***3	= 0		x \$420 =		0
ME	Application Si	ze Fee (37 CF	R 1.16(s))						
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							TOTAL ADD'L FE	E	0
		(Column 1)	I.	(Column 2)	(Column 3	)			
Г		CLAIMS REMAINING AFTER AMENDMEN	а IT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EX	TRA	RATE (\$)	ADDITI	ONAL FEE (\$)
Ľ	Total (37 CFR 1.16(i))	*	Minus	**	=		X \$ =		
N	Independent (37 CFR 1.16(h))	*	Minus	***	=		X \$ =		
N N U	Application Si	ze Fee (37 CF	R 1.16(s))						
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
							TOTAL ADD'L FE	E	
* If I ** If *** I The	* 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.								
This c	collection of informat	tion is required	by 37 CFR 1.	16. The informatio	n is required to obt	ain or retain a	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.

Application Number	Application/Control No.		Applicant(s)/Patent under Reexamination	
	13/911,792		LARSON ET AL.	
Document Code - DISQ		Internal D	ocument – DC	NOT MAIL

TERMINAL DISCLAIMER		
Date Filed : 1/27/14	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:	
ANDRE ROBINSON	
3 TDS WERE APPRVD.	

U.S. Patent and Trademark Office

Application Number	Application/Co	ntrol No.	Applicant(s)/Patent under Reexamination			
	13/911,792		LARSON ET AL.			
Document Code - DISQ	Internal D	ocument – DC	NOT MAIL			

TERMINAL DISCLAIMER		
Date Filed : 1/27/14	This patent is subject to a Terminal Disclaimer	

# Approved/Disapproved by:

ANDRE ROBINSON

2 TDS WEREN'T APPRVD.:

[ X ] FAILED TO STATE THE AMOUNT OF INTEREST OWNED BY APPLICANT

U.S. Patent and Trademark Office

Subst. for form 1449/PTO				Complete if Known								
INFORMA		CI OSUDE STAT	TEMEN	TRV	Applicat	ion Number	Ι		13/91	1,792		
APPLICA	NT	OLUGURE GIMI	CHIEN		Filing Da	ate			06-06	-2013		
(Use as mai	ny sheets a:	s necessary)			First Na	med Inventor	1		Victor	Larson		
					Art Unit		T		24	53		
					Examine	er Name	Ī		Krisn	a Lim		
			1		Docket	Number	T	77580-19	6(VRN	K1CP3CN	IFT10)	
<b></b>			4	U.S.	PATEN	TS	f					
EXAMINER'	CITE NO.	Patent Number		Publication Dat		me of Patentee	OF Á	pplicant of	Pager	s, Columns, Li	nes, Where	
S INITIALS						Cited Docu	cument		Relevant Passages or Re Figures Appear		or Relevant ear	
	A179	5,070,528	3	12/03/1991		Hawe et	t al.					
}	A180	5,412,730	)	05/02/1995	5	Jones	s					
	A181	7,669,049	)	02/23/2010	2010 Wang et al.							
}	A182	4,912,762	2	03/27/1990	)	Lee et .	al.	al.				
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EXAMINER' S INITIALS	CITE NO.	Patent Number	, ,	Publication Dat	ie Na	me of Patentee of Cited Docu	e or Applicant of Pages, Columns, Lines cument Relevant Passages or i Figures Appes		nes, Where or Relevant lear			
	<b>.</b>		F(	DREIGN PA	TENT D	OCUMENTS						
EXAMINER' S INITIALS	CITE NO.	Foreign Patent Docu Country Codes-Number Codes( <i>if known</i> )	iment «-Kind	Publication Date	e Nar Applica	ne of Patentee or nt of Cited Docum	ent	Pages, Colum Where Rei Figures A	ns, Lines Ievant opear	Tran	ranslation	
										Yes	No	
	••••••	OTHER ART	ľ (Inclu	Iding Autho	or, Title,	Date, Pertin	en	t Pages, El	ic.)			
EXAMINER 'S INITIALS	CITE NO.	Include name of the (book, magazine, joi city and/or country w	author (i urnal, sei vhere pul	n CAPITAL LE rial, symposium blished.	TTERS), ti 1. catalog,	tle of the article etc.), date, page	(wh :(s).	en appropriate volume-issue	e), title of number(s	the item s), publisher,		
	D1417	Office Action date 13/620,550 (0775)	d Janua 80-0181	ary 28, 2014 fi I)	rom Corre	esponding U.S	, Pa	atent Applica	tion Nun	nber		
		EXAMINER				DATE CONSIDERED						

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO	Complete if Known				
NEADMATION DIGALACIDE STATEMENT DV	Application Number	13/911,792			
APPLICANT	Filing Date	06-06-2013			
(Use as many sheets as necessary)	First Named Inventor	Victor Larson			
	Art Unit	2453			
	Examiner Name	Krisna Lim			
	Docket Number	77580-196(VRNK1CP3CNFT10)			

### CERTIFICATION STATEMENT

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

- [ ] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [X] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [X] The Commissioner is hereby authorized to charge any required fees to Deposit Account 50-1133.
- Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

/Toby H. Kusmer/

Date: January 30, 2014

Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 49337152-1.077580.0196

Electronic Patent Application Fee Transmittal								
Application Number:	13	911792						
Filing Date:	06	-Jun-2013						
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES							
First Named Inventor/Applicant Name:	Victor Larson							
Filer:	Toby H. Kusmer./Kerrie Jones							
Attorney Docket Number:	77	580-196(VRNK1CP3	CNFT10)					
Filed as Large Entity								
Utility under 35 USC 111(a) Filing Fees								
Description		Fee Code	Quantity	Amount	Sub-Total in USD(\$)			
Basic Filing:								
Pages:								
Claims:								
Miscellaneous-Filing:								
Petition:								
Patent-Appeals-and-Interference:								
Post-Allowance-and-Post-Issuance:								
Extension-of-Time:								

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
	180			

Electronic Acknowledgement Receipt						
EFS ID:	18071457					
Application Number:	13911792					
International Application Number:						
Confirmation Number:	7953					
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES					
First Named Inventor/Applicant Name:	Victor Larson					
Customer Number:	23630					
Filer:	Toby H. Kusmer./Kerrie Jones					
Filer Authorized By:	Toby H. Kusmer.					
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)					
Receipt Date:	06-FEB-2014					
Filing Date:	06-JUN-2013					
Time Stamp:	12:06:45					
Application Type:	Utility under 35 USC 111(a)					

# Payment information:

Submitted wi	th Payment	yes								
Payment Type	2	Deposit Account	Deposit Account							
Payment was	successfully received in RAM	\$180	\$180							
RAM confirma	ation Number	8022								
Deposit Account 501133										
Authorized U	ser									
File Listin	g:									
Document Number	<b>Document Description</b>	File Name	File Name File Size(Bytes)/ Multi Pa Message Digest Part /.zip (if a							
Petitioner Apple Inc Ex. 1004, p. 379										

1	Information Disclosure Statement (IDS) Form (SB08)	_196IDS.pdf	661102	no	2			
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Information								
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2	Non Patent Literature	13620550.pdf	255051	no	9			
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		Total Files Size (in bytes)	9.	46768				
This Acknow characterize Post Card, as	ledgement Receipt evidences receip d by the applicant, and including pag described in MPEP 503.	t on the noted date by the U ge counts, where applicable.	SPTO of the indicated It serves as evidence	l document of receipt s	s, imilar to a			
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.								
lf a timely su U.S.C. 371 ar national stag	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.							
national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.								

Unit	ed States Paten	UNITED STATES DEPAR United States Patent and Address: COMMISSIONER I P.O. Box 1450 Alexandria, Virginia 22 www.uspto.gov	TTMENT OF COMMERCE Trademark Office OR PATENTS 313-1450				
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.			
13/911,792	06/06/2013	Victor Larson 77	77580-196(VRNK1CP3CNFT10) 7953				
23630 McDermott Wi	7590 02/14/2014 II & Emerv	4	EXAMINER				
The McDermot	t Building		LIM, K	RISNA			
Washington, D	C 20001		ART UNIT	PAPER NUMBER			
			2453				
			NOTIFICATION DATE	DELIVERY MODE			
			02/14/2014	ELECTRONIC			

# 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

Office Action Summary     Examiner     Art Unit     AlA (First Inventor to File)       KRISNA LIM     2453     Status								
The MAILING DATE of this communication appears on the cover sheet with the correspondence address Period for Reply								
<ul> <li>A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.</li> <li>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.</li> <li>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.</li> <li>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).</li> </ul>								
itatus								
1) Responsive to communication(s) filed on $\frac{1/27/2014}{120(h)}$								
A declaration(s)/amdavit(s) under 37 CFR 1.130(b) was/were filed on								
$2a$ ) $\square$ This action is <b>FINAL</b> . $2b$ $\square$ This action is non-final.								
. the restriction requirement and election have been incorporated into this action								
4) 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 <i>Ex parte Quayle</i> , 1935 C.D. 11, 453 O.G. 213.								
Disposition of Claims*								
<ul> <li>5) ∑ Claim(s) <u>26-50</u> is/are pending in the application.</li> <li>5a) Of the above claim(s) is/are withdrawn from consideration.</li> <li>6) ☐ Claim(s) is/are allowed.</li> <li>7) ∑ Claim(s) <u>26-50</u> is/are rejected.</li> <li>8) ☐ Claim(s) is/are objected to.</li> <li>9) ☐ Claim(s) are subject to restriction and/or election requirement.</li> <li>If any claims have been determined <u>allowable</u>, you may be eligible to benefit from the <b>Patent Prosecution Highway</b> program at a articipating intellectual property office for the corresponding application. For more information, please see ttp://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to <u>PPHfeedback@uspto.gov</u>.</li> <li>Application Papers</li> <li>10) ☐ The specification is objected to by the Examiner.</li> <li>11) ☐ The drawing(s) filed on is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.</li> </ul>								
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).								
<ul> <li>Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).</li> <li>Priority under 35 U.S.C. § 119 <ul> <li>12)</li> <li>Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).</li> </ul> </li> <li>Certified copies: <ul> <li>a)</li> <li>All</li> <li>b)</li> <li>Some** c)</li> <li>None of the: <ul> <li>1.</li> <li>Certified copies of the priority documents have been received.</li> <li>2.</li> <li>Certified copies of the priority documents have been received in Application No.</li> <li>3.</li> <li>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)).</li> </ul> </li> <li>** See the attached detailed Office action for a list of the certified copies not received.</li> </ul></li></ul>								
ttachment(s)								
) X Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)								
Paper No(s)/Mail Date 4) U Other:								

Part of Paper No./Mail Date 20140207

# Petitioner Apple Inc. - Ex. 1004, p. 382

1. The present application is being examined under the pre-AIA first to invent provisions.

2. Claims 26-50 are pending for examination. Claims 1-25 were canceled. This action is in response to the original application filed 06/06/2013.

3. 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 double patenting rejection is appropriate where the claims at issue 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 reference 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. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more

information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

4. Claims 26-50 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 29-56 of copending Application No. 13/903, 788. Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service (DNS) system) configured to be connected to a secure communication network using the received look up network address of a second network device based on an identifier associated with the second network device and the information for a virtual network address. The difference is the current application clearly claimed that the request is a domain name service (DNS) request while the copending application just calls a request. And another difference is the current application just calls the network address while the copending application calls an internet protocol (IP) address. Another difference is the current application clearly states the connection to the second network device is over the encrypted communication link while the copending application does not. It would have been obvious to one of ordinary skilled in the art at the time the invention was made to recognize that such variation and clarification of the claimed language would not be patentably distinguishable.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 26-50 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of copending application **13/618,966.** 

Although the claims at issue are not identical, they are not patentably distinct from each other because they are directed to a network device (a domain name service

(DNS) system) configured to be connected to a secure communication network (an encrypted communication link, a virtual communication link) using the received look up network address (an Internet Protocol (IP) address) of a second network device (a target device) based on an identifier associated with the second network device and the information for a virtual network address. The difference is a variation of calling and clarification of the claimed language similarly as in paragraphs 4-7 above.

This is a <u>provisional</u> obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Kiuchi discloses that the C-HTTP name server stores the IP address and public key of a particular computer in a data structure that maps the name of the particular computer to the corresponding IP address and public key. Kiuchi discloses that the client-side proxy sends a request to the C-HTTP, where the request is asking the C-HTTP server for permission to establish a connection with a server-side proxy.

Wesinger describes a system in which a configuration file is stored on a series of firewalls. The configuration files store security information by domain name and use the domain name to determine if a particular request is to be allowed.

Moreover, Wesinger discloses the following sequence: (i) a request is received by the firewall/DNS server, (ii) the domain name in the request is looked up in the configuration file, (iii) if the connection is allowed, then the firewall/DNS server may invoke code that performs channel processing, which includes encryption.

Wesinger discloses that DNS propagation happens in a normal manner, but also teaches that the DNS propagation happens through the firewall servers, and the DNS propagation is subject to allow or deny connection rules.

# In Examiner's opinion, both Kiuchi and Wesinger may not clearly disclose the

feature of *"intercepting a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device* and determining whether or not to establish a secure communication connection over the encrypted communication link". Moreover, both Kiuchi and Wesinger may not clearly disclose "send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device; receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link".

Moreover, in Examiner's opinion, Examiner believes that the requested is intercepted and determined before the request reached the firewall/DNS server.

6. In response to the above rejection, applicants have submitted Terminal Disclaimers; however those Terminal Disclaimers have not been approved because the amount of percent interest of the owner is missing in the form. Applicants are once again requested to submit the TD.

**7. THIS ACTION IS MADE FINAL.** 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 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 mailing date of this final action.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) days from the mail date of this letter.

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).

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) If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (In USA or Canada) or 571-272-100.

KI February 07, 2014

/Krisna Lim/ Primary Examiner Art Unit 2453 OK TO ENTER: /K.L./

### 02/07/2014

Application No. 13/911,792

## IN THE CLAIMS

This listing of claims is provided for the sole convenience of the Examiner. No claims have been amended herein.

## LISTING OF CLAIMS:

1-25. (Canceled)

26. (Previously Presented) A network device, comprising:

a storage device storing an application program for a secure communications service; and at least one processor configured to execute the application program for the secure communications service so as to enable the network device to:

send a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receive, following interception of the DNS request and a determination that the second network device is available for the secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connect to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicate data with the second network device using the secure communications service via the encrypted communication link,

the network device being a device at which a user uses the secure communications service to access the encrypted communication link.

27. (Previously Presented) The network device of claim 26, wherein the secure communications service includes an audio-video conferencing service, and the at least one processor is configured to execute the application program to communicate at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

28. (Previously Presented) The network device of claim 26, wherein the secure communications service includes a telephony service.

29. (Previously Presented) The system of claim 28, wherein the telephony service uses modulation.

30. (Previously Presented) The network device of claim 29, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

31. (Previously Presented) The network device of claim 26, wherein the network device is a mobile device.

32. (Previously Presented) The network device of claim 26, wherein the identifier associated with the second network device is a domain name.

33. (Previously Presented) The network device of claim 26, wherein the encrypted communication link is part of a virtual private network communication link.

34. (Previously Presented) The network device of claim 33, wherein the virtual private network communication link is based on inserting into each data packet communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

35. (Previously Presented) The network device of claim 26, wherein the indication that the second network device is available for the secure communications service is a function of the result of a domain name lookup.

36. (Previously Presented) The network device of claim 26, wherein the encrypted communication link is an end-to-end link extending from the network device to the second

network device.

37. (Previously Presented) The network device of claim 26, wherein the interception of the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

38. (Previously Presented) The network device of claim 26, wherein the interception of the DNS request occurs at another network device that is separate from the network device.

39. (Previously Presented) A method executed by a first network device for communicating with a second network device, the method comprising:

sending a domain name service (DNS) request to look up a network address of a second network device based on an identifier associated with the second network device;

receiving, following interception of the DNS request and a determination that the second network device is available for a secure communications service: (1) an indication that the second network device is available for the secure communications service, (2) the requested network address of the second network device, and (3) provisioning information for an encrypted communication link;

connecting to the second network device over the encrypted communication link, using the received network address of the second network device and the provisioning information for the encrypted communication link; and

communicating data with the second network device using the secure communications service via the encrypted communication link,

the first network device being a device at which a user uses the secure communications service to access the encrypted communication link.

40. (Previously Presented) The method of claim 39, wherein the secure communications service includes a video conferencing service, and communicating includes communicating at least one of encrypted video data and audio data with the second network device via the encrypted communication link using the secure communications service.

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41. (Previously Presented) The method of claim 39, wherein the secure communications service includes a telephony service.

42. (Previously Presented) The method of claim 39, wherein the telephony service uses modulation.

43. (Previously Presented) The method of claim 42, wherein the modulation is based on one of frequency-division multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

44. (Previously Presented) The method of claim 39, wherein the network device is a mobile device.

45. (Previously Presented) The method of claim 39, wherein the identifier associated with the second network device is a domain name.

46. (Previously Presented) The method of claim 39, wherein the encrypted communication link is part of a virtual private network communication link, and communicating with the second network device using the secure communications service includes inserting into data packets communicated over the virtual private network communication link one or more data values that vary according to a pseudo-random sequence.

47. (Previously Presented) The method of claim 39, wherein the indication that the second network device is available for a secure communications service is a function of a domain name lookup.

48. (Previously Presented) The method of claim 39, wherein the encrypted communication link is an end-to-end link extending from the first network device to the second network device.

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Application No. 13/911,792

49. (Previously Presented) The method of claim 39, wherein the intercepting the DNS request consists of receiving the DNS request to determine that the second network device is available for the secure communications service.

50. (Previously Presented) The method of claim 39, wherein the intercepting the DNS request occurs at another network device that is separate from the first network device.

# 13911792 - GAU: 2453

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				Ar	t Unit			24	53	
				Ex	aminer Name			Krisn	a Lim	
				D	ocket Number		77580-19	6(VRN	K1CP3CN	IFT10)
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	D1417	Office Action dated 13/620,550 (07758	d January 28, 2014 ( 30-0181)	from	Corresponding U.S.	. Pat	ient Applica	tion Nun	nber	
		EXAMINER	/Krisna Lim/	Ι		DA	TE CONSIL	DERED	02/07/2	014

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO	Complete if Known		
INFORMATION DISCLOSURE STATEMENT BY	Application Number	13/911,792	
APPLICANT	Filing Date	06-06-2013	
(Use as many sheets as necessary)	First Named Inventor	Victor Larson	
	Art Unit	2453	
	Examiner Name	Krisna Lim	
	Docket Number	77580-196(VRNK1CP3CNFT10)	
A. (m. 1.	AWIALI AWAWPARELIW		

### **CERTIFICATION STATEMENT**

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

- [ ] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [X] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [X] The Commissioner is hereby authorized to charge any required fees to Deposit Account 50-1133.
- Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

/Toby H. Kusmer/

Date: January 30, 2014

Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

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			Application Number		13/911,792	
			Filing Dates		06-06-2013	
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			Examiner Name		Olanrowaiu I Bucknos	
			Deaket Number	7750		
	*****			Docket Number	//58	0-196 (VRNK-0001CP3CNF19)
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				Application Number		13/911,792		
INFORMATION DISCLOSURE				Filing Dates		06-06-2013		
STATEMENT BY APPLICANT			First Named Inventor		Victor Larson			
(Use as	many she	ets as necessary)		Art Unit		2495		
				Examiner Name				
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				Art Unit	2495		
				Examiner Name	Olanrewaju J. Bucknor		
				Docket Number	77580-196 (VRNK-0001CP3CNFT9)		
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				Application Number		13/911,792	
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		Examiner Name	Olanrewaju J. Bucknor	
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			Art Unit	2455
L			Examiner Name	Olanrewaju J. Bucknor
			Docket Number	77580-196 (VRNK-0001CP3CNF19)
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		Examiner Name	Olanrowaiu I Bucknor		
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			77580-196 (VRNK-0001CP3CNF19)		
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		Examiner Name	Olanrewaiu J. Bucknor			
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D472	Exhibit 160 Marino un Claima of the '750 F	L[				
D473	Exhibit 160, Manilo Vs. Claims of the 739 F	50 Datont				
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D483	Exhibit 170, Aziz ('234) vs. Claims of the '18	30 Patent				
D484	Exhibit 171, Aziz ('234) vs. Claims of the '2	11 Patent				
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			Application Number	13/911,792
INF	ORM/	ATION DISCLOSURE	Filing Date	06-06-2013
STA	<b>TEMI</b>	ENT BY APPLICANT	First Named Inventor	Victor Larson
(Use	(Use as many sheets as necessary)			2495
			Examiner Name	Olanrewaju J. Bucknor
Т			Docket Number	77580-196 (VPNK-0001CP3CNET9)
			DOCKELINUMBER	77580-150 (VRNR-0001CF 5CNF 15)
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	D522	Exhibit 209, RFC 2538, Storing Certificates '504 Patent	s in the Domain Name Sy	vstem (DNS) vs. Claims of the
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	D525	Exhibit 212, RFC 2486, RFC 2661, RFC 2 L2TP" vs. Claims of the '135 Patent	401, and Internet-Draft, "	Secure Remote Access with
	D526	Exhibit 213, U.S. Patent No. 7,100,195 in 0 6,496,867 vs. Claims of the '135 Patent	Combination with RFC 24	101 and U.S. Patent No.
	D527	Exhibit 214, U.S. Patent No. 7,100,195 in 0 6,496,867 vs. Claims of the '151 Patent	Combination with RFC 24	I01 and U.S. Patent No.
	D528	Exhibit 215, U.S. Patent No. 6,643,701 vs.	Claims of the '135 Pater	t
	D529	Exhibit 216, U.S. Patent No. 6,643,701 vs.	Claims of the '151 Pater	t
	D530	Exhibit 217, U.S. Patent No. 6,496,867 in (	Combination with RFC 24	01 vs. Claims of the '151 Patent
	D531	Exhibit 218, U.S. Patent No. 6,496,867 in (	Combination with RFC 24	101 vs. Claims of the '135 Patent
	D532	Exhibit 219, U.S. Patent No. 6,496,867 vs.	Claims of the '211 Pater	t
	D533	Exhibit 220, U.S. Patent No. 6,496,867 vs.	Claims of the '504 Pater	t
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	D536	Exhibit 223, U.S. Patent No. 6,557,037 vs.	Claims of the '504 Pater	t
	D537	Exhibit 224, RFC 2230, Key Exchange De	legation Record for the D	NS vs. Claims of the '135 Patent
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	D228	Exhibit C3: Claim Chart BinGO (Patent No	7,704 7,704	

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		Filing Date	06-06-2013	
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		Examiner Name		
		Docket Number	77590 196 (VPNK 0001CP2CNETO)	
			77580-198 (VRNR-0001CF3CNF19)	
D561	Exhibit C4: Claim Chart Wang (Patent No	0. 6,502,135)		
D562	Exhibit C4: Claim Chart Beser (Patent No.	. 7,490,151)		
D563	Exhibit C5: Claim Chart Beser (Patent No	0. 6,502,135)		
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D566	Exhibit D: Memorandum Opinion in Vimet	X v. Microsoft.		
D567	Closed HPPT-Based Network on the Interr	o Kaihara, "C-HTTP – Th net," Published in the Proc	e Development of a Secure, ceedings of SNDSS 1996.	
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D574	Exhibit D-5: Jeff Sedayao, "Mosaic Will Kill My Network!' – Studying Network Traffic Patterns of Mosaic Use," in Electron. Proc. 2nd World Wide Web Conf.'94: Mosaic and the Web, Chicago, IL, Oct. 1994.		g Network Traffic Patterns of aic and the Web, Chicago, IL,	
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D576	Exhibit D-8: David M. Martin, "A Framewor Boston University, Boston, MA, USA (Feb 2	k for Local Anonymity in t 21, 1998).	he Internet," Technical Report.	
D577	Exhibit D-9: Copy of U.S. Pat. No. 7,764,23	31		
D578	Exhibit E-1: Claim Charts Applying Kiuchi a	and Other References to	Claims of the '135 Patent.	
D579	Exhibit E1: Declaration of Chris Hopen (Pa	itent No. 6,502,135)		
D580	Exhibit E1: Declaration of Chris Hopen (Pa	itent No. 7,490,151)		
D581	Exhibit E-2: Claim Charts Applying Wesing	er and Other References	to Claims of the '135 Patent.	
D582	Exhibit E2: Declaration of Michael Fratto (F	Patent No. 6,502,135)		
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D584	Exhibit E-3: Claim Charts Applying Solana	and Other References to	Claims of the '135 Patent.	
D585	Exhibit E3: Declaration of James Chester (	Patent No. 6,502,135)		
D586	Exhibit E3: Declaration of James Chester (	Patent No. 7,490,151)		
D587	Exhibit E-4: Claim Charts Applying Aziz an	d Other References to Cl	aims of the '135 Patent.	
D588	Exhibit X1: Aventail Connect Administrator	's Guide v3.1/v2.6., PP 1-	20 (1996-1999)	
D589	Exhibit X10: Copy of U.S. Patent No. 4,885	5,778		
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D593	Exhibit X4: Reed et al., "Proxies for Anonyn Applications Conference, San Diego, CA, D	nous Routine," 12th Ann ecember -9-13, pp 1-10 (	uary Computer Security 1996).	
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D595	Exhibit X6: Copy of U.S. Patent No. 6,496,8	367		
D596	Exhibit X7: BinGO! User's Guide Incorporat Reference.	ting by Reference BinGO	Extended Feature	
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ATEME	ATEMENT BY APPLICANT First Named Inventor Victor Lars			
e as many	sheets as necessary)	Art Unit	2495	
		Examiner Name	Olanrewaju J. Bucknor	
1	T	Docket Number	77580-196 (VRNK-0001CP3CNET9)	
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D598	Exhibit X8: Copy of U.S. Patent No. 6,182	2,741		
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D614	Exhibit Y3: Copy of U.S. Patent No. 5,950,	,519		
D615	Exhibit Y4: Ferguson, P. and Huston, G., " No. 1 (June 1998 ("Ferguson").	What Is a VPN", The Inte	rnet Protocol Journal, Vol 1.,	
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D622	Form PTO/SB/42, Listing Each Patent and New Question of Patentability (Patent No. 6	Printed Publication Reliev 3,502,135)	d Upon to Provide a Substantial	
D623	Form PTO/SB/42, Listing Each Patent and New Question of Patentability (Patent No. 7	Printed Publication Relied 7,490,151)	d Upon to Provide a Substantial	
D624	Request for Inter Partes Reexamination (Patent No. 6,502,135)			
D625	Request for Inter Partes Reexamination Tra	ansmittal Form (PTO/SB/	58) (Patent No. 6,502,135)	
D626	Request for Inter Partes Reexamination Tra	ansmittal Form (PTO/SB/	58) (Patent No. 7,490,151)	
D620	Request for Inter Partes Reexamination Un	der 35 U.S.C. § 311 (Pati	ent No. 7,400,154)	
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D630	Transmittal Letter (Patent No. 0,502,135)			
D631	Joint Claim Construction and Prehearing St	atement		
D632	Exhibit A: Agreed Upon Terms: P.R. 4-3. Ini	int Claims Construction a	nd Prehearing Statement	

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as many sheets as necessary)		First Named Inventor	Victor Larson					
		Art Unit	2495					
		Examiner Name	Olanrewaju J. Bucknor					
		Docket Number	77580-196 (VRNK-0001CP3CNFT9					
D634	Exhibit C; VirnetX's Proposed (	Construction of Claim Terms and Su	pporting Evidence					
0635	Exhibit D; Defendants' Intrinsic Prehearing Statement	and Extrinsic Support; P.R. 4-3 Joir	nt Claim Construction and					
0636	U.S. Patent 6,839,759							
0637	Exhibit B-4; VirnetX, Inc. v. Mic Summary Judgment of Invalidit	rosoft Corp., Case No. 6:07-cv-80, I y of U.S. Patent No. 6,839,759 (E.D	Microsoft's Motion for Partial . Tex. Dec. 18, 2009)					
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0644	Exhibit D-14; Caronni et al., "SKIP – Securing the Internet," 5th International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises (WET ICE '96) (June 19-21, 1996)							
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0646	Exhibit E-1; Claim Charts Apply	ing Kiuchi as a Primary Reference t	o the '759 Patent.					
0647	Exhibit E-2; Claim Charts Apply	ing Kent as a Primary Reference to	the '759 Patent					
0648	Exhibit E-3; Claim Charts Apply	ing Aziz as a Primary Reference to	the '759 Patent					
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0650	Exhibit D-5; Edwards et al., "Hig ISDN System 29, pages 927-93	h Security Web Servers and Gatew 8 (Sept. 1997)	ays," Computer Networks and					
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0652	Exhibit E-3; Claim Charts Apply	ing Blum to Claims of the '151 Pater	nt					
0653	Exhibit B-1, File History of U.S.	Patent 7,490,151						
654	Exhibit E-1, Claim Charts Apply	ing Kiuchi, and Kiuchi and Martin to	Claims of the '151 Patent					
0655	Exhibit E-2, Claim Charts Apply	ing Wesinger, and Wesinger and Ma	artin to Claims of the '151 Patent					
656	Exhibit E-4, Claim Charts Apply the '151 Patent	ing Aziz and Edwards, and Aziz, Ed	wards, and Martin to Claims of					
0657	Exhibit E-6, Claim Charts Apply Claims of the '151 Patent	ing Wesinger and Edwards, and We	singer, Edwards, and Martin to					
658	VirnetX Inc., V. Mitel Networks	Corp.; Defendants' Joint Invalidity C	ontentions					
659	Exhibit 37, RFC 2661 vs. Claims	s of the '135 Patent						
660	Exhibit 38, RFC 2661 vs. Claims	s of the '211 Patent						
661	Exhibit 39, RFC 2661 vs. Claims	of the '504 Patent						
662	Exhibit 40, SecureConnect vs. C	laims of the '135 Patent						
663	Exhibit 41, SecureConnect vs. C	laims of the '211 Patent						
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665	Exhibit 43, SFS-HTTP vs. Claim	s of the '135 Patent						
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			Docket Number	77580-196 (VRNK-0007	ICP3CNFT9)		
D669	Exhibit 47, US '883 vs. C	laims of the '211 F	Patent				
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D680	Exhibit 61, Prestige 128	Plus vs. Claims of	the '135 Patent				
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D694	Exhibit 75, US 820 Vs. C	aims of the '504 P	atent				
D095	Exhibit 75, US 1019 Vs. C	aims of the 211 P	atent				
	Exhibit 77, US 019 VS. C	aims of the '504 Pa	atent	A - and - a - a - a - a - a - a - a - a - a -			
D697	Exhibit 78, US 049VS. C	aims of the 135 P	atent				
D098	Exhibit 79, US 049 Vs. Cl	aims of the 211 Pa	atent				
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D700	Exhibit 98 US '671 vg Cl	aims of the 125 D	atent				
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0709	Exhibit 91 IP '704 ve Or	aims of the '125 De	tont				
D710	Exhibit 92 ID '704 vs. Cle	ame of the 100 Pa	tont				
1110 1110	Exhibit 02, JF 704 VS. UE	thibit 02 IP '704 vs. Claims of the '504 Datest					
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<b>FATEME</b>	ENT BY APPLICANT	First Named Inventor	Victor Larson			
e as many	sheets as necessary)	Art Unit	2495			
		Examiner Name	Olanrewaju J. Bucknor			
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0710	Exhibit 00, US (319 vp. Claims of the (504 l	Datoat				
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D720	Exhibit 100, VENVEAN VS. Claims of the '135 E	Patont				
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D723	Exhibit 104, Special Anthology vs. Claims	of the '135 Patent				
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D755	Exhibit 200, BinGO! User's Guide/Extende	d Features Reference vs.	Claims of the '135 Patent			
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D761	Exhibit 212, RFC 2486, RFC 2661, RFC 24 L2TP' vs. Claims of the '135 Patent	01 and Internet-Draft, "Se	cure Remote Access with			
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s many	^r sheets as necessary)	Art Unit	2495		
		Examiner Name	Olanrewaju J. Bucknor		
	T	Docket Number	77580-196 (VRNK-0001CP3CNE		
J764	Exhibit 220, U.S. Patent No. 6,496,867 vs.	Claims of the '504 Paten			
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0767	Exhibit 223, U.S. Patent No. 6,557,037 VS.	claims of the 504 Paten	NS va. Claime of the (125 Potent		
0769	Exhibit 224, RFC 2230, Rey Exchange Del	Batont (Einal)	NS VS. Claims of the 155 Patent		
0760	Exhibit 228, U.S. 588 vs. Claims of the '504	Patent (Final)			
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0774	Exhibit 230, Microsoft VPN vs. Claims of th	it 230, Microsoft VPN vs. Claims of the '135 Patent' (Final)			
2770	Exhibit XX, Microsoft V/PNvs, Claims of the	504 Patent			
2772	Exhibit Cisco-1 Cisco's Prior Art System vs	Claims of the '135 Patr	ant		
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2777	Exhibit 226, ITU-T Standardization Activitie	s vs. Claims of the '135 F	Patent		
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7780	Exhibit 234, Aventail Connect 3.1/2.6 Admin	nistrator's Guide ("Avent	ail Connect") vs. Claims of the		
781	Exhibit 235. Microsoft VPN vs. Claims of the	e '504 Patent			
0782	Exhibit 1, IETF RFC 2065: Domain Name S	System Security Extension	ons; published January 1997 vs.		
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784	Exhibit 3 REC 2543 vs. Claims of the '135	Patent			
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0790	Exhibit 9, H.323 vs. Claims of the '135 Pate	nt	······································		
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0801	Exhibit 22, iPass vs. Claims of the '211 Patent				
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2804	Exhibit 25, U.S. Patent No. 6,453,034 ('034	Patent") vs. Claims of th	ie 211 Patent		
2805	Exhibit 26, U.S. Patent No. 6,453,034 ('034	Patent") vs. Claims of th	e 504 Patent		
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TEME	NT BY API	PLICA	NT	First Named Inventor	Victor Larson		
s many sheets as necessary)		Art Unit	2495				
				Examiner Name	Olanrewaiu J. Buc	knor	
	T			Docket Number	77580-196 (VRNK-0001C	P3CNFT9)	
					17000-100 (47/(47/-00010		
D811	Exhibit 106, Ga	aunlet Sy	stem and Gaunlet	References vs. Claims of	the 135 Patent		
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D815	'211 Patent	hibit 133, Overview of Access VPNs and Tunneling Technologies ("Overview") vs. Claims of the I1 Patent					
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D817	Exhibit 149, At	kinson v	s. Claims of the '13	5 Patent			
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D824	Exhibit 191, Av	entall C	onnect 3.01/2.51 (*)	Aventali Connect ) vs. Cli	aims of the "135 Patent		
D825	Exhibit 195, Aventail Connect 3.1/2.6 Administrator's Guide ("Aventail Connect") vs. Claims of the '135 Patent						
D826	Exhibit 204, Do	omain Na	ame System (DNS)	Security vs. Claims of th	e '211 Patent		
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D828	Exhibit 210, Lendenmann vs. Claims of the '211 Patent						
D829	Exhibit 211, Le	ndenma	nn vs. Claims of the	e '504 Patent			
D830	Exhibit 213, U. 6,496,867 vs. C	S. Pater Claims of	t No. 7,100,195 in f the '135 Patent	combination with RFC 24	UT and U.S. Patent No.		
D831	Exhibit 215, Az	izvs. Cl	aims of the 135 Pa	tent	······		
D832	Cisco 180, Efil	Ing Ackr	nowledgment				
D833	Exhibit A, U.S.	Patent	7,188,180	0.400			
D834	Exhibit B1, File	History	of U.S. Patent 7,18	18, 180			
D835 D836	Exhibit B2, File	History	of Reexamination	Control No. 95/001,270, F	Reexamination of U.S. 7,188,180		
D837	Exhibit D1, "Le	ndenma	Corp nn": Rolf Lendenma	an, Understanding OSF [	DCE 1.1 For AIX and OS/2, IBM		
0830	Fyhibit D5 "So	bneier"	Bruce Schnolor Ar	on (Oct. 1990). Inlied Cryptography (100	6)		
D839	Exhibit D6, RF	C 793; Ir	formation Sciences	s Institute, "Transmission	Control Protocol," DARPA		
D840	Exhibit D7, "Sc	himpf"; E	Brian C. Schimpf, "Security (Eeb. 10	Securing Web Access wit	h DCE," Presented at Network		
D841	Exhibit D8, "Ro	senbern	y"; Ward Rosenber	ry, David Kenney, and Ge	erry Fisher, Understanding DCE		
D842	Exhibit D9, Ma Computers: Th	sys; Dar	iel R. Masys & Dixi	ie B. Baker, "Protecting C	linical Data on Web Client		
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D843	Exhibit E1, Clai	im Chart	s Applying Lenden	mann as a Primary Refer	ence to the '180 Patent.		
D844	Exhibit E2, Clai	im Chart	s Applying Kiuchi a	is a Primary Reference to	the '180 Patent		
D845	Exhibit E3, Clai	im Chart	s Applying Solana	as a Primary Reference t	o the '180 Patent		
D846	Exhibit E4, Clai Patent	im Chart	s Applying Schimp	r and Rosenberry as a Pr	mary Reference to the '180		
D847	Request for Inte	er Parte	Reexamination of	Patent No. 7,188,180			
D848	Modified PTO F	Form 14	19				
)849	Request for Inte	er Parte		ansmittal Form No. 7,18			

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ORMATION DISCLOSURE			~ <b>F</b>	Application Number 13/911,792		
			KE	Filing Date	06-06-2013	
ATEM	ENT BY A	APPLICA	NI	First Named Inventor	Victor Larson	
as many	sneets as ne	ecessary)		Art Unit	2495	
				Examiner Name	Olanrewaju J. Buc	knor
				Docket Number	77580-196 (VRNK-0001C	P3CNFT
D850	Exhibit A; I	U.S. Patent 7	7,921,211 with Tern	ninal Disclaimer		
D851	Exhibit B, ( (Patent No	Certificate of . 7,921,211)	Service to Reques	t For Inter Partes Reexam	ination Under 35 U.S.C. § 311	
D852	Exhibit C1, 920, Reed	, Claim Char and Beser	t – USP 7,921,211	Relative to Solana, Alone	and in Conjunction with RFC	
D853	Exhibit C2, conjunction	, Claim Char h with RFC 9	t – USP 7,921,211 20, Reed, and Bes	Relative to Solana in view er	of RFC 2504 and Further in	
D854	Exhibit C3, 920, Reed	, Claim Char , and Beser)	t – USP 7,921,211	Relative to Provino, Alone	and in Conjunction with RFC	
D855	Exhibit C4, Conjunctio	, Claim Char n with RFC §	t – USP 7,921,211 920, Reed and Bes	Relative to Provino in view er	v of RFC 2230 and Further in	
D856	Exhibit C5, Conjunctio	, Claim Char n with RFC §	t – USP 7,921,211 920, Reed and Bes	Relative to Provino in view er	of RFC 2504 and in Further	
D857	Exhibit C6, 920, RFC 2	, Claim Char 2401, and Re	t – USP 7,921,211 eed	Relative to Beser, Alone a	nd in Conjunction with RFC	
D858	Exhibit C7, RFC 920, I	, Claim Char RFC 2401, F	t – USP 7,921,211 leed, and Beser	Relative to RFC 2230, Alo	ne and in Conjunction with	
D859	Exhibit C8, RFC 920, I	, Claim Char RFC 2401, F	t – USP 7,921,211 leed, Beser, and RI	Relative to RFC 2538, Alo FC 2065	ne and in Conjunction with	
D860	Exhibit D1, Cisco Syst America ar	, Asserted Cl ems, Inc., Ap nd Aastra US	aim and Infringeme ople Inc., Aastra Te SA, Inc., Civ. Act 6:2	nt Contentions by Plaintiff chnologies Ltd, NEC Corp 2010cv00417 (E.D. Tex)	VirnetX, Inc. in VirnetX, Inc. v. poration, NEC Corporation of	
D861	Exhibit D2, Asserted Claims and Infringement Contentions by Plaintiff VirnetX, Inc. against Apple based on 7,921,211 Patent					
D862	Exhibit X1, Domains"	Solana, E. e	et al. "Flexible Interr	net Secure Transactions B	ased on Collaborative	
D863	Exhibit X2,	U.S. Patent	6,557,037			
D864	Exhibit X4, (November	Atkinson, R r 1997)	., IETF RFC 2230, '	Key Exchange Delegatior	n Record for the DNS"	
D865	Exhibit X6, 1998) Is Ac	Kent, et al., ccessible at:	IETF RFC 2401, "S http://www.ietf.org/	Security Architecture for the rfc/rfc2401.txt	e Internet Protocol" (November	
D866	Exhibit X7, (January 1	Eastlake, D 997) Is Acce	. et al., IETF RFC 2 ssible at: http://www	065, "Domain Name Syste v.ietf.org/rfc/rfc2065.txt	em Security Extensions"	
D867	Exhibit X9, Accessible	Guttman, E At: http://ww	. et al., IETF RFC 2 w.ietf.org/rfc/rfc250	504, "Users' Security Han )4.txt	dbook" (February 1999) Is	
D868	Exhibit Y3, October 19	Braden, R., 989 ("RFC11	RFC 1123, "Requir 23").	ements for Internet Hosts	- Application and Support,"	
D869	Exhibit Y4, Accessible	Atkinson, R At: http://ww	., RFC 1825, "Secu /w.ietf.org/rfc/rfc182	rity Architecture for the Int 25.txt	ernet Protocol (August 1995) Is	
D870	Exhibit Y5, CRL Profile	Housley, R. e" (January 1	et al., RFC 2459, " 999) Is accessible	Internet X.509 Public Key At: http://www.ietf.org/rfc/r	Infrastructure Certificate and fc2459.txt	
D871	Exhibit A, l	J.S. Patent 7	,418,504			
D872	Exhibit B, 0 (Patent No	Certificate of . 7,418,504)	Service to Request	For Inter Partes Reexami	ination Under 35 U.S.C. § 311	escular for West and a subject of the
D873	Exhibit C1, 920, Reed,	Claim Charl and Beser	– USP 7,418,504 I	Relative to Solana, Alone a	and in Conjunction with RFC	
D874	Exhibit C2, Conjunction	Claim Charl n with RFC 9	– USP 7,418,504 I 20, Reed, and Bes	Relative to Solana in view er	of RFC 2504 and Further in	
D875	Exhibit C3, 920, Reed,	Claim Charl and Beser	– USP 7,418,504 I	Relative to Provino, Alone	and in Conjunction with RFC	
D876	Exhibit C4, Conjunctio	Claim Chart n with RFC 9	– USP 7,418,504 I 20, Reed and Bese	Relative to Provino in View ar	of RFC 2230 and Further in	
D877	Exhibit C5, Conjunction	Claim Chart	- USP 7,418,504 I 20, Reed, and Bes	Relative to Provino in View er	of RFC 2504 and in Further	

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STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson	<u></u>
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		Antonin	2495	
		Examiner Name	Olanrewaju J. Buckn	ior
		Docket Number	77580-196 (VRNK-0001CP:	3CNFT9)
D878	Exhibit C6, Claim Chart – USP 7,418,504 F 920, RFC 2401, and Reed	Relative to Beser, Alone	and in Conjunction with RFC	
D879	Exhibit C7, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, and Beser	Relative to RFC 2230, Al	one and in Conjunction with	
D880	Exhibit C8, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, Beser, and RF	Relative to RFC 2538, Al C 2065	one and in Conjunction with	
D881	Exhibit D1, Asserted Claims and Infringeme Cisco Systems, Inc., Applce, Inc, Aastra Te America and Aastra USA, Inc., Civ. Act. 6:2	ent Contentions by Plain echnologies Ltd., NEC C 2010cv00417 (E.D. Tex)	tiff VirnetX Inc. in VirnetX, Inc. v. orporation, NEC Corporation of	
D882	Exhibit D2, Asserted Claims and Infringeme Inc. Based on the 7,418,504	ent Contentions by Plain	tiff VirnetX Inc. against Apple	
D883	Exhibit X5, Eastlake, D., et al., IETF RFC 2 (DNS)" (March 1999)	538, "Storing Certificate	s in the Domain Name System	
D884	Exhibit X6, Kent, S. IETF RFC 2401, "Secu (November1998) http://www.ietf.org/rfc/rfc2	rity Architecture for the I 401.txt	nternet Protocol,	
D885	Exhibit X8, Postel, J. et al., IETF RFC 920, http://www.ietf.org/rfc/rfc920.txt	"Domain Requirements"	' (October 1984) Is Accessible at	
D886	Exhibit X10, Reed, M. et al. "Proxies for An Applications Conference, San Diego, CA, D	onymous Routing," 12th bec. 9-13, 1996.	Annual Computer Security	
D887	Request for Inter Partes Reexamination Tra	ansmittal form		
D888	Transmittal Letter			<u></u>
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D890	Exhibit D-7, "Thomas": Brian Thomas, "Rec Dec. 1997)	ipe for E-Commerce, IE	EE Internet Computing, (Nov	
D891	Exhibit D-9, "Kent II": Stephen Kent & Rand Internet Engineering Task Force, Internet D	all Atkinson, "IP Encaps raft (Feb. 1998)	ulating Security Payload (ESP),"	
D892	Exhibit C1, Claim Chart – USP 7,921,211 R 920, Reed and Beser (Came from Inval. Cis	elative to Solana, Alone sco dtd 11/18/11)	and in Conjunction with RFC	
D893	Exhibit C2, Claim Chart – USP 7,921,211 R Conjunction with RFC 920, Reed, and Bese	elative to Solana in Viev er	v of RFC 2504 and Further in	
D894	Exhibit C3, Claim Chart – USP 7,921,211 R 920, Reed, and Beser	elative to Provino, Alone	e and in Conjunction with RFC	
D895	Exhibit C4, Claim Chart – USP 7,921,211 R Conjunction with RFC 920, Reed and Beset	elative to Provino in Vie	w of RFC 2230 and Further in	
D896	Exhibit C5, Claim Chart – USP 7,921,211 R Conjunction with RFC 920, Reed and Beset	elative to Provino in Vie	w of RFC 2504 and in Further	
D897	Exhibit C6, Claim Chart – USP 7,921,211 R 920, RFC 2401, and Reed	elative to Beser, Alone a	and in Conjunction with RFC	
D898	Exhibit C7, Claim Chart – USP 7,921,211 R RFC 920, Reed, and Beser	elative to RFC 2230, Ald	one and in Conjunction with	
D899	Exhibit C8, Claim Chart – USP 7,921,211 R RFC 920, RFC 2401, Reed, Beser, and RFC	elative to RFC 2538, Alc C 2065	one and in Conjunction with	
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D901	Exhibit C1, Claim Chart – USP 7,418,504 R 920, Reed and Beser	elative to Solana, Alone	and in Conjunction with RFC	
D902	Exhibit C2, Claim Chart – USP 7,418,504 R Conjunction with RFC 920, Reed, and Bese	elative to Solana in View r	v of RFC 2504 and Further in	
D903	Exhibit C3, Claim Chart – USP 7,418,504 R 920, Reed, and Beser	elative to Provino, Alone	and in Conjunction with RFC	
D904	Exhibit C5, Claim Chart – USP 7,418,504 R Conjunction with RFC 920, Reed and Beser	elative to Provino in Viev	w of RFC 2504 and in Further	
D905	Exhibit C6, USP 7,418,504 Relative to Bese and Reed	r, Alone and in Conjunc	tion with RFC 920, RFC 2401,	

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STATEM	ENT BY APPLICANT	First Named Inventor	Victor Larson				
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		Examinar Nama	Olaproviciu I Bucknor				
		Docket Number	77580-196 (VRNK-0001CP3CNF19)				
D906	Exhibit C7, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, and Beser	Relative to RFC 2230, Al	one and in Conjunction with				
D907	Exhibit C8, Claim Chart – USP 7,418,504 F RFC 920, RFC 2401, Reed, Beser, and RF	Relative to RFC 2538, Al	one and in Conjunction with				
D908	504 Request for Inter Partes Reexaminatio	n					
D909	Defendants' Supplemental Joint Invalidity C	Contentions					
D910	Exhibit 226, Securing Web Access with DC	E vs. Claims of the '135	Patent				
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D918	Exhibit 234, U.S. '648 vs. Claims of the '13	5 Patent					
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D920	Exhibit 236, U.S. '648 vs. Claims of the '50	4 Patent					
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D937	Exhibit 253, U.S. Patent No.6,324,648 vs. 0	Claims of the '151 Paten	t				
D938	Exhibit 254, U.S. Patent No.6,857,072 vs. 0	Claims of the '151 Paten	t				
D939	Exhibit A, Aventail Press Release, May 2, 1	997					
D940	Exhibit B, InfoWorld, "Aventail Delivers High 64D, (1997)	hly Secure, Flexible VPN	I Solution," InfoWorld, page				
D941	Exhibit C, Aventail AutoSOCKS v2.1 Admin	istrator's Guide					
D942	Exhibit D, Aventail Press Release, October	12, 1998					
D943	Exhibit G, Aventail Press Release, May 26,	1999					
D944	Exhibit H, Aventail Press Release, August S	9, 1999					
D945	Exhibit J, "Aventail ExtraNet Center 3.1: Se June 28, 1999	curity with Solid Manage	ement, Network Computing,				
D946	Petition in Opposition to Patent Owner's Pe Determination on Certain Prior Art	tition to Vacate Inter Par	tes ReExamination				
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D949	Exhibit C1, Claim Chart Aventail Connect v	3.1					
D950	Exhibit C2, Claim Chart Aventail Connect v	3.01					

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		Application Number 13/911,792		
<b>FORM</b>	ATION DISCLOSURE	Filing Date	06-06-2013	
ГАТЕМІ	ENT BY APPLICANT	First Named Inventor	Victor Larson	
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		Examinar Nama		
		Docket Number	77580-196 (VRNK-0001CP3CNF19)	
D951	Exhibit C3, Claim Chart Aventail AutoSC	DCKS		
D952	Exhibit C4, Claim Chart Wang			
D953	Exhibit C5, Claim Chart Beser			
D954	Exhibit C6, Claim Chart BINGO			
D955	Exhibit X6, U.S. Patent 6,496,867			
D956	Exhibit X10, U.S. Patent 4,885,778			
D957	Exhibit X11, U.S. Patent 6,615,357			
D958	Exhibit Y3, U.S. Patent 5,950,519			
D959	Request for Inter Partes Reexamination	Transmittal Form		
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D961	Exhibit D, v3.1 Administrator's Guide			
D962	Exhibit E-1, Claim Charts Applying Kluc	hi to Various Claims of the '1	35 Patent	
D963	Exhibit E-2, Claim Charts Applying Wes	inger to Various Claims of the		
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D965	Exhibit E-4, Claim Charts Applying Aziz	Transmittel Form		
D966	Request for Inter Partes Reexamination	Transmittai Form		
D967	Request for inter Partes Reexamination			
D968	Fubilit C1 Claim Chart Aventail Canna	ot v2 01		
D909	Exhibit C1, Claim Chart Avental Conner			
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D977	Exhibit E-1, Claim Charts Applying Kiuc	hi, and Kiuchi and Martin to C	Claims of the '151 Patent	
D978	Exhibit E-2, Claim Charts Applying Wes	inger, and Wesinger and Mai	rtin to Claims of the '151 Patent	
D979	Exhibit E-3, Claim Charts Applying Blum	to Claims of the '151 Patent		
D980	Exhibit E-4, Claim Charts Applying Aziz the '151 Patent	and Edwards, and Aziz, Edw	vards, and Martin to Claims of	
D981	Exhibit E-5, Claim Charts Applying Kiuc of the '151 Patent	hi and Edwards, and Kiuchi, I	Edwards, and Martin to Claims	
D982	Exhibit E-6, Claim Charts Applying Wes Claims of the '151 Patent	inger and Edwards, and Wes	inger, Edwards, and Martin to	
D983	Exhibit A, U.S. Patent 6,839,759			
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D985	Exhibit E-1, Claim Charts Applying Kiuc	hi, as Primary Reference to the	he '759 Patent	
D986	Exhibit E-2, Claim Charts Applying Kent	as a Primary Reference to th	1759 Patent	
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D988	Exhibit E-4, Claim Charts Applying Kent References to the '759 Patent	In View of Caronni as a Prim		
D989	Request for Inter Partes Reexamination	I ransmittal Form		
D990	Request for Inter Partes Reexamination			
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D992	Centricate of Service to Request for Inte	r Partes Reexamination Und	er 55 U.S.U. § 311	
D004	Request for inter Partes Reexamination	Transmittal Form		
D994	Request for inter Partes Reexamination	Tanshillar FUHH		
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EXCEPT WHERE LINED THROUGH. /K.L./ Petitioner Apple Inc. - Ex. 1004, p. 429

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		Application Number 13/911,792				
URIVIATION DISCLUSURE			Filing Date	06-06-2013		
		N I	First Named Inventor	Victor Larson		
is many	sneets as necessary)		Art Unit	2495		
			Examiner Name	Olanrewaju J. Buc	knor	
			Docket Number	77580-196 (VRNK-0001C	P3CNFT9)	
D997	Exhibit C1, Claim Char	t – USP 7,921,211	Relative to Solana, Alone	and in Conjunction with RFC		
2007	920, Reed and Beser	t - 11SP 7 021 211	Relative to Solana in view	of REC 2504 and Eurther in		
	conjunction with RFC 9	20, Reed, and Bes				
D999	Exhibit C3, Claim Chart – USP 7,921,211 Relative to Provino, Alone and in Conjunction with RFC 020, Reed, and Beser					
D1000	Exhibit C4, Claim Char Conjunction with RFC	whibit C4, Claim Chart – USP 7,921,211 Relative to Provino in view of RFC 2230 and Further in Deprive the only on the only of				
D1001	Exhibit C5, Claim Char Conjunction with RFC	t – USP 7,921,211 920, Reed and Bes	Relative to Provino in view er	v of RFC 2504 and in Further		
D1002	Exhibit C6, Claim Char 920, RFC 2401, and R	t – USP 7,921,211 eed	Relative to Beser, Alone a	and in Conjunction with RFC		
D1003	Exhibit C7, Claim Char	t – USP 7,921,211	Relative to RFC 2230, Ald	one and in Conjunction with		
D1004	Exhibit C8, Claim Char	t – USP 7,921,211	Relative to RFC 2538, Alc	one and in Conjunction with		
<u></u>	RFC 920, RFC 2401, F	Reed, Beser, and R	FC 2065			
D1005	Exhibit D1, Asserted Cl Cisco Systems, Inc., Aj America and Aastra US	Exhibit D1, Asserted Claim and Infringement Contentions by Plaintiff VirnetX, Inc. in <i>VimetX, Inc. v.</i> <i>Cisco Systems, Inc., Apple Inc., Aastra Technologies Ltd, NEC Corporation, NEC Corporation of</i> <i>America and Aastra USA, Inc.,</i> Civ. Act 6:2010cv00417 (E.D. Tex)				
D1006	Exhibit D2, Asserted Cl based on 7,921,211 Pa	laims and Infringerr Itent	nent Contentions by Plaint	iff VirnetX, Inc. against Apple		
D1007	Exhibit B1, File History	of U.S. Patent 7,41	8,504			
D1008	Exhibit B2, File History	of U.S. Patent App	lication No. 09/558,210			
D1009	Exhibit D-10, Gaspoz et al., "VPN on DCE: From Reference Configuration to Implementation," Bringing Telecommunication Services to the People – IS&N '95, Third International Conference on Intelligence in Broadband Services and Networks, October 1995 Proceedings, Lecture Notes in Computer Science, Vol. 998 (Springer, 1995)					
D1010	Exhibit D-11, Copy of L	J.S. Patent No. 6,26	69,099			
D1011	Exhibit D-11, Copy of L	J.S. Patent No. 6,56	60,634		~~~	
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D1014	Exhibit D-15, Copy of L	J.S. Patent No. 4,95	52,930			
D1015	Exhibit D-17, Pfaffenbe Academic Press (1996)	rger, Netscape Nav	vigator 3.0: Surfing the We	b and Exploring the Internet,		
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01017	Exhibit D-6, Copy of U.	S. Patent No. 5,689	9,641			
01018	Exhibit D-9, Lawton, "N 1996	ew Top-Level Dom	ains Promise Descriptive	Names," Sunworld Online,		
01019	Exhibit E-1, Copy of Ca to the <i>Lendenmann</i> refe on December 7, 1998 a	talog Listing by IBN erence. The link to ind retrieved by the	A for RS/6000 Redbooks ( the <i>Lendenmann</i> reference Wayback Machine	Collection which includes a Link e was archived at archive.org		
01020	Exhibit E-10, copy of ar February 19, 1999 and	Archived Version retrieved by the Wa	of the Lawton reference a ayback Machine	rchived at archive.org on		
D1021	Exhibit E-11, Abstracts Security, 1996, Archive	of the Proceedings d at archive.org on	of the Symposium on Net April 10, 1997, and retriev	work and Distributed System red by the Wayback Machine		
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⊃1023	Exhibit E-13, Copy of S www.isbnsearch.org	earch Results for IS	SBN 0-12-553153-2 (Pfaffe	enberger) from		
01024	Exhibit F-1, Claim Char	ts applying Lenden	mann as a Primary Refere	ence to the '504 Patent.		
	Exhibit E-2 Claim Char	ts applying Aziz as	a Primary Reference to th	e '504 Patent		

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		Application Number	13/911,792				
INFORMA	TION DISCLOSURE	Filing Date	06-06-2013				
STATEME	ENT BY APPLICANT	First Named Inventor	Victor Larson				
(Use as many	sheets as necessary)	Art Unit	2495				
		Examiner Name	Olanrewaju I Bucknor				
		Decket Number	77590 406 (VPNK 0004CP3CNET0)				
			77580-196 (VRNR-0001CF3CNF19)				
D1026	Exhibit F-3, Claim Charts applying Kiuchi a Patent	and Pfaffenberger as Prin	nary References to the '504				
D1027	Exhibit E-2, First Page of U.S. Patent No. 8 the Lendenmann reference as a prior art re	5,913,217 published June eference	e 15, 1999 and citing a portion of				
D1028	Exhibit E-3, Request for Comments 2026, 1996	"The Internet Standards	Process – Revision 3," October				
D1029	Exhibit E-4, First Page of U.S. 5,463,735, prior art Reference	oublished October 31, 19	95 and citing RFC 793 as a				
D1030	Exhibit E-5, Copy of catalog listing from Bo Martin reference with an issue date of Feb	oston University Digital Co ruary 21, 1998	ommon Website, listing the				
D1031	Exhibit E-6, Copy of Technical Reports Arc Department which includes a link to the Ma archive.org on January 22, 1998 and Retri	chive Listing from Boston artin paper. The link to th eved by the Wayback Ma	University Computer Science ne Martin paper was archived at achine				
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D1035	Request for Inter Partes ReExamination; U	J.S. Patent 7,418,504					
D1036	Request for Inter Partes ReExamination Tr	ansmittal Form; U.S. Pal	tent 7,418,504				
D1037	PTO Form 1449						
D1038	Exhibit C1, Claim Chart – USP 7,921,211 r 920, Reed and Beser	elative to Solana, alone a	and in conjunction with RFC				
D1039	Exhibit C2, Claim Chart – USP 7,921,211 relative to Solana in view of RFC 2504 and further in conjunction with RFC 920, Reed, and Beser						
D1040	Exhibit C3, Claim Chart – USP 7,921,211 r 920, Reed, and Beser	elative to Provino, alone	and in conjunction with RFC				
D1041	Exhibit C4, Claim Chart – USP 7,921,211 r conjunction with RFC 920, Reed and Bese	elative to Provino in view r	v of RFC 2230 and further in				
D1042	Exhibit C5, Claim Chart – USP 7,921,211 r conjunction with RFC 920, Reed and Bese	elative to Provino in view r	of RFC 2504 and in further				
D1043	Exhibit C6, Claim Chart – USP 7,921,211re RFC 2401, and Reed	elative to Beser, Alone ar	nd in conjunction with RFC 920,				
D1044	Exhibit C7, Claim Chart – USP 7,921,211 r 2401, Reed, and Beser	elative to RFC 2230, alo	ne and in conjunction with RFC				
D1045	Exhibit C8, Claim Chart – USP 7,921,211 r 920, RFC 2401, Reed, Beser, and RFC 20	elative to RFC 2538, alo 65	ne and in conjunction with RFC				
D1046	Request for Inter Partes Reexamination un	ider 35 U.S.C. § 311					
D1047	Exhibit C1, Claim Chart – USP 7,418,504 r 920, Reed and Beser	elative to Solana, alone a	and in conjunction with RFC				
D1048	Exhibit C2, Claim Chart – USP 7,418,504 r conjunction with RFC 920, Reed, and Bese	elative to Solana in view er	of RFC 2504 and further in				
D1049	Exhibit C3, Claim Chart – USP 7,418,504 r 920, Reed, and Beser	elative to Provino, alone	and in conjunction with RFC				
D1050	Exhibit C5, Claim Chart – USP 7,418,504 r conjunction with RFC 920, Reed and Bese	Exhibit C5, Claim Chart – USP 7,418,504 relative to Provino in view of RFC 2504 and in further conjunction with RFC 920, Reed and Beser					
D1051	Exhibit C6, USP 7,418,504 relative to Bese and Reed	er, alone and in conjunction	on with RFC 920, RFC 2401,				
D1052	Exhibit C7, Claim Chart – USP 7,418,504 r 920, RFC 2401, Reed, and Beser	elative to RFC 2230, alo	ne and in conjunction with RFC				
D1053	Exhibit C8, Claim Chart – USP 7,418,504 r 920, RFC 2401, Reed, Beser, and RFC 20	elative to RFC 2538, alo	ne and in conjunction with RFC				
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NFORMATION DISCLOSURE STATEMENT BY APPLICANT Use as many sheets as necessary)			Application Number 13/911,792		
			Filing Date	06-06-201	3
			First Named Inventor	Victor Lars	son
			Art   Init	2495	
Examiner Name Olaprovaju I Buc					lucknor
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			Docket Number	77580-196 (VRNK-000	DICP3CNFT9)
D1055 Exh	bit 226, Securing V	Veb Access with DC	E vs. Claims of the '135	Patent	
D1056 Exh	bit 227, Securing V	Veb Access with DC	E vs. Claims of the '151	Patent	
D1057 Exh	bit 228, Understan	ding OSF DCE 1.1 f	or AIX and OS/2 vs. Cla	ims of the '135 Patent	
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D1063 Exh	bit 234, U.S. '648 v	vs. Claims of the '135	5 Patent		
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D1066 Exh	bit 237, U.S. '072 v	s. Claims of the '13	5 Patent		
D1067 Exh	bit 238, Gauntlet S	system vs. Claims o	f the '211 Patent		
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D1071 Exh	bit 242, U.S. '588	vs. Claims of the '50	4 Patent		
D1072 Exh	bit 243, Microsoft V	VPN vs. Claims of th	ie '135 Patent		
D1073 Exh	bit 244, Microsoft V	VPN vs. Claims of th	ie '211 Patent		
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D1081 Exh	bit 252, Microsoft V	/PN_vs. Claims of th	e '151 Patent	<u></u>	
D1082 Exh	bit 253, U.S. Pater	nt No.6,324,648_vs. (	Claims of the '151 Pater	t	
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D1084 Peti	ion in Oppositio <mark>n</mark> t	o Patent Owner's Pe	tition to Vacate Inter Pa	rtes Reexamination	
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Con	struction (E.D. Tex	. Jul. 30, 2009)			
D1090 Exh	bit D15, U.S. Pater	nt 4,952,930			
D1091 Exh	bit F1, Claim Char	ts Applying Lendenm	ann as a Primary Refer	ence to the '211 Patent	
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D1094 Exh	bit 2, Letter and at	tachment from Ramz ems (June 23, 2011)	i Khazen, Counsel for V	irnetX, to Dmitriy Kheyfits,	
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D1098 Tra	script of Markman	Hearing Dated Janu	ary 5, 2012		
D1099 Dec	aration of John P	J. Kelly, Ph.D			
D1100 Def	ndants' Responsiv	e Claim Construction	n Brief: Exhibits A-P and	11-7	
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0011-		Application Number	13/911,792			
	TION DISCLOSURE	Filing Date	06-06-2013			
ATEME		First Named Inventor	Victor Larson			
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		Examiner Name	Olanrewaju J. Bucknor			
		Docket Number	77580-196 (VRNK-0001CP3CNFT			
D1102	Exhibit A: Agreed Upon Terms Dated 11/0					
D1103	Exhibit B: Disputed Claim Terms Dated 11	/08/11				
D1104	Exhibit C: VirnetX's Proposed Construction 11/08/11	n of Claim Terms and Sup	porting Evidence Dated			
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D1106	Declaration of Austin Curry in Support of V	/irnetX Inc.'s Opening Clai	m Construction Brief			
D1107	Declaration of Mark T. Jones Opening Cla	ims Construction Brief				
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D1110	European Search Report from correspond 0142)	ing EP Application Numbe	er 11005789 (Our Ref.: 077580-			
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D1117	Transmittal Letters (Patent No.8,051,181)					
D1118	Exhibit X5, Droms, R., RFC 2131, "Dynam	ic Host Configuration Prote	ocol," 1987			
119	Hopen Transcript dated April 11, 2012					
D1120	VirnetX Claim Construction Opinion					
D1121	Declaration of Angelos D. Keromytic, Ph.D					
D1122	Declaration of Dr. Robert Dunham Short III					
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D1124	Exhibit A-3. Declaration of Jason Nieh, Ph	D. (Control No. 95/001 26	9)			
D1125	Exhibit A-4, Redacted Deposition of Chris I 6:07-CV 417 (E.D. Tex. April 11, 2012	Hopen from VirnetX, Inc. v	Cisco Systems, Inc., No.			
D1126	Exhibit B-1, Excerpt from Deposition of Def 1999	ense FY 2000/2001 Bienr	nial Budget Estimates, Feb.			
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D1122								
D1133	Exhibit 118A, Altiga VPN System vs. Clain	ns of the 135 Patent						
D1134	Exhibit 119A, Altiga VPN System' vs. Clain	ns of the '151 Patent ²						
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D1138	Exhibit 123A, Altiga VPN System ¹ vs. Clain	ns of the '759 Patent ²						
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D1141	Exhibit 14A, SSL 3.0 ¹ vs. Claims of the '21'	1 Patent ²						
D1142	Exhibit 228A, Understanding OSF DCE 1. f the '135 Patent ²	for AIX and OS/2 ¹ (APP_	VX0556531-804) vs. Claims of					
D1143	Exhibit 229A, Understanding OSF DCE 1.1 for AIX and OS/2 ¹ (APP_VX0556531-804) vs. Claims of the '151 Patent ²							
D1144	Exhibit 230A, Understanding OSF DCE 1.1 the '180 Patent ²	Exhibit 230A, Understanding OSF DCE 1.1 for AIX and OS/2 ¹ (APP_VX0556531-804) vs. Claims of the '180 Patent ²						
D1145	Exhibit 231A, Understanding OSF DCE 1.1 the '211 Patent ²	Exhibit 231A, Understanding OSF DCE 1.1 for AIX and OS/2 ¹ (APP_VX0556531-804) vs. Claims of the '211 Patent ²						
D1146	Exhibit 232A, Understanding OSF DCE 1.1 the '504 Patent ²	Exhibit 232A, Understanding OSF DCE 1.1 for AIX and OS/2 ¹ (APP_VX0556531-804) vs. Claims of the '504 Patent ²						
D1147	Exhibit 233A, Understanding OSF DCE 1.1 the '759 Patent ²	Exhibit 233A, Understanding OSF DCE 1.1 for AIX and OS/2 ¹ (APP_VX0556531-804) vs. Claims of the '759 Patent ²						
D1148	Exhibit 255, Schulzrinne ¹ vs. Claims of the	135 Patent ²						
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D1159	Exhibit 1. Alexander CV.pdf							
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D1165	Exhibit 7. The Schulzringe Presentation ¹ us	Claims of the '135 Date	sont					
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			Examiner Name	Olanrewaju J. B	ucknor		
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)       Filing Date       06-06-2013         First Named Inventor       Victor Larson         Art Unit       2495         Examiner Name       Olanrewaju J. Bucknor         D1201       Exhibit A-1, Kiuchi ¹ vs. Claims of the '135 Patent ² D1202       Exhibit B-1, Kiuchi ¹ vs. Claims of the '211 Patent ² D1203       Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ²	VFT9)					
STATEMENT BY APPLICANT (Use as many sheets as necessary)       First Named Inventor       Victor Larson         Art Unit       2495         Examiner Name       Olanrewaju J. Bucknor         D1201       Exhibit A-1, Kiuchi ¹ vs. Claims of the '135 Patent ² D1202       Exhibit B-1, Kiuchi ¹ vs. Claims of the '211 Patent ² D1203       Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ²	JFT9)					
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Examiner Name       Olanrewaju J. Bucknor         D1201       Exhibit A-1, Kiuchi ¹ vs. Claims of the '135 Patent ² D1202       Exhibit B-1, Kiuchi ¹ vs. Claims of the '211 Patent ² D1203       Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ²	NFT9)					
D1201     Exhibit A-1, Kiuchi ¹ vs. Claims of the '135 Patent ² D1202     Exhibit B-1, Kiuchi ¹ vs. Claims of the '211 Patent ² D1203     Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ² 01203	NFT9)					
D1201       Exhibit A-1, Kiuchi ¹ vs. Claims of the '135 Patent ² D1202       Exhibit B-1, Kiuchi ¹ vs. Claims of the '211 Patent ² D1203       Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ²						
D1202       Exhibit B-1, Kiuchi ¹ vs. Claims of the '211 Patent ² D1203       Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ²						
D1203 Exhibit C-1, Kiuchi ¹ vs. Claims of the '504 Patent ²						
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D1204 Exhibit D. Materials Considered						
D1205 Exhibit E, Event Report of Studt C, Stubblebing Ph D						
D1206 E tribit E E and Danad of Studit G. Studblebine, Ph.D.						
D1200 Exhibit F, Expert Report of Stuart G. Stublebine, Ph.D.	******					
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			First Named Inventor	Victor Larsor	1			
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			Examiner Name	Olanrewaju J. Buo	knor			
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/Krisna Lim/

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Filing Date	06-06-2013
First Named Inventor	Victor Larson
Art Unit	2495
Examiner Name	Olanrewaju J. Bucknor
Docket Number	77580-196 (VRNK-0001CP3CNFT9)
	Application Number Filing Date First Named Inventor Art Unit Examiner Name Docket Number

## **CERTIFICATION STATEMENT**

[X] Under 37 C.F.R. 1.98(d), copies of all patent, publication, pending U.S. application or other information that was previously submitted to, or cited by the USPTO in co-pending application No. 13/336,790 and are not required. Applicant will provide copies of the previously submitted references at the Examiner's request.

This application claims priority from U.S. Application No. 13/903,788, filed May 28, 2013, which claims priority from and is a continuation of co-pending U.S. Application No. 13/336,790, filed December 23, 2011, now U.S. Patent No. 8,458,341, which claims priority from and is a continuation of co-pending U.S. Application No. 13/049,552, filed March 16, 2011, which is a continuation of U.S. Application No. 11/840,560, filed August 17, 2007, now U.S. Patent No. 7,921,211, which is a continuation of U.S. Application No. 10/714,849, filed November 18, 2003, now U.S. Patent No. 7,418,504, which is a continuation of U.S. Application No. 09/558,210, filed April 26, 2000, now abandoned, which is a continuation-in-part of U.S. Application No. 09/504,783, filed on February 15, 2000, now U.S. Patent No. 6,502,135, issued December 31, 2002, which claims priority from and is a continuation-in-part patent application of previously-filed U.S. Application No. 09/429,643, filed on October 29, 1999, now U.S. Patent No. 7,010,604, issued March 07, 2006.

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- [X] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
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- [] The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$180.00, or further fees which may be due, to Deposit Account 50-1133.
- [] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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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Toby H. Kusmer;Reg. No.:26,418 McDermott Will & Emery L.L.P. 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

Date: 7/31/13

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INFORMATION DISCLOSURE STATEMENT BY	Application Number	13/911,792			
APPLICANT	Filing Date	06-06-2013			
(Use as many sheets as necessary)	First Named Inventor	Victor Larson			
	Art Unit	2453			
	Examiner Name	Krisna Lim			
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- [ ] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
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#### SIGNATURE

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Date: October 1, 2013

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

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1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Subst. for form 1449/PTO	Complete if Known				
INFORMATION DISCLOSURE STATEMENT BY	Application Number	13/911,792			
APPLICANT	Filing Date	06-06-2013			
(Use as many sheets as necessary)	First Named Inventor	Victor Larson			
	Art Unit	2453			
	Examiner Name	Krisna Lim			
	Docket Number	77580-196 (VRNK1CP3CNFT10)			
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#### CERTIFICATION STATEMENT

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

- [] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [X] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is hereby authorized to charge any required fees to Deposit Account 50-1133.
- [] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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.

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 45878214-1.077580.0196

Date: October 10, 2013

## 13911792 - GAU: 2453

Subst. for fo	orm 1449/PT	0		Complete if Known							
INFORM		SCLOSURE STATEME	NTRY	A	pplication Number		13/91	11,792			
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	A170	6,434,600	08/13/200	2	Waite et	al.					
	A171	7,225,249	05/29/200	7	Barry et	al.					
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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.

Subst. for form 1449/PTO	Complete if Known					
INFORMATION DISCLOSURE STATEMENT BY	Application Number	13/911,792				
APPLICANT	Filing Date	06-06-2013				
(Use as many sheets as necessary)	First Named Inventor	Victor Larson				
	Art Unit	2453				
	Examiner Name	Krisna Lim				
	Docket Number	77580-196 (VRNK1CP3CNFT10)				
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#### CERTIFICATION STATEMENT

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

- [] Information Disclosure Statement is being filed with the filing of the application or before the receipt of a first office action.
- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [X] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is hereby authorized to charge any required fees to Deposit Account 50-1133.
- [] Information Disclosure Statement is being filed with the Request for Continued Examination. The Commissioner is hereby authorized to charge the fee pursuant to 37 CFR 1.17(P) in the amount of \$810.00, or further fees which may be due, to Deposit Account 50-1133.

#### 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.

Date: September 27, 2013

<u>/Toby H. Kusmer/</u> Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

DM_US 45367118-1.077580.0196

#### CLAIMS

What is claimed is:

1. A network device, comprising:

a storage device storing an application program for a secure communications service; and

at least one processor configured to execute the application program for the secure communications service so as to enable the network device to:

send a request to look up a network address of a second network device based on an identifier associated with the second network device;

receive an indication that the second network device is available for the secure communications service, the indication including the requested network address of the second network device and provisioning information for a secure communication link;

connect to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and

communicate at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

2. The network device of claim 1, wherein the secure communications service includes an audio-video conferencing service.

3. The network device of claim 2, wherein the at least one processor is configured to execute the application program so as to encrypt at least one of the video data and the audio data transmitted over the secure communication link.

4. The network device of claim 1, wherein the secure communications service includes a telephony service.

5. The system of claim 4, wherein the telephony service uses modulation.

6. The network device of claim 5, wherein the modulation is based on one of frequencydivision multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

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Petitioner Apple Inc. - Ex. 1004, p. 451

7. The network device of claim 1, wherein the network device is a mobile device.

8. The network device of claim 7, wherein the mobile device is a notebook computer.

9. The network device of claim 1, wherein the identifier associated with the second network device is a domain name.

10, The network device of claim 1, wherein the secure communication link is a virtual private network link.

11. The network device of claim 1, wherein the secure communication link is based on inserting into each data packet communicated over the secure communication link one or more data values that vary according to a pseudo-random sequence.

12. The network device of claim 1, wherein the secure communication link is based on a network address hopping regime that is used to pseudo-randomly change network addresses in packets transmitted between the network device and the second network device.

13. The network device of claim 1, wherein the indication that the second network device is available for the secure communications service is a function of the result of a domain name lookup.

14. A method executed by a first network device for communicating with a second network device, the method comprising:

sending a request to look up a network address of a second network device based on an identifier associated with the second network device;

receiving an indication that the second network device is available for a secure communications service, the indication including the requested network address of the second network device and provisioning information for a secure communication link; connecting to the second network device over the secure communication link, using the received network address of the second network device and the provisioning information for the secure communication link; and

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communicating at least one of video data and audio data with the second network device using the secure communications service via the secure communication link.

15. The method of claim 14, wherein the secure communications service includes a video conferencing service.

16. The method of claim 14, further comprising encrypting at least one of the video data and the audio data over the secure communication link.

17. The method of claim 14, wherein the secure communications service includes a telephony service.

18. The method of claim 17, wherein the telephony service uses modulation.

19. The method of claim 18, wherein the modulation is based on one of frequencydivision multiplexing (FDM), time-division multiplexing (TDM), or code division multiple access (CDMA).

20. The method of claim 19, wherein the network device is a mobile device.

21. The method of claim 20, wherein the mobile device is a notebook computer.

22. The method of claim 14, wherein the identifier associated with the second network device is a domain name.

23. The method of claim 14, wherein communicating with the second network device using the secure communications service via the secure communication link includes inserting into data packets communicated over the secure communication link one or more data values that vary according to a pseudo-random sequence.

24. The method of claim 14, wherein communicating with the second network device using the secure communications service via the secure communication link includes a network address hopping regime that is used to pseudo-randomly change network addresses in packets transmitted between the first network device and the second network device.

## Petitioner Apple Inc. - Ex. 1004, p. 453

25. The method of claim 14, wherein the indication that the second network device is available for a secure communications service is a function of a domain name lookup.

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U.S. Patent and Trademark Office

Part of Paper No. : 20140207

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	Ina	lex of C	Claim	IS	1:	13911792					LARSON ET AL.				
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Part of Paper No.: 20140207

## RESPONSE UNDER 37 CFR 1.116 - EXPEDITED PROCEDURE TECHNOLOGY CENTER 2400

Docket No.: 77580-196 (VRNK1CP3CNFT10) (PATENT)

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

In re Application of: Victor Larson, et al.	:	
Application No.: 13/911,792	•	Confirmation No. 7953
Filed: June 6, 2013	:	Group Art Unit: 2453
Customer Number: 23630	•	Examiner: Krisna Lim

# For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

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

#### <u>RESPONSE AFTER FINAL REJECTION</u> <u>UNDER 37 CFR § 1.116</u>

Commissioner:

In response to the final Office Action dated February 14, 2014, please enter and consider the following:

Remarks begin on page 2 of this paper.

DM_US 52152628-1.077580.0196

#### **REMARKS**

Claims 26-50 are pending, with claims 26 and 39 being the independent claims. Double patenting rejections are the only remaining issues in the application. Favorable reconsideration and allowance of the subject application is respectfully requested.

#### **Double Patenting Rejections**

The Office Action provisionally rejects claims 26-50 on the ground of nonstatutory obviousness-type double patenting over claims 29-56 of copending Application No. 13/903,788 ("the '788 application"). The Office Action further provisionally rejects claims 26-50 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of Application No. 13/618,966 ("the '966 application").

The '966 application is abandoned, rendering the double patenting rejection moot as to that application. Accordingly, Applicants respectfully submit that a terminal disclaimer is not required with regard to the '966 application.

Without addressing the merits or conceding the correctness of the double patenting rejections, Applicants submit herewith a terminal disclaimer with respect to the '788 application. Accordingly, the remaining double patenting rejection should be withdrawn. Applicants note that the filing of a terminal disclaimer to obviate a rejection based on nonstatutory double patenting is not an admission of the propriety of the rejection. M.P.E.P. § 804.02, *citing Quad Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 20 USPQ2d 1392 (Fed. Cir. 1991).

Applicants thank the Examiner for his thoughtful examination of claims 26-50 in view of *Kiuchi*, "C-HTTP The Development of a Secure, Closed HTTP-Based Network on the Internet," Department of Epidemiology and Biostatistics, Faculty of Medicine, University of Tokyo, Japan (submitted as citation No. D1223 in the Information Disclosure Statement of August 1, 2013, and marked as considered by the Examiner on August 30, 2013), and in view of U.S. Patent No. 5,898,830 to *Wesinger, Jr. et al.* (submitted as citation No. A50 in the same Information Disclosure Statement). (*See* OA at 4-5.) Although Applicants agree with the Examiner's ultimate conclusion that the claims are allowable over *Kiuchi* and *Wesinger*, Applicants disagree

with the Examiner's characterizations of the references and the claims, (*id.*), and submit that the claims are allowable because the references do not disclose or suggest the particular combinations of elements recited in the claims.

Since the double patenting rejections were the only remaining issues in the Office Action, the application is believed to be in condition for allowance, and such action is respectfully requested.

#### CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance. Applicants respectfully invite the Examiner to contact the undersigned attorney to promptly address any questions or issues regarding the allowability of the pending claims.

Any absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because Applicants' remarks are not intended to be exhaustive, as there may be other reasons for patentability of any or all claims that have not been expressed. Moreover, nothing in this response should be construed as an intent to concede any issue with regard to any claim.

If necessary, please charge any fees due in connection with the filing of the terminal disclaimer under 37 C.F.R. 1.20(d) to Deposit Account 50-1133.

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,

#### McDERMOTT WILL & EMERY LLP

Date: <u>May 15, 2014</u>

/Toby H. Kusmer/ Toby H. Kusmer, P.C., Reg. No. 26,418 Customer No. 23630 28 State Street Boston, MA 02109-1775 Telephone: (617) 535-4000 Facsimile: (617) 535-3800 E-mail: tkusmer@mwe.com

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.								
TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING	Docket Number (Optional)								
REJECTION OVER A PENDING "REFERENCE" APPLICATION	77580-196 (VRNK1CP3CNFT10								
In re Application of: Victor Larson, et al.									
Application No.: 13/911,792									
Filed: June 6, 2013									
For: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNIC DOMAIN NAMES	ATIONS USING SECURE								
The applicant, <u>VirnetX</u> , Inc, owner of <u>100</u> percent interest in the disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instatutory term of any patent granted on the instatutory term of any patent granted on the instatutory filed, <u>May 28, 2013</u> , as the term of any patent granted on said <b>reference</b> application may be shorted filed prior to the grant of any patent on the pending <b>reference</b> application. The applicant hereby agrees that an application shall be enforceable only for and during such period that it and any patent granted on the granted or with any patent granted on the instant application and is binding upon the granted.	e instant application hereby ant application which would extend lumber 13/903,788 aned by any terminal disclaimer y patent so granted on the instant e application are commonly e, its successors or assigns.								
In making the above disclaimer, the applicant does not disclaim the terminal part of any patent granted on the i extend to the expiration date of the full statutory term of any patent granted on said <b>reference</b> application, "as is said <b>reference</b> application may be shortened by any terminal disclaimer filed prior to the grant of any patent or application," in the event that: any such patent granted on the pending <b>reference</b> application expires for failure held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or ter CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated patent yet as shortened by any terminal disclaimer filed prior to its grant.	nstant application that would the term of any patent granted on a the pending <b>reference</b> to pay a maintenance fee, is minally disclaimed under 37 prior to the expiration of its full								
Check either box 1 or 2 below, if appropriate.									
1. The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to ac	t on behalf of the assignee.								
<ol> <li>Hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or five (5) years, or both.</li> <li>The undersigned is an attorney or agent of record. Reg. No. 26,418</li> </ol>	imprisonment of not more than								
/Toby H Kusmer/	May 15, 2014								
Signature	Date								
Tohy H Kusmer									
Typed or printed name									
Attorney for Assignee	(617) 525 4000								
Title	Telephone Number								
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WARNING: Information on this form may become public. Credit card information s be included on this form. Provide credit card information and authorization on P	should not ₽TO-2038.								
This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the pub to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estim including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon	lic which is to file (and by the USPTO nated to take 12 minutes to complete, the individual case. Any comments on								

to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 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.

Electronic Patent Application Fee Transmittal										
Application Number:	139	911792								
Filing Date:	06-	Jun-2013								
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES									
First Named Inventor/Applicant Name:	Vic	tor Larson								
Filer:	Toby H. Kusmer./Kimila Carraway									
Attorney Docket Number:	775	580-196(VRNK1CP3	CNFT10)							
Filed as Large Entity										
Utility under 35 USC 111(a) Filing Fees										
Description		Fee Code	Quantity	Amount	Sub-Total in USD(\$)					
Basic Filing:										
Pages:										
Claims:										
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Electronic Acknowledgement Receipt				
EFS ID:	19044788			
Application Number:	13911792			
International Application Number:				
Confirmation Number:	7953			
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES			
First Named Inventor/Applicant Name:	Victor Larson			
Customer Number:	23630			
Filer:	Toby H. Kusmer./Kimila Carraway			
Filer Authorized By:	Toby H. Kusmer.			
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)			
Receipt Date:	15-MAY-2014			
Filing Date:	06-JUN-2013			
Time Stamp:	20:22:48			
Application Type:	Utility under 35 USC 111(a)			

## Payment information:

Submitted with Payment	yes				
Payment Type	Deposit Account				
Payment was successfully received in RAM \$200					
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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)					

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File Listin	g:							
Document Number	<b>Document Description</b>	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)			
1		077580-0196_Response_After_ 2860967		ves	5			
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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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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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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 your 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.

Application Number	Application/Control No.		Applicant(s)/Patent under Reexamination	
	13/911,792		LARSON ET AL.	
Document Code - DISQ		Internal D	ocument – DC	NOT MAIL

TERMINAL DISCLAIMER		
Date Filed : 5/15/14	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

ANDRE ROBINSON

U.S. Patent and Trademark Office

PTO/SB/30 (07-09)

Approved for use through 07/31/2012. OMB 0651-0031 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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(	for	Application Number	13911792	*****		
Continu	ed Examination (RCE)	Filing Date	2013-06-06			
Continu	Transmittal	First Named Invento	r Victor Larso	n		
Address to:	Hanomida	Art Unit	2453			
Mail Stop RCE Commissioner f	or Patents	Examiner Name	Krisna Lim			
P.O. Box 1450 Alexandria, VA	22313-1450	Atterney Deeket No	77580-196			
		Allomey Docket Nu	nber processes			
Request for Contin 1995, or to any de	st for Continued Examination (RCE) ( ued Examination (RCE) practice under 37 Cl sign application. See Instruction Sheet for RC	FR 1.114 does not apply to Es (not to be submitted to	the above-identil any utility or plant a the USPTO) on pag	fied application. pplication filed prior to June 8, e 2.		
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Signature	/Toby H. Kusmer/		Date	May 19, 2014		
Name (Print/Type)	Toby H. Kusmer		Registration No.	26,418		
I hereby certify that thi addressed to: Mail Sto Office on the date sho	CERTIFICATE OF s correspondence is being deposited with the Unite p RCE, Commissioner for Patents, P. O. Box 1450, wn below.	MAILING OR TRANSMIS of States Postal Service with su Alexandria, VA 22313-1450 oi	SION fficient postage as first facsimile transmitted t	dass mail in an envelope o the U.S. Patent and Trademark		
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to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 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 SE ND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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#### Instruction Sheet for RCEs

(not to be submitted to the USPTO)

#### NOTES:

An RCE is not a new application, and filing an RCE will not result in an application being accorded a new filing date.

#### Filing Qualifications:

The application must be a utility or plant application filed on or after June 8, 1995. The application cannot be a provisional application, a utility or plant application filed before June 8, 1995, a design application, or a patent under reexamination. See 37 CFR 1.114(e).

#### Filing Requirements:

**Prosecution in the application must be closed.** Prosecution is closed if the applicat ion is under appeal, or the last Office action is a final action, a notice of allowance, or an action that otherwise closes prosecution in the application (e.g., an Office action under *Ex parte Quayle*). See 37 CFR 1.114(b).

**A** submission and a fee are required at the time the RCE is filed. If reply to an Office action under 35 U.S.C. 132 is outstanding (e.g., the application is under final rejection), the submission must meet the reply requirements of 37 CFR 1.111. If there is no outstanding Office action, the submission can be an information disclosure statement, an amendment, new arguments, or new evidence. See 37 CFR 1.114(c). The submission may be a previously filed amendment (e.g., an amendment after final rejection).

#### WARNINGS:

#### Request for Suspension of Action:

All RCE filing requirements must be met before suspension of action is granted. A request for a suspension of action under 37 CFR 1.103(c) does not satisfy the submission requirement and does not permit the filing of the required submission to be suspended.

#### Improper RCE will NOT toll Any Time Period:

**Before Appeal** - If the RCE is improper (e.g., prosecution in the application is not closed or the submission or fee has not been filed) and the application is not under appeal, the time period set forth in the last Office action will continue to run and the application will be abandoned after the statutory time period has expired if a reply to the Office action is not timely filed. No additional time will be given to correct the improper RCE.

**Under Appeal -** If the RCE is improper (e.g., the submission or the fee has not been filed) and the application is under appeal, the improper RCE is effective to withdraw the appeal. Withdrawal of the appeal results in the allowance or abandonment of the application depending on the status of the claims. If there are no allowed claims, the application is abandoned. If there is at least one allowed claim, the application will be passed to issue on the allowed claim(s). See MPEP 1215.01.

#### See MPEP 706.07(h) for further information on the RCE practice.

Page 2 of 2

#### **Privacy Act Statement**

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

- The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
- 2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
- 5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
- A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
- 7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
- 8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
- 9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal					
Application Number:	13911792				
Filing Date:	06-Jun-2013				
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES				
First Named Inventor/Applicant Name:	Vic	tor Larson			
Filer:	То	by H. Kusmer./Kerri	e Jones		
Attorney Docket Number:	77	580-196(VRNK1CP3	CNFT10)		
Filed as Large Entity					
Utility under 35 USC 111(a) Filing Fees					
Description		Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for Continued Examination	1801	1	1200	1200
	Tot	al in USD	)(\$)	1200

Electronic Acknowledgement Receipt					
EFS ID:	19061957				
Application Number:	13911792				
International Application Number:					
Confirmation Number:	7953				
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES				
First Named Inventor/Applicant Name:	Victor Larson				
Customer Number:	23630				
Filer:	Toby H. Kusmer./Kerrie Jones				
Filer Authorized By:	Toby H. Kusmer.				
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)				
Receipt Date:	19-MAY-2014				
Filing Date:	06-JUN-2013				
Time Stamp:	12:26:10				
Application Type:	Utility under 35 USC 111(a)				

## Payment information:

Submitted wi	th Payment	yes	yes				
Payment Type	e	Deposit Account					
Payment was	successfully received in RAM	\$1200					
RAM confirma	ation Number	10935					
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	EXAMINATION FE (37 CFR 1.16(o), (p),	EE or (q))		N/A		N/A		N/J	A		
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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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Applicant:	Victor Larson	Docket No. 077580-0196	.An
	SYSTEM AND METHOD EMPLOYING AN A	GILE NETWORK PROTOCOL'FOR	······
Title:	SECURE COMMUNICATIONS USING SECUR	E DOMAIN NAMES Serial/Reg /Patent N	o. <b>13/911,792</b>
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	· · · ·	1.7	EM391227393US
		(120115)	EM391227402US
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## PATENT ABSTRACTS OF JAPAN

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(21)Application numb	er : 08-083518	(71)Applicant	: NIPPON TELEGR & TELEPH CORP <ntt></ntt>
(22)Date of filing :	05.04.1996	(72)Inventor :	MURAYAMA JUNICHI TANIMOTO SHIGEAKI ISHIHARA FUMIAKI OZAWA KAZUYUKI

#### (54) ADDRESS SOLUTION PROCESSING METHOD

#### (57)Abstract:

PROBLEM TO BE SOLVED: To provide an address solution processing method in which an intensified security function and high speed communication are made compatible.

SOLUTION: In the method for solving a physical address of a non-multiple address wide area network 10 from an internet address by an address solution server 7 used to build up an internet on the non-multiple address wide area network 10, in the case of receiving an address solution request with respect to a same destination internet address, a reply is made or not by a different physical address depending on the internet address of a request source for address solution. In the embodiment, based on information registered in advance, a reply is made by a physical address of a destination host with respect to an address solution request from a host whose communication is allowed and no reply is made to an address solution request from a host whose communication is not allowed, and reply is made with a



physical address of a router having a security function with respect to an address solution request from a host whose communication permission is not definitely decided.

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(21)出顧番号	特顧平8-83518	(71)出願人	000004226 日本費付貸款株式会社
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(54) 【発明の名称】 アドレス解決処理方法

(57)【要約】

【課題】 セキュリティ機能の強化と高速通信とが両立 したアドレス解決処理方法を提供する。

【解決手段】 非同報型広域網上にインタネットを構築 する際に用いるアドレス解決サーバで、インタネットア ドレスから非同報型広域網の物理アドレスを解決する方 法において、同一宛先インタネットアドレスに対するア ドレス解決要求受信時に、アドレス解決の要求元のイン タネットアドレスに応じて異なる物理アドレスで応答す るか又は応答しないようにする。一例では、予め登録さ れた情報に基づき、通信許可済のホストからのアドレス 解決要求に対しては宛先ホストの物理アドレスで応答 し、通信不許可のホストからのアドレス解決要求に対し ては応答せず、通信許可又は不許可を一律に決められな いホストからのアドレス解決要求に対してはセキュリテ ィ機能を有する中継ルータの物理アドレスで応答する。



【特許請求の範囲】

【請求項1】 非同報型広域網上にインタネットを構築 する際に用いられるアドレス解決サーバで、インタネッ トで用いられるインタネットアドレスから非同報型広域 網で用いられる物理アドレスを解決するアドレス解決処 理方法において、同一宛先インタネットアドレスに対す るアドレス解決要求受信時に、アドレス解決の要求元の インタネットアドレスに応じて異なる物理アドレスで応 答するか又は応答しないことを特徴とするアドレス解決 処理方法。

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【請求項2】 予め登録された情報に基づき、通信を許 可されているホストからのアドレス解決要求に対しては 宛先ホストの物理アドレスで応答し、通信を許可されて いないホストからのアドレス解決要求に対しては応答せ ず、通信の許可又は不許可を一律に決められないホスト からのアドレス解決要求に対してはセキュリティ機能を 有する中継ルータの物理アドレスで応答することを特徴 とする請求項1に記載のアドレス解決処理方法。

【発明の詳細な説明】

[0001]

【発明の属する技術分野】本発明は、非同報型広域網上 にインタネットを構築する際に用いられるアドレス解決 サーバに用いて好適なアドレス解決処理方法に関するも のである。

【0002】非同報型広域網上でのアドレス解決処理 は、非同報型広域網上の異なるサブネットに帰属するホ スト間で、中継ルータを介さない高速パケット通信経路 を設定するために必要な処理である。これを実現する従 来のアドレス解決処理方法では、同一宛先インタネット アドレスに対するアドレス解決要求に対しては、アドレ 30 ス解決の要求元のインタネットアドレスに関わりなく、 同一の物理アドレスで応答していた。

[0003]

【発明が解決しようとする課題】非同報型広域網上に構 築されたインタネットでは、異なるサブネットに帰属す るホスト間通信でも中継ルータを介さない通信が可能で あるため、同一宛先インタネットアドレスに対するアド レス解決要求に対して、アドレス解決の要求元のインタ ネットアドレスに関わりなく同一の物理アドレスで応答 すると、常に中継ルータを介しない通信が行われてしま 40 う。中継ルータを介さない通信が行われると、パケット 中継処理遅延を削減できるものの、パケット転送路上で ファイアウォールと呼ばれるようなパケット中継装置を 用いてパケットフィルタリングを行うことが不可能にな る。

【0004】一方この問題を解決するために、常に中継 ルータを介した通信を行うこともできるが、この場合、 パケット転送路上でパケットフィルタリングを行うこと が可能になるものの、常にパケット中継処理遅延が増加 する。従って、このような従来のアドレス解決処理方法 50 2

では、セキュリティ機能の弱い高速通信又はセキュリテ ィ機能の強い低速通信のいずれかしか実現できないとい う欠点があった。

【0005】そこで、本発明はこの問題を解決し、セキ ユリティ機能の強化と高速通信とを両立させるアドレス 解決処理方法を提供することを目的とする。

[0006]

【課題を解決するための手段】本発明のアドレス解決処 理方法は、上述の目的を達成するために行われた発明で 10 あって、パケット転送に先立つアドレス解決処理時に、

同一宛先インタネットアドレスに対するアドレス解決要 求受信時でも、アドレス解決の要求元のインタネットア ドレスに応じて異なる物理アドレスで応答するか又は応 答しないことを特徴とする。

【0007】このような本発明においては、アドレス解 決処理時に、例えば、予め登録された情報に基づき、通 信を許可されているホストからのアドレス解決要求に対 しては直接宛先ホストの物理アドレスで応答し、通信を 許可されていないホストからのアドレス解決要求に対し

ては応答せず、通信の許可又は不許可を一律に決められ ないホストからのアドレス解決要求に対してはセキュリ ティ機能を有する中継ルータの物理アドレスで応答する ようにすることができる。

【0008】このようにすれば、通信を許可されている ホストとは高速通信が実現され、通信を許可されていな いホストからのアクセスが防止され、通信の許可又は不 許可を一律に決められないホストとは、セキュリティ機 能を有する中継ルータを介した通信が実現され、セキュ リティ機能の強化と高速通信とを両立させることができ る。

#### [0009]

【発明の実施の形態】次に図面を用いて、本発明の実施 例を説明する。図1は本発明を実施するためのネットワ ークモデルを示す図、図2はアドレス解決サーバでの本 発明におけるアドレス解決処理を説明するフローチャー トである。

【0010】図1のネットワークモデルは広域ATM網 10を示しており、この広域ATM網10は、端末1を含む サブネット11、端末2を含むサブネット12、端末3を含 むサブネット13、並びに、端末4、端末5、ルータ6及 びアドレス解決サーバ7を含むサブネット14から構成さ れている。図中のIP.a.b. はインタネットアドレスを示 し、ATM.a.b.は非同報型広域網の物理アドレスを意味 し、aの部分はサブネット部、bの部分はホスト部を表 す。また、図中のxは任意の正の整数を表す。このよう な構成において、例えば、アドレス解決サーバ7には、 予め、ルータ6を介さない通信を許可するサブネットと してサブネット13を登録する。

【0011】先ず、ルータを介さない通信を許可する場

3 合について説明する。サブネット11の端末1がサブネッ ト14の端末1と通信しようとした場合、端末1はアドレ ス解決サーバ7にアドレス解決要求パケットを送信す る。アドレス解決サーバ7は、アドレス解決要求パケッ ト受信処理を行い(図2のステップ22)、この後ソース アドレス解析処理を行い(ステップ23)端末1のIP.1. 1. を特定する。IP.1.1.はルータを介さない通信を許可 するサブネット1(IP.1.x)に帰属するため、宛先端末 アドレス解析処理を行い (ステップ24)、ATM.4.2 を解 決する。

【0012】この後アドレス解決応答パケット送信処理 を行い(ステップ27)、アドレス解決要求パケット送信 元の端末1に対してATM.4.2 を解決したアドレス解決応 答パケットを送り返す。アドレス解決終了後、端末1は IPパケットをATM.4.2 を付与した内部転送用フレームに カプセル化し、これを直接端末4に転送する。なお、図 2のステップ21及び28は、それぞれ開始及び終了のステ ップである。

【0013】次に、通信を許可しない場合について説明 する。サブネット13の端末3がサブネット14の端末4と 20 有する中継ルータを介した通信が実現される。また、パ 通信しようとした場合、端末3はアドレス解決サーバ7 にアドレス解決要求パケットを送信する。アドレス解決 サーバ7は、アドレス解決要求パケット受信処理を行い (図2のステップ22)、この後ソースアドレス解析処理 を行い(ステップ23)、端末1のIP.4.2.を特定する。 IP.4.2. は通信を許可しないサブネット13 (IP.4.x) に 帰属するため、無応答処理を行い(ステップ26)、ここ で処理が終了する。ここでは、アドレス解決が行われな いため、端末3はIPパケットを端末4に向けて送信でき ない。

【0014】最後に通信の許可又は不許可が不明な場合 について説明する。サブネット12の端末2がサブネット 14の端末4と通信しようとした場合、端末2はアドレス 解決サーバ7にアドレス解決要求パケットを送信する。 アドレス解決サーバ7は、アドレス解決要求パケット受 信処理を行い(図2のステップ22)、この後ソースアド レス解析処理を行い(ステップ23)、端末1のIP.2.2. を特定する。IP.2.2.の端末に関しては許可又は不許可 が不明のため、中継ルータアドレス解決処理を行い(ス

テップ25)、ATM.4.1 を解決する。 【0015】この後アドレス解決応答パケット送信処理 を行い(ステップ27)、アドレス解決要求パケット送信 元の端末2に対してATN.4.1を解決したアドレス解決応 答パケットを送り返す。アドレス解決終了後、端末2は IPパケットをATM.4.1 を付与した内部転送用フレームに カプセル化し、これを中継ルータ6に転送する。中継ル ータ6では、中継パケットのソースIPアドレス又は TCP ポート番号等を基にしてパケットフィルタリングを行

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10 い、必要なパケットのみを端末4に転送する。 [0016]【発明の効果】上述のように、本発明によれば、アドレ ス解決処理時におけるセキュリティ機能及びパケット転 送時におけるセキュリティ機能が効果的に発揮される。 即ち、アドレス解決処理時におけるセキュリティ機能に よって、通信を許可されているホストとは中継ルータを 介さない高速通信が実現され、通信を許可されていない ホストからのアクセスが防止され、通信の許可又は不許 可を一律に決められないホストとはセキュリティ機能を

ケット転送時のセキュリティ機能によって、通信の許可 又は不許可を一律に決められないホストとの通信時に、 中継ルータにおいて、中継パケットのソースIPアドレス 又は TCPポート番号等を基にしてパケットフィルタリン グを行うことができる。従って、セキュリティ機能の強 化と高速通信とを両立させることができる。 【図面の簡単な説明】

【図1】本発明を実施するためのネットワークモデルを 示す図である。

- 30 【図2】アドレス解決サーバでの本発明におけるアドレ ス解決処理を説明するフローチャートである。 【符号の説明】
  - 1、2、3、4、5 端末 6 ルータ
  - 7 アドレス解決サーバ
  - 10 広域ATM網
  - 11、12、13、14 サブネット
  - 21~28 フローチャートの各ステップ







フロントページの続き

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(54) Title: METHOD AND APPARATUS FOR TRANSPARENTLY PROCESSING DNS TRAFFIC						
(57) Abstract A method and apparatus for transparently processing DNS traffic. To access information on the internet using a domain name, the internet protocol (IP) address that maps to the host name must be determined. The host name system (DNS) is utilized to transmit and process the address and domain name information. DNS traffic comprises approximately 10 % of the internet network traffic. When a client requests a name server to translate a domain name into an IP address, the requests are forwarded from one network router to another network router until a name server that maintains the desired information is reached. The network routers do not examine the information, but merely forward the information along the pathway to the destination name server. One or more embodiments of the invention provide for updated routers that recognize when the information consists of DNS traffic, parses the information, caches the address information (if any), and then continues to forward the desired information back to the client of the name service. Consequently, when another request for						

similar address information is forwarded to a router, the router can provide the response to the requestor instead of forwarding the request to a distant name server. In this manner, routers intercept DNS traffic and cache DNS information, allowing clients that utilize different name servers to benefit from the cached information. Such updated routers reduce the latency in DNS responses and reduce network traffic.

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#### METHOD AND APPARATUS FOR TRANSPARENTLY PROCESSING DNS TRAFFIC

#### **BACKGROUND OF THE INVENTION**

#### 1. FIELD OF THE INVENTION

This invention relates to the field of computer software, and, more specifically, to caching DNS information.

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#### 2. <u>BACKGROUND ART</u>

In a computer network environment and the internet, computers on the network (clients or servers) are assigned unique identifiers that may be 25 mapped to a textual name referred to as a domain name. Computer users often only have knowledge of the domain name and not the unique identifier. To communicate with a computer on the network, the unique identifier of the computer you are contacting must be ascertained. To ascertain the unique identifier, network routers forward the identifier request to other routers until a domain name server that maintains the desired information is located. Existing schemes can waste time forwarding the identifier request from one router to another router resulting in an increase

5 of traffic on the network and slowing down the time it takes to access and retrieve any information on the internet. These problems can be understood by reviewing networks, internets, and how they work.

#### <u>Networks</u>

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In modern computing environments, it is commonplace to employ multiple computers or workstations linked together in a network to communicate between, and share data with, network users. A network also may include resources, such as printers, modems, file servers, etc., and may also include services, such as electronic mail.

A network can be a small system that is physically connected by cables (a local area network or "LAN"), or several separate networks can be connected together to form a larger network (a wide area network or

- 20 "WAN"). Other types of networks include the internet, tel-com networks, the World Wide Web, intranets, extranets, wireless networks, and other networks over which electronic, digital, and/or analog data may be communicated.
- 25 Computer systems sometimes rely on a server computer system to provide information to requesting computers on a network. When there are a large number of requesting computers, it may be necessary to have more than one server computer system to handle the requests. In prior art systems,

there is a problem in efficiently directing requests to the correct server in a multiple server system.

One area where this has been a problem is on the internet. The 5 problem can be better understood by reviewing the structure and operation of the internet below.

#### The Internet

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The Internet is a worldwide network of interconnected computers. An Internet client accesses a computer on the network via an Internet provider. An Internet provider is an organization that provides a client (e.g., an individual or other organization) with access to the Internet (via analog telephone line or Integrated Services Digital Network line, for example). A client can, for example, read information from, download a file from or send

an electronic mail message to another computer/client using the Internet.

To retrieve a file or service on the Internet, a client must search for the 20 file or service, make a connection to the computer on which the file or service is stored, and download the file or service. Each of these steps may involve a separate application and access to multiple, dissimilar computer systems. The World Wide Web (WWW) was developed to provide a simpler, more uniform means for accessing information on the Internet.

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The components of the WWW include browser software, network links, servers. and WWW protocols. The browser software, or browser, is a user-friendly interface (i.e., front-end) that simplifies access to the Internet. A

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browser allows a client to communicate a request without having to learn a complicated command syntax, for example. A browser typically provides a graphical user interface (GUI) for displaying information and receiving input. Examples of browsers currently available include Mosaic, Netscape Navigator and Communicator, Microsoft Internet Explorer, and Cello.

Information servers maintain the information on the WWW and are capable of processing a client request. Hypertext Transport Protocol (HTTP) is the standard protocol for communication with an information server on the WWW. HTTP has communication methods that allow clients to request data from a server and send information to the server.

To submit a request, the client contacts the HTTP server and transmits the request to the HTTP server. The request contains the communication method requested for the transaction (e.g., GET an object from the server or POST data to an object on the server). The HTTP server responds to the client by sending a status of the request and the requested information. The connection is then terminated between the client and the HTTP server.

20 A client request therefore, consists of establishing a connection between the client and the HTTP server, performing the request, and terminating the connection. The HTTP server does not retain any information about the request after the connection has been terminated. HTTP is, therefore, a stateless protocol. That is, a client can make several

25 requests of an HTTP server, but each individual request is treated independent of any other request. The server has no recollection of any previous request.

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An addressing scheme is employed to identify Internet resources (e.g., HTTP server, file or program). This addressing scheme is called Uniform Resource Locator (URL). A URL contains the protocol to use when accessing the server (e.g., HTTP), the Internet domain name of the site on which the server is running, the port number of the server, and the location of the resource in the file structure of the server.

The WWW uses a concept known as hypertext. Hypertext provides the ability to create links within a document to move directly to other information. To activate the link, it is only necessary to click on the hypertext link (e.g., a word or phrase). The hypertext link can be to information stored on a different site than the one that supplied the current information. A URL is associated with the link to identify the location of the additional information. When the link is activated, the client's browser uses the link to access the data at the site specified in the URL.

If the client request is for a file, the HTTP server locates the file and sends it to the client. An HTTP server also has the ability to delegate work to gateway programs. The Common Gateway Interface (CGI) specification

- 20 defines a mechanism by which HTTP servers communicate with gateway programs. A gateway program is referenced using a URL. The HTTP server activates the program specified in the URL and uses CGI mechanisms to pass program data sent by the client to the gateway program. Data is passed from the server to the gateway program via command-line arguments, standard
- 25 input, or environment variables. The gateway program processes the data and returns its response to the server using CGI (via standard input, for example). The server forwards the data to the client using the HTTP.

A browser displays information to a client/user as pages or documents (referred to as "web pages" or "web sites"). A language is used to define the format for a page to be displayed in the WWW. The language is called Hypertext Markup Language (HTML). A WWW page is transmitted to a

5 client as an HTML document. The browser executing at the client parses the document and displays a page based on the information in the HTML document.

HTML is a structural language that is comprised of HTML elements that are nested within each other. An HTML document is a text file in which certain strings of characters, called tags, mark regions of the document and assign special meaning to them. These regions are called HTML elements. Each element has a name, or tag. An element can have attributes that specify properties of the element. Blocks or components include unordered list, text

15 boxes, check boxes, radio buttons, for example. Each block has properties such as name, type, and value. The following provides an example of the structure of an HTML document:

	<html></html>
20	<head>  element(s) valid in the document head </head>
	<body>  element(s) valid in the document body </body>
25	

Each HTML element is delimited by the pair of characters "<" and ">". The name of the HTML element is contained within the delimiting characters. The combination of the name and delimiting characters is

30 referred to as a marker, or tag. Each element is identified by its marker. In most cases, each element has a start and ending marker. The ending marker

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is identified by the inclusion of an another character, "/" that follows the "<" character.

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HTML is a hierarchical language. With the exception of the HTML element, all other elements are contained within another element. The HTML element encompasses the entire document. It identifies the enclosed text as an HTML document. The HEAD element is contained within the HTML element and includes information about the HTML document. The BODY element is contained within the HTML. The BODY element contains all of the text and other information to be displayed. Other HTML elements are described in HTML reference manuals.

## Domain Name Server

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A computer user navigates the internet or web from a browser on a computer system. To access a web site, the user enters the host name (or domain name) of the web site into the browser. This can be accomplished by clicking on a link, by activating a tool bar button, or by manually entering a

- 20 name or address into a location field and pressing "enter". The names that a browser client uses are known as host names, such as www.sun.com for example. The name that is entered is not the actual Internet Protocol (IP) address of the intended web server. The actual IP address is a string of numbers that uniquely locate the web server that provides the web site data.
- 25 A worldwide distributed database system, called the "Domain Name System (DNS)" provides the mapping between server names and the associated IP addresses.

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Each client (or host) is configured with, or otherwise learns about, a name server that is willing to answer its queries (for mapping a domain name to an IP address, or vice versa). Such a name server is referred to as the "local name server" for that host. Client application software, such as a web

- 5 browser, also use a local library, called the "DNS resolver" to obtain the translation from server name to IP address. The resolver in turn contacts a predetermined local DNS name server to obtain the translation. DNS name servers can maintain caches of previously resolved names. More specifically, name resolution processes typically require two hosts on the client side.
- 10 Consider a user working on "asha.eng.sun.com" that wants to get the address of "whitehouse.gov". The client browser will talk with a local resolver (a library attached to the browser process itself, in the current example running on asha.eng.sun.com). The local resolver will go to one of a relatively small number of local name servers, e.g. "ns.sun.com". Here ns.sun.com is called
- 15 the client side name server. The client side name server will communicate with the outside world to determine the IP address of whitehouse.gov, and forward this information to the resolver that is part of the browser process.

DNS is a global network of servers that translate host names into

- 20 numerical addresses (known as Internet Protocol, or IP addresses) and provides IP address to name mapping as well. A DNS server consists of a name server and a resolver. The name server provides responses to resolver requests when it can by supplying the correct address for the host name supplied by the resolver. Referring to Figure 1, at step 100, the user enters the
- 25 domain name into the browser. At step 102, the browser requests the DNS Resolver to translate the domain name into the IP address. At step, 104, the resolver searches its cache to see if it already has a valid (unexpired) mapping available. If the cache has a valid mapping, it returns the IP address to the

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browser at step 116. If the mapping is not in cache, the resolver forwards the request to the local name server at step 106.

All name servers know about at least one other name server that 5 provides the DNS service for the root (.) domain. Thus, at step 108, the local name server contacts the name server for the any known domain. For example, if the host name is "www.java.sun.com", and the local name server does not know the address for the name server "java.sun.com", it will check to see if it knows the next level domain, i.e., the address for "sun.com". If the

- 10 local name server does not know the address for "sun.com", it will check to see if it knows the address of next level domain, i.e., ".com". If the local name server does not know the address for ".com", it will contact the root name server ".". At step 110, the local name server will obtain the address for the complete domain from the name server contacted (if that name server
- 15 knows the address). Otherwise, at step 110, the local name server will obtain the address for the next level of the domain from the contacted name server. For example, if the local name server contacted the name server for ".com" and that name server does not know the full address, the ".com" name server will return the domain address for "sun.com". Steps 108 and 110 are then
- 20 repeated until the complete domain address is obtained. Continuing with the above example, the local name server would contact the "java.com" name server and obtain the address for "java.sun.com". The local name server would then contact the name server for "java.sun.com" and obtain the address for "www.java.sun.com". When a request is made to a name server,
- 25 there are often many network routers ("routers") that forward the request from one location to another until it reaches the desired name server.

Once an intermediate or complete IP address is obtained, the address is saved in cache so that a future request may be serviced entirely from local cache at step 114. Thus, if a request for an alternative domain is received (e.g., a request for "ftp.sun.com"), the local name server can contact the name

5 server (e.g., "sun.com") directly, without repeating the communication with the root domain server or with intermediate name servers (e.g., the ".com" name server). At step, 116, the IP address is returned to the browser. Once the IP address is known, the browser communicates with the web server at that address to retrieve the requested web page or other information.

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The operation of the DNS network is described in:

P.V. Mockapetris "Domain names - concepts and facilities", RFC 1034. Nov 1987.

P.V. Mockapetris "Domain names - implementation and specification", RFC 1035. Nov 1987.

### DNS Server Problems

When DNS information is cached in a local name server, the cached information is only available to the clients that access that particular local name server (e.g., clients of the same internet service provider, or members of the same organization). Thus, if two users access different local name servers and each user requests the same IP address, both requests will have to go up the chain of name servers through the various routers, to obtain the

25 needed information.

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For example, if two users in different universities in New Zealand were to query the DNS for the IP address of www.sun.com, both of the requests would be serviced by the local name server at ns.sun.com in the United States without any local caching benefit. Figure 2 provides another example of the prior art. Clients Cl1 212 and Cl2 214 are part of the SUN network 200 that utilizes local name server DNS1 220. Clients Cl3 216 and Cl4 218 are part on the NSCP network 204 that utilizes local name server DNS2 222. If client Cl1 212 requests information regarding an IP address on the SYDNEY 2000 network 208 in Sydney, Australia, the request is processed at the SYDNEY 2000 208 network's local name server ns.syd.au 224. Routers 210 would forward the request from Cl1 to the local name servers 220 that forwards the request through routers 210 on the internet 206 until it reaches the SYDNEY 2000 network 208 and name server 224. The request is then

transmitted back along the same route through routers 210 until it returns back to local name server 220 where it is cached.

Only clients that access that same local DNS name server benefit from the caching information. Thus, in the above example, only Cl₂ benefits from the Cl₁ request and its resulting cached information. If Cl₄ requests a DNS translation for www.syd.au, it does not benefit from the cached information, and the information is requested and transmitted all the way to Australia and back. Thus, both DNS₁ and DNS₂ would obtain the relevant information from Australia creating traffic on the individual networks 200 204 and 208 and internet 206.

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Networks may be divided up into layers. For example, one layer may provide for the forwarding of information from one location to another, referred to as the network layer, and another layer may provide for the

parsing and processing of the information passed across the network, referred to as the application layer. Name resolution as provided by the domain name system (DNS) is an application layer protocol. Network routers 210 are only concerned with the network layer protocol and forward the DNS request

5 to its desired destination. Consequently, routers 210 don't parse or process the information that they forward in packets.

#### Network Traffic Reduction

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Prior art methods for reducing network traffic have provided methods for caching web pages and HTML information. Two such prior art methods are referred to as Active Networks and Transparent Proxies.

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#### Active Networks

Routers are dedicated machines for forwarding and switching traffic as quickly as possible. In an Active Network, specific routers are configured to 20 process packets of web and other non-DNS information. Specific geographic locations are chosen to place the specially configured routers. Consequently, the performance of an Active Network is based on the placement strategy of the updated routers.

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#### Transparent Proxies

Transparent Proxies are used mostly by large corporations and internet service providers for reducing their web traffic. In a typical set-up, the domain administrator configures the routers so that all of the web requests (identified by a port number, e.g., 80) are automatically diverted to a proxy server ("transparent proxy"). A proxy server (or proxy) is a server that carries out requests transmitted to it (i.e., from a client), keeping copies of fetched documents or information for some time so that they can be accessed more

- 10 quickly in the future, speeding up access for commonly requested information. This storing and retrieval of information and fetched documents by the proxy is referred to as caching and the information maintained in the proxy is referred to as a cache or proxy cache. If the proxy does not have the desired information, the proxy sends a request to the
- 15 appropriate web server (which may be processed through several routers) that then returns the information to the proxy for caching. When the proxy gets the desired information, it provides this information to the requesting client.
- The prior art methods do not provide any method for optimizing DNS 20 traffic. Approximately 10% of the traffic on the internet is currently comprised of DNS traffic. Further, since DNS information does not change often (IP addresses often remain the same even when computers on a network are moved), the validity of a DNS entry may be much longer than that of data transmitted through the web. Consequently, an efficient method 25 for optimizing and processing DNS traffic is needed.

#### SUMMARY OF THE INVENTION

A method and apparatus for transparently processing DNS traffic. To access information on the internet using a domain name, the internet 5 protocol (IP) address that maps to the domain name must be determined. The domain name system (DNS) is utilized to transmit and process the address and domain name information. DNS traffic comprises approximately 10% of the internet network traffic.

10 When a client requests a name server to translate a domain name into an IP address, the requests are forwarded from one network router to another network router until a name server that maintains the desired information is located. The network routers do not examine the information, but merely forward the information along the pathway to the destination name server.

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One or more embodiments of the invention provide for updated routers that recognize when the information consists of DNS traffic, parses the information, caches the address information (if any), and then continues to forward the desired information back to the name server. Consequently,

20 when another request for similar address information is forwarded to a router, the router can provide the response to the requestor instead of forwarding the request to a distant name server. In this manner, routers intercept DNS traffic and cache DNS information, allowing clients that utilize different name servers to benefit from the cached information. Such updated

25 routers reduce the latency in DNS responses and reduce network traffic.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a prior art method for processing DNS information.

5 Figure 2 demonstrates the relationship between several networks.

Figure 3 is a block diagram of one embodiment of a computer system capable of providing a suitable execution environment for one or more embodiments of the invention.

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Figure 4 demonstrates the relationship between several networks and the path of DNS traffic according to one or more embodiments of the invention.

15 Figure 5 illustrates the steps executed by an updated router according to one or more embodiments of the invention.

#### DETAILED DESCRIPTION OF THE INVENTION

The invention is a method and apparatus for transparently caching DNS traffic. In the following description, numerous specific details are set forth to provide a more thorough description of embodiments of the invention. It is apparent, however, to one skilled in the art, that the invention may be practiced without these specific details. In other instances, well known features have not been described in detail so as not to obscure the invention.

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#### Embodiment of Computer Execution Environment (Hardware)

An embodiment of the invention can be implemented as computer software in the form of computer readable code executed on a general

- 15 purpose computer such as computer 300 illustrated in Figure 3, or in the form of bytecode class files running on such a computer. A keyboard 310 and mouse 311 are coupled to a bi-directional system bus 318. The keyboard and mouse are for introducing user input to the computer system and communicating that user input to processor 313. Other suitable input devices
- 20 may be used in addition to, or in place of, the mouse 311 and keyboard 310.
   I/O (input/output) unit 319 coupled to bi-directional system bus 318
   represents such I/O elements as a printer, A/V (audio/video) I/O, etc.

Computer 300 includes a video memory 314, main memory 315 and mass storage 312, all coupled to bi-directional system bus 318 along with keyboard 310, mouse 311 and processor 313. The mass storage 312 may include both fixed and removable media, such as magnetic, optical or magnetic optical storage systems or any other available mass storage WO 00/14938

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technology. Bus 318 may contain, for example, thirty-two address lines for addressing video memory 314 or main memory 315. The system bus 318 also includes, for example, a 32-bit data bus for transferring data between and among the components, such as processor 313, main memory 315, video memory 314 and mass storage 312. Alternatively, multiplex data/address lines may be used instead of separate data and address lines.

In one embodiment of the invention, the processor 313 is a microprocessor manufactured by Motorola, such as the 680X0 processor or a

- 10 microprocessor manufactured by Intel, such as the 80X86, or Pentium processor, or a SPARC microprocessor from Sun Microsystems, Inc. However, any other suitable microprocessor or microcomputer may be utilized. Main memory 315 is comprised of dynamic random access memory (DRAM). Video memory 314 is a dual-ported video random access memory.
- One port of the video memory 314 is coupled to video amplifier 316. The video amplifier 316 is used to drive the cathode ray tube (CRT) raster monitor 317. Video amplifier 316 is well known in the art and may be implemented by any suitable apparatus. This circuitry converts pixel data stored in video memory 314 to a raster signal suitable for use by monitor 317. Monitor 317 is
  a type of monitor suitable for displaying graphic images.

Computer 300 may also include a communication interface 320 coupled to bus 318. Communication interface 320 provides a two-way data communication coupling via a network link 321 to a local network 322. For

25 example, if communication interface 320 is an integrated services digital network (ISDN) card or a modem, communication interface 320 provides a data communication connection to the corresponding type of telephone line, which comprises part of network link 321. If communication interface 320 is

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a local area network (LAN) card, communication interface 320 provides a data communication connection via network link 321 to a compatible LAN. Wireless links are also possible. In any such implementation, communication interface 320 sends and receives electrical, electromagnetic or optical signals which carry digital data streams representing various types of information.

Network link 321 typically provides data communication through one or more networks to other data devices. For example, network link 321 may
provide a connection through local network 322 to local server computer 323 or to data equipment operated by an Internet Service Provider (ISP) 324. ISP 324 in turn provides data communication services through the world wide packet data communication network now commonly referred to as the "Internet" 325. Local network 322 and Internet 325 both use electrical,

15 electromagnetic or optical signals which carry digital data streams. The signals through the various networks and the signals on network link 321 and through communication interface 320, which carry the digital data to and from computer 300, are exemplary forms of carrier waves transporting the information.

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Computer 300 can send messages and receive data, including program code, through the network(s), network link 321, and communication interface 320. In the Internet example, remote server computer 326 might transmit a requested code for an application program through Internet 325, ISP 324, local network 322 and communication interface 320.

The received code may be executed by processor 313 as it is received, and/or stored in mass storage 312, or other non-volatile storage for later

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execution. In this manner, computer 300 may obtain application code in the form of a carrier wave.

Application code may be embodied in any form of computer programproduct. A computer program product comprises a medium configured to store or transport computer readable code, or in which computer readable code may be embedded. Some examples of computer program products are CD-ROM disks, ROM cards, floppy disks, magnetic tapes, computer hard drives, servers on a network, and carrier waves.

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The computer systems described above are for purposes of example only. An embodiment of the invention may be implemented in any type of computer system or programming or processing environment.

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#### Embodiment of Software Apparatus for Transparently Caching DNS Traffic

One or more embodiments of the invention may be described by examining the layered model of networking and the peer relationships

- 20 between the different layers. At the network layer, a peer relationship exists between each router that is connected by some type of wire. At the higher application layer, DNS entities (e.g., DNS resolvers and the local name servers) have a peer relationship with multiple hops in between (e.g., the routers). The routers at the network layer (the hops of the network layer) do
- 25 not examine the information from application layer protocols. The routers merely transparently transfer the information between DNS clients and DNS servers.
In one or more embodiments of the invention, the layering model of networks is violated. DNS traffic is communicated from one machine to another machine through the use of name service ports. DNS traffic commonly arrives from and is transmitted to a specific DNS port (e.g., port 53). Consequently, based on the port information that is present in all IP packets, the routers have the ability to identify when DNS traffic is being transmitted versus when web or other traffic is being transmitted.

When an intermediate router (or hop in the network protocol layer) 10 identifies that DNS information is in the packet it is transmitting across the internet, the routers violate the layering model and examine the information in the packet as if the router were a member of the application protocol. The information is then parsed and cached. Thus, the routers snoop on the DNS replies from a name-server and cache the intercepted replies. The routers

15 also intercept DNS requests, and determine if the request can be served from the cache. If the cache contains the requested information, the router provides the response to the DNS query. If the cache does not contain the requested information, the router forwards the request to the next router or hop along the path to the name server.

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Referring to the prior art system of Figure 1, at step 106, the resolver forwards the request to the local name server, and at step 108, the name server of the lowest level domain name is contacted. In one or more embodiments of the invention, the forwarding step 106 and the contacting

25 step 108 are processed through routers that may intercept the transmissions. The routers examine the packet of information from the intercepted transmissions and store any necessary information in cache. Further, when the information is obtained from the name server and transmitted back to

the local name server at step 110, in one or more embodiments of the invention, the routers again intercept the transmission, parse the information, and cache the address information as it passes by on its way to the local name server.

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Figure 5 demonstrates the process performed by an updated router according to one or more embodiments of the invention. The process starts at step 500. At step 502, the router examines the port information to determine if the current information is DNS traffic or some other type of

- 10 traffic (e.g., web traffic). If the information is not DNS traffic, the router merely performs as normal and forwards the request to the next hop to its destination at step 512.
- If the information is DNS traffic, the router parses the information at step 504. At step 506, the router determines if the parsed information (e.g., the requested address information) is in its cache. If the information is not in its cache, the router stores the relevant information (if any) in its cache at step 510 and forwards the request to the next hop in the information's path at step 512. If the information is in the router's cache, the router returns the requested information to the requestor at step 508. In this manner, the updated routers maintain their own cache and are capable of processing DNS translation requests.

Alternatively, between step 502 and step 504, if the information is DNS traffic, the router will automatically forward the DNS information to a preconfigured host. Routers are currently configured to recognize types of internet traffic and forward specified types of internet traffic to a specific location or host. Once the host receives the information, the host executes

the remaining steps 504-514. For example, the host parses the information at step 504 and searches its own cache for valid information at step 506. If there is any information to store in the cache (i.e., the DNS information is being returned), the information is stored in the host's cache at step 510. In such an embodiment, the router classifies and diverts packets to the configured host, and the host performs all additional functionality.

Referring to Figure 4, in one or more embodiments of the invention, one or more of the routers 210 may be modified as defined in Figure 4, to 10 intercept, parse, and cache DNS information. For example, routers 404 and 406 may be updated. Consequently, when Cl₁ 212 requests a DNS translation from ns.syd.au 224, the request is forwarded through route 400 along routers 210 and updated routers 404 and 406. However, updated router 404 determines that it is DNS traffic, violates its network layer, and intercepts the

- 15 request. Router 404 parses the requested information and determines if it is in its cache. If the requested information is in its cache, router 404 returns the result back to Cl1 212 (along route 400). If the requested information is not in its cache, it merely forwards the request to the next hop in pathway 400. Router 406, upon determining that the transmission is DNS traffic, intercepts
- 20 the request and searches its cache. Upon determining that the relevant information is not in its cache, router 406 forwards the request to the next hop in pathway 400. The request is forwarded until it reaches the local name server ns.syd.au 224. Alternatively, as described above, in one or more embodiments, the router forwards the request (if it is DNS traffic) to a
- 25 configured host that maintains the cache and processing capabilities.

The request is processed by ns.syd.au 224 and returned back to Cl₁ 212 along path 400. When the information reaches router 406 on its way back to

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Cl₁ 212, router 406 intercepts the request, the router or configured host parses the address information, and stores the address information in cache. Router 406 then forwards the results to the next hop along path 400. Each updated router or configured host along path 400 will store the result in its cache.

Subsequent to the above request, if Cl4 requests a similar DNS translation, the request would be forwarded along route 402. However, router 406 would identify the request as DNS traffic, router 406 intercepts the request, router 406 or a configured host parses the request, searches cache, and

10 returns the requested information back to the previous hop on pathway 402. Consequently, the request by Cl4 is serviced locally at router 406 or the configured host and does not need to be serviced in Australia at ns.syd.au 224.

As described above, according to one or more embodiments of the 15 invention, the updated routers perform additional processing from other routers. The processing by the routers as described above and illustrated in Figure 5, includes viewing a portion of the DNS traffic, parsing the information, maintaining a database for cache storage, and searching cache for the information.

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Some DNS name servers return different answers for client requests for the same host name. Such a response may be based on load-balancing considerations (e.g., the attempt to balance network traffic across multiple servers), or it may be chosen to direct the clients to "nearby" hosts. Use of

25 such schemes may be less effective with the transparent DNS caching according to one or more embodiments of the invention. Some schemes provide for strategic geographic placement of cacheable data (e.g., routers that may cache web traffic) in order to provide the information for the highest

number of clients possible. The geographical scheme described in pending patent application number 09/081,860 entitled "Method and Apparatus for Effective Traffic Localization Through Domain Name System" which is hereby incorporated by reference, works well when used to determine which

- 5 network routers are to be updated in accordance with one or more embodiments of the invention. In such a geographic scheme, the information returned is deliberately provided to be applicable to a large number of (if not all) DNS clients, with client-side computation to still achieve the load-balancing and traffic localization goals desired. Such a
- 10 scenario reduces the network load as well as the latency observed in DNS translations.

Thus, a method and apparatus for encoding content characteristics for the retrieval of information is described in conjunction with one or more specific embodiments. The invention is defined by the claims and their full scope of equivalents.

#### <u>CLAIMS</u>

 A method for transparently processing DNS traffic comprising: transmitting a request for information to a network router; parsing said transmitted request;

5 parsing said transmitted request; searching cache for said requested information; and returning said requested information if said requested information is in said cache.

 2. The method of claim 1 further comprising: forwarding said request to a next hop of said request if said requested information is not in said cache;

receiving said requested information;

parsing said requested information;

15 storing said requested information in said cache; and forwarding said requested information to a next hop of said requested information.

The method of claim 1 wherein said information is internet
 protocol address information.

4. The method of claim 1 wherein said network router is applicable to one or more DNS clients based on geographical placement.

25 5. The method of claim 2 wherein said receiving step comprises transmitting said requested information from a name server.

6. A system comprising

a processor;

a memory coupled to said processor;

code executed by said processor configured to transparently process

5 DNS traffic;

said code comprising:

a method transmitting a request for information to a network router;

a method parsing said transmitted request;

10 a method searching cache for said requested information; and a method returning said requested information if said requested information is in said cache.

7. The system of claim 6 wherein said code further comprises:

a method forwarding said request to a next hop of said request if said requested information is not in said cache;

a method receiving said requested information;

a method parsing said requested information;

a method storing said requested information in said cache; and

20 a method forwarding said requested information to a next hop of said requested information.

8. The system of claim 6 wherein said information is internet protocol address information.

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9. The system of claim 6 wherein said network router is applicable to one or more DNS clients based on geographical placement.

10. The system of claim 7 wherein said code for a method receiving said requested information comprises a method transmitting said requested information from a name server.

5 11. A computer program product comprising

a computer usable medium having computer readable program code embodied therein configured to transparently process DNS traffic, said computer program product comprising:

computer readable code configured to cause a computer to transmit a 10 request for information to a network router;

computer readable code configured to cause a computer to parse said transmitted request;

computer readable code configured to cause a computer to search cache for said requested information; and

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computer readable code configured to cause a computer to return said requested information if said requested information is in said cache.  The computer program product of claim 11 further comprising: computer readable code configured to cause a computer to forward said request to a next hop of said request if said requested information is not in said cache;

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computer readable code configured to cause a computer to receive said requested information;

computer readable code configured to cause a computer to parse said requested information;

computer readable code configured to cause a computer to store said 10 requested information in said cache; and

computer readable code configured to cause a computer to forward said requested information to a next hop of said requested information.

13. The computer program product of claim 11 wherein said15 information is internet protocol address information.

14. The computer program product of claim 11 wherein said network router is applicable to one or more DNS clients based on geographical placement.

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15. The computer program product of claim 12 wherein said computer readable code configured to cause a computer to receive comprises computer readable code configured to cause a computer to transmit said requested information from a name server.

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16. The method of claim 1 wherein said cache is maintained by said network router.

17. The method of claim 1 wherein said cache is maintained by a configured host.

18. The system of claim 6 wherein said cache is maintained by said5 network router.

19. The system of claim 6 wherein said cache is maintained by a configured host.

10 20. The computer program product of claim 11 wherein said cache is maintained by said network router.

21. The computer program product of claim 11 wherein said cache is maintained by a configured host.

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# FIG. 1

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FIG. 5

SUBSTITUTE SHEET (RULE 26)

# PATENT ABSTRACTS OF JAPAN

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# (54) METHOD AND DEVICE FOR CLIENT/HOST COMMUNICATION USING COMPUTER NETWORK

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### (57)Abstract:

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PROBLEM TO BE SOLVED: To protect plural hosts on a private network wherein intermediate devices are placed behind an allowed client in a topology state by dynamically constituting the allowed client with the use of the address of a protection host and the keys and addresses of the intermediate devices (ciphering firewall, ciphering route, source gateway).

SOLUTION: A registered name server of a domain 100 is so constituted as to return a new resource address type (SX record) in response to a request for information needed for a secure communication with a protection host 140 placed in the domain 100. A resolver placed on (or related to) an allowed client 210 dynamically updates information used by the client to perform secure communication by using data in the SX record.



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(54)【発明の名称】 コンピュータ・ネットワークを利用したクライアント/ホスト間の通信方法と装置

#### (57)【要約】

(19)日本国特許庁(JP)

【課題】 保護ホストのアドレスおよび中間デバイス (暗号化ファイアウォール、暗号化ルータ、セキュア・ ゲートウェイ)のキーとアドレスを使用して許可クライ アントを動的に構成し、中間デバイスがその背後にトポ ロジ状に置かれている私用ネットワーク上の複数のホス トを保護すること。

【解決手段】 ドメインの登録ネーム・サーバはそのド メインに置かれた保護ホストとのセキュア・コミュニケ ーションのために必要な情報の要求に応答して、新規の リソース・アドレス・タイプ(SXレコード)を戻すよ うに構成されている。許可クライアントに置かれている (さもなければ、それと関連づけられている)リゾルバ はSXレコード内のデータを使用して、セキュア・コミ ュニケーションを処理するためにクライアントによって 使用された情報を動的に更新する。



【特許請求の範囲】

【請求項1】 第1マシンによって使用される情報を動 的に更新して前記第1マシンによる第2マシンへのセキ ュア・アクセスを容易化するための方法であって、

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(a) 前記第2マシンを収容しているドメインに関する 照会を受信し、

(b)前記照会に応答するために必要な情報を要求する ために前記ドメインの第1ネーム・サーバに連絡し、

(c)前記第1ネーム・サーバから第1応答を受信し、

(d) 前記第2マシンに対応するセキュア・エクスチェ 10 法。 ンジャのIDを、前記第1応答の中のリソース・レコー ドから抜き出し、

(e)該第1マシンによって使用される第1データ構造 を前記 | Dを使用して更新して該第2マシンへのセキュ ア・アクセスを容易化するためのステップを含むことを 特徴とする方法。

【請求項2】 請求項1に記載の方法において、前記照 会を生成するアプリケーション・プログラムによって実 行されることを特徴とする方法。

【請求項3】 請求項1に記載の方法において、前記第 20 1 データ構造を更新する前記ステップは前記マシンのア ドレスを記録することを含むことを特徴とする方法。

【請求項4】 請求項1に記載の方法において、前記第 1 データ構造を更新する前記ステップは前記セキュア・ エクスチェンジャの前記1Dを記録することを含むこと を特徴とする方法。

【請求項5】 請求項1に記載の方法において、前記第 1 データ構造を更新する前記ステップは前記セキュア・ エクスチェンジャの暗号データ項目を記録することを含 むことを特徴とする方法。

【請求項6】 請求項5に記載の方法において、前記セ キュア・エクスチェンジャの前記暗号データ項目は暗号 キーであることを特徴とする方法。

【請求項7】 請求項5に記載の方法において、前記セ キュア・エクスチェンジャの前記暗号データ項目はセキ ュアDNS KEYリソース・レコードから取得される ことを特徴とする方法。

【請求項8】 請求項5に記載の方法において、前記セ キュア・エクスチェンジャの前記暗号データ項目は暗号 アルゴリズムであることを特徴とする方法。

【請求項9】 請求項1に記載の方法において、前記第 1データ構造を更新する前記ステップは前記セキュア・ エクスチェンジャに関係するオリジナル・データベース 名を記録することを含むことを特徴とする方法。

【請求項10】 請求項9に記載の方法において、前記 オリジナル・データベース名は前記第1応答の中の前記 リソース・レコードに対応するシグネーチャ・リソース ・レコードからラベル・カウントを使用して導き出され ることを特徴とする方法。

【請求項11】 請求項9に記載の方法において、前記 50 ナル・データベース名を導き出し、

オリジナル・データベース名は前記第1応答の中の前記 リソース・レコードからの所有者名であることを特徴と する方法。

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【請求項12】 請求項1に記載の方法において、前記 第2マシンは前記照会のサブジェクトであることを特徴 とする方法。

【請求項13】 請求項12に記載の方法において、前 記照会を受信する前記ステップは前記第2マシンのアド レスの要求を受信することを含むことを特徴とする方

【請求項14】 請求項1に記載の方法において、前記 第2マシンは前記ドメインに関係する第2ネーム・サー バであることを特徴とする方法。

【請求項15】 請求項1に記載の方法において、前記 セキュア・エクスチェンジャの前記IDは該セキュア・ エクスチェンジャの名前であることを特徴とする方法。 【請求項16】 請求項15に記載の方法において、前 記セキュア・エクスチャンジャの前記名前はDNS名で あることを特徴とする方法。

【請求項17】 請求項1に記載の方法において、前記 セキュア・エクスチェンジャの前記IDは該セキュア・ エクスチェンジャのアドレスであることを特徴とする方 法。

【請求項18】 請求項1に記載の方法において、前記 セキュア・エクスチェンジャは前記第2マシンを保護す るファイアウォールであることを特徴とする方法。

【請求項19】 請求項1に記載の方法において、前記 セキュア・エクスチェンジャは前記第2セキュア・マシ ンであることを特徴とする方法。

30 【請求項20】 請求項1に記載の方法において、前記 第1データ構造はアクセス・コントロール・リストであ ることを特徴とする方法。

【請求項21】 請求項1に記載の方法において、前記 第1データ構造はトンネル・マップであることを特徴と する方法。

【請求項22】 請求項1に記載の方法において、前記 第1データ構造を更新する前記ステップは該第1データ 構造内に少なくとも1つのデータ・セットを作成するこ とを含むことを特徴とする方法。

40 【請求項23】 請求項22に記載の方法において、 (a) 前記第1応答を受信する前記ステップは前記第2 ーマシンのアドレスを該第1応答から抜き出すことを含 み、そこでは該第2マシンは前記照会のサブジェクトと なっており、

(b) 前記データ・セットを作成する前記ステップは、 (i)前記セキュア・エクスチェンジャの前記 IDを使 用して、該セキュア・エクスチェンジャのパラメータを 導き出し、

(ii) 該セキュア・エクスチェンジャに関係するオリジ

(iii ) a)前記第2マシンの前記アドレス、b)該セ キュア・エクスチェンジャの前記パラメータ、および c)前記オリジナル・データベース名を該データ・セッ トとしてストアすることを含むことを特徴とする方法。 【請求項24】 請求項23に記載の方法において、前 記セキュア・エクスチェンジャの前記パラメータを導き 出す前記ステップは前記第1応答から該パラメータを抜 き出すことを含むことを特徴とする方法。

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【請求項25】 請求項23に記載の方法において、前 記セキュア・エクスチェンジャの前記パラメータを導き 10 出す前記ステップは該パラメータに関して追加の照会を 行うことを含むことを特徴とする方法。

【請求項26】 請求項23に記載の方法において、前 記パラメータを導き出す前記ステップは該パラメータを 前記1Dと等しいものと定義することを含むことを特徴 とする方法。

【請求項27】 請求項23に記載の方法において、前 記パラメータは前記セキュア・エクスチェンジャの暗号 データ項目であることを特徴とする方法。

【請求項28】 請求項22に記載の方法において、 (a)前記第1応答を受信する前記ステップは前記ドメ インに関係する第2ネーム・サーバのアドレスを導き出 すことを含み、前記第2ネーム・サーバは該第1応答の 中に指定されており、

 (b)前記データ・セットを作成する前記ステップは、
 (i)前記セキュア・エクスチェンジャの前記1Dを使用して、該セキュア・エクスチェンジャのパラメータを 導き出し、

(ii) 該セキュア・エクスチェンジャに関係するオリジ ナル・データベース名を導き出し、

(iii) a) 前記第2マシンの前記アドレス、b) 該セ キュア・エクスチェンジャの前記パラメータ、および c) 前記オリジナル・データベース名を第1データ・セ ットとしてストアすることを含むことを特徴とする方 法。

【請求項29】 請求項28に記載の方法において、前 記第2ネーム・サーバの前記アドレスを導き出す前記ス テップは前記第1応答から該アドレスを抜き出すことを 含むことを特徴とする方法。

【請求項30】 請求項28に記載の方法において、前 40 記第2ネーム・サーバの前記アドレスを導き出す前記ス テップは該アドレスに関して追加の照会を行うことを含 むことを特徴とする方法。

【請求項31】 請求項28に記載の方法において、前 記セキュア・エクスチェンジャの前記パラメータを導き 出す前記ステップは該パラメータを前記第1応答から抜 き出すことを含むことを特徴とする方法。

【請求項32】 請求項28に記載の方法において、前 記セキュア・エクスチェンジャの前記パラメータを導き 出す前記ステップは該パラメータに関して追加の照会を 50 行うことを含むことを特徴とする方法。

【請求項33】 請求項28に記載の方法において、前 記第2マシンは前記ドメインに関係する前記第2ネーム ・サーバであることを特徴とする方法。

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【請求項34】 請求項28に記載の方法において、さらに、

(a)前記第1データ・セットを使用して、前記照会に 対する第2応答を取得し、

(b)前記第2マシンのアドレスを前記第2応答から抜き出し、

(c)該第2マシンの名前に最良に合致する既存のオリ ジナル・データベース名を収めている既存のデータ・セ ットを前記第1データ構造から判断し、

(d)前記既存のデータ・セットを使用して、(i)該 第2マシンの前記アドレス、(ii)前記セキュア・エク スチェンジャの既存のパラメータ、および(iii)前記 既存のオリジナル・データベース名を第2データ・セッ トにストアするステップを含むことを特徴とする方法。 【請求項35】 請求項34に記載の方法において、前

20 記照会に対する前記第2応答を取得する前記ステップ は、

(a)ネーム・サーバの応答性に関する情報を収めてい る第2データ構造を更新して、前記第2ネーム・サーバ を次に照会するネーム・サーバとして含めておき、 (b)前記第2データ構造を使用して、該照会をリダイ

(0)前記第2テーダ構造を使用して、該照会をリダイ レクトし、

(c)該照会に対する第2応答を受信するステップを含むことを特徴とする方法。

【請求項36】 請求項35に記載の方法において、前 30 記第2データ構造はSLISTであることを特徴とする 方法。

【請求項37】 請求項34に記載の方法において、前 記既存のデータ・セットを使用する前記ステップは該既 存のデータ・セットからのデータ項目を指し示すことを 含むことを特徴とする方法。

【請求項38】 請求項34に記載の方法において、前 記既存のデータ・セットを使用する前記ステップは該既 存のデータ・セットからデータ項目をコピーすることを 含むことを特徴とする方法。

【請求項39】 請求項22に記載の方法において、前 記データ・セットはa)前記第2マシンのアドレスおよ びb)前記セキュア・エクスチェンジャのパラメータを 含むことを特徴とする方法。

【請求項40】 請求項1に記載の方法において、前記 ドメインの前記第1ネーム・サーバに連絡する前記ステ ップは前記照会を該第1ネーム・サーバに転送すること を含むことを特徴とする方法。

【請求項41】 請求項1に記載の方法において、前記 ドメインの前記第1ネーム・サーバに運絡する前記ステ ップは前記セキュア・エクスチェンジャの前記1Dを要

求することを含むことを特徴とする方法。

【請求項42】 第1マシンによって使用される情報を 動的に更新して、前記第1マシンによる第2マシンへの セキュア・アクセスを容易化するための方法であって、 (a)前記第2マシンのアドレスを取得し、

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(b) 該第2マシンへのセキュア・アクセスを容易化す るために該第1マシンによって使用されるデータ構造を 使用して、該第2マシンの名前に最良に合致する既存の オリジナル・データベース名を収めている既存のデータ ・セットを前記データ構造から判断し、

(c)前記既存のデータ・セットを使用して、(i)該 第2マシンの前記アドレス、(ii)セキュア・エクスチ ェンジャの既存のパラメータ、および(iii)前記既存 のオリジナル・データベース名を第2データ・セットに ストアするステップを含んでいることを特徴とする方 法。

【請求項43】 請求項42に記載の方法において、前 記既存のデータ・セットを使用する前記ステップは該既 存のデータ・セットからのデータ項目を指し示すことを 含むことを特徴とする方法。

【請求項44】 請求項42に記載の方法において、前 記既存のデータ・セットを使用する前記ステップは該既 存のデータ・セットからデータ項目をコピーすることを 含むことを特徴とする方法。

【請求項45】 請求項42に記載の方法において、前 記第2マシンの前記アドレスを取得する前記ステップ は、

(a) 前記アドレスの照会を受信し、

(b)前記照会を該第2マシンのドメインのネーム・サ ーバに転送し、

(c)前記ネーム・サーバから応答を受信し、

(d)前記応答から該アドレスを抜き出すステップを含 むことを特徴とする方法。

【請求項46】 第1マシンによる第2マシンへのセキ ュア・アクセスを容易化するための方法であって、

(a)前記第2マシンを収容しているドメインに関係す る前記第1マシンからの照会を第1ネーム・サーバで受 信し、

(b)該第2マシンに対応するセキュア・エクスチェン ジャのIDを取得し、

(c)前記IDを含んでいる応答を生成し、

(d) 該第1マシンのために前記応答を送信し、該応答 は該第2マシンへのセキュア・アクセスを容易化するた めに該第1マシンによって使用可能であることを特徴と する方法。

【請求項47】 請求項46に記載の方法において、前 記照会は前記第2マシンのアドレスの要求を含んでいる ことを特徴とする方法。

【請求項48】 請求項46に記載の方法において、前 記応答は前記第2マシンへのセキュア・アクセスのため 50 めておくステップを含むことを特徴とする方法。

6 に使用される情報を前記第1マシンが動的に更新するこ とを可能にすることを特徴とする方法。

【請求項49】 請求項48に記載の方法において、前 記1Dを取得する前記ステップは前記第2マシンに該当 するデータベースから該IDを取得することを含むこと を特徴とする方法。

【請求項50】 請求項49に記載の方法において、前 記応答を生成する前記ステップは、

(a) 前記セキュア・エクスチェンジャのパラメータを 10 取得し、

(b)前記パラメータを該応答に含めておくステップを 含むことを特徴とする方法。

【請求項51】 請求項50に記載の方法において、前 記セキュア・エクスチェンジャの前記パラメータは該セ キュア・エクスチェンジャのアドレスを含むことを特徴 とする方法。

【請求項52】 請求項50に記載の方法において、前 記セキュア・エクスチェンジャの前記パラメータは該セ キュア・エクスチェンジャの暗号データ項目を含むこと 20 を特徴とする方法。

【請求項53】 請求項52に記載の方法において、前

記セキュア・エクスチェンジャの前記暗号データ項目は 暗号キーであることを特徴とする方法。

【請求項54】 請求項52に記載の方法において、前 記セキュア・エクスチェンジャの暗号データ項目は暗号 アルゴリズムであることを特徴とする方法。

【請求項55】 請求項49に記載の方法において、前 記セキュア・エクスチェンジャは第3マシンであること を特徴とする方法。

30 【請求項56】 請求項55に記載の方法において、前 記第3マシンは前記第2マシンを保護するファイアウォ ールであることを特徴とする方法。

【請求項57】 請求項49に記載の方法において、前 記セキュア・エクスチェンジャは前記第2マシンである ことを特徴とする方法。

【請求項58】 請求項49に記載の方法において、前 記セキュア・エクスチェンジャの前記しDは該セキュア ・エクスチェンジャの名前であることを特徴とする方 法。

【請求項59】 請求項49に記載の方法において、前 記セキュア・エクスチェンジャの前記IDは該セキュア ・エクスチェンジャのアドレスであることを特徴とする 方法。

【請求項60】 請求項49に記載の方法において、前 記照会に対する返答は前記データベースに存在せず、前 記応答を生成する前記ステップは、

(a)前記第2マシンを収容している前記ドメインに関 係する第2ネーム・サーバのIDを取得し、

(b)前記第2ネーム・サーバの前記 | Dを該応答に含

【請求項61】 請求項60に記載の方法において、前 記応答を生成する前記ステップは前記第2ネーム・サー バのアドレスを前記応答に入れて提供することをさらに 含むことを特徴とする方法。

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【請求項62】 請求項49に記載の方法において、前 記照会に対す返答は前記データベースに存在し、前記応 答を生成する前記ステップは

(a) 該照会に対する前記返答を取得し、

(b)該照会に対する該返答を該応答に含めておくステ ップを含むことを特徴とする方法。

【請求項63】 第1マシンによる第2マシンへのセキ ュア・アクセスを容易化するためのシステムであって、 (a)前記第2マシンを収容しているドメインに関する 照会を受信するように構成された制御ロジックと、

(b)前記ドメインの第1ネーム・サーバに連絡して、 前記照会に応答するために必要な情報を要求するように 構成された制御ロジックと、

(c)前記第1ネーム・サーバから第1応答を受信する ように構成された制御ロジックと、

(d) 該第2マシンに対応するセキュア・エクスチェン 20 ジャの1Dを、前記第1応答の中のリソース・レコード から抜き出すように構成された制御ロジックと、

(e)該第2マシンへのセキュア・アクセスを容易化す るために前記第1マシンによって使用される第1データ 構造を前記IDを使用して更新するように構成された制 御ロジックであって、前記第1データ構造は該第2マシ ンに対応するデータ・セットを含んでいるものとを備え ていることを特徴とするシステム。

【請求項64】 請求項63に記載のシステムにおい て、前記照会を生成するように、および前記生成された 30 照会を該照会を受信する前記ロジックに与えるように構 成されたソフトウェア・アプリケーション・プログラム 内に具現化されていることを特徴とするシステム。

【請求項65】 第1マシンによる第2マシンへのセキ ュア・アクセスを容易化するためのデータ構造を含んで いるコンピュータ可読媒体であって、前記データ構造 は、

(a)前記第2マシンのアドレス、

(b)該第2マシンに対応するセキュア・エクスチェンジャのパラメータ、および

(c)前記セキュア・エクスチェンジャに関係するオリ ジナル・データベース名をもつトンネル・マップを含ん でいることを特徴とするコンピュータ可読媒体。

【請求項66】 請求項65に記載のコンピュータ可読 データ構造において、前記オリジナル・データベース名 は前記セキュア・エクスチェンジャを示すリソース・レ コードに対応するシグネーチャ・リソース・レコードか らラベル・カウントを使用して導き出されることを特徴 とするコンピュータ可読データ構造。

【請求項67】」請求項65に記載のコンピュータ可読 50 号。

データ構造において、前記オリジナル・データベース名 は前記セキュア・エクスチェンジャを示すリソース・レ コードからの所有者名であることを特徴とするコンピュ ータ可読データ構造。

【請求項68】 請求項65に記載のコンピュータ可読 データ構造において、前記第1マシンに関連づけられた リゾルバ・プログラムによって生成されることを特徴と するコンピュータ可読データ構造。

【請求項69】 第1マシンによる第2マシンへのセキ 10 ュア・アクセスを容易化するためのソフトウェア・プロ

グラムを具現化しているコンピュータ可読媒体であっ て、前記ソフトウェア・プログラムは、

(a)前記第2マシンを収容しているドメインに関する 照会を受信するように構成されたプログラム・コード と、

(b)前記ドメインの第1ネーム・サーバに連絡して、 前記照会に応答するために必要な情報を要求するように 構成されたプログラム・コードと、

(c)前記第1ネーム・サーバから第1応答を受信する ように構成されたプログラム・コードと、

(d) 該第2マシンに対応するセキュア・エクスチェン ジャのIDを、前記第1応答の中のリソース・レコード から抜き出すように構成されたプログラム・コードと、 (e) 該第2マシンへのセキュア・アクセスを容易化す るために前記第1マシンによって使用される第1データ 構造を前記IDを使用して更新するように構成されたプ ログラム・コードであって、前記第1データ構造は該第 2マシンに対応するデータ・セットを含んでいるものと を備えていることを特徴とするコンピュータ可読媒体。

【請求項70】 搬送波に具現化されていて、第1マシンによる第2マシンへのセキュア・アクセスを容易化するためのコンピュータ・データ信号であって、該データ信号は、

(a)前記第2マシンを収容しているドメインに関する 照会を受信するように構成されたコード・セグメントと (b)前記ドメインの第1ネーム・サーバに連絡して、 前記照会に応答するために必要な情報を要求するように 構成されたコード・セグメントと、

(c)前記第1ネーム・サーバから第1応答を受信する ように構成されたコード・セグメントと、

(d) 該第2マシンに対応するセキュア・エクスチェン ジャのIDを、前記第1応答の中のリソース・レコード から抜き出すように構成されたコード・セグメントと、 (e) 該第2マシンへのセキュア・アクセスを容易化す るために前記第1マシンによって使用される第1データ 構造を前記IDを使用して更新するように構成されたコ ード・セグメントであって、前記第1データ構造は該第 2マシンに対応するデータ・セットを含んでいるものと を含んでいることを特徴とするコンピュータ・データ信 号

【発明の詳細な説明】

[0001]

【発明の属する技術分野】本発明は一般的にはコンピュ ータ・ネットワークに関し、具体的には、コンピュータ ・ネットワークを利用する許可(authorized)クライアン トと保護ホスト間のセキュア・コミュニケーションに関 する。

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[0002]

【従来の技術】A ネットワーク・アドレス

コンピュータは相互に接続されてネットワークを形成 し、これらのネットワークは他のネットワークに接続さ れてインターネットを形成している。「Internet (イン ターネット)」と呼ばれる世界的規模のインターネット の利用は、会議室(down the hall) にだけではなく、海 外に置かれたホスト・コンピュータと通信する必要のあ るクライアント・マシン上でプログラムを実行させる人 が増加するのに伴って急激に増加している。Internet上 の各ホストはwww.whitehouse.govといった固有の名前、 および128.102.252.1.といった対応する ネットワーク・アドレスをもっている。US Postal Serv 20 ice (米国郵便サービス)を通してレターを郵送する人 が受取人の住所を知っている必要があるのと同じよう に、ネットワークを通してホストと通信するクライアン トはホストのネットワーク・アドレスを知っている必要 がある。しかし、通常は、クライアントはホストの名前 だけを知っている。

【0003】Internetの世界では、ホストの名前とアド レスは世界の各国に置かれているコンピュータ上のデー タベースにストアされている。これらのデータベースの 1つをもち、ホスト・アドレスの照会(queries) に応答 30 するコンピュータは、「ドメイン・ネーム・サーバ(Dom ain Name Server)」または単純に「ネーム・サーバ」を 含めて、種々の名前で知らされている。非常に多数のホ スト・コンピュータはInternetアドレスをもっているの で、すべてのホストの名前とアドレス情報を1つのデー タベースに保存しておくことは実用的でない。その代わ りに、このような情報は世界各国のInternetドメイン・ ネーム・サーバ間に分散されている。

【0004】ドメイン・ネーム・サーバおよびそれらに 関連づけられた名前とアドレス・データベースは、アド 40 レス照会に応答するために使用される1つのシステムに すぎない(「リゾルビングアドレス(resolving address es)」とも呼ばれる)。「ディレクトリ・サービス」、 「ディレクトリ・システム」、「DS」といった用語や その他の用語は、一般に、オンライン・データベースか ら情報を取り出してネットワーク経由で照会に応答する システムを指すために使用されている。例えば、X50 0ディレクトリ・システム標準に準拠して実現されてい る分散データベースには、ネットワーク・アドレス以外 にも、他の多数の種類の情報(例えば、人の名前とアド 50 レス、プリンタの名前とロケーション、電話番号とファ ックス番号)を含めることが可能になっている。X > 00の詳細は当菜者には周知であるので、ここで詳細に説 明することは省略する。参考文献としては、例えば、Uy less D. Black 著「OSI: A Nodel for Computer Com munication Standards (OSI: コンピュータ通信標準 モデル)」、Prentice-Hall (1991), pp. 38 8-89がある。

【0005】ある企業がInternetに接続するときは、そ
 の企業はそのドメイン名(例えば、sun.com)を登録する。これは第2レベル・ドメインと呼ばれている。企業は第2レベル・ドメインのすべてのアドレス照会がInternetドメイン・ネーム・システムによって送られる先の公開ネーム・サーバを少なくとも2つ指名し、登録しなければならない。これらのサーバは、以下では、ドメインの「登録」ネーム・サーバと呼ぶことにする。企業はそのドメインをもっと小さなセグメントに分割することがよくあり、これらのセグメントは「ゾーン」と呼ばれている(例えば、eng.sun.comおよびcorp.sun.com)。

当業者ならば理解されるように、「ゾーン」という用語 はドメインを任意に分割したものを指す場合があり、こ の中にはドメイン全体自体も含まれる。企業はそれぞれ のゾーンだけで「権限をもつ」ネーム・サーバを指名す ることができる。この場合、各ゾーンは独自のデータベ ース(「ゾーン・データベース」)をもち、そこには、 そのゾーンに置かれているマシンの名前、アドレス、お よびその他の情報が収容されている。説明の便宜上、 「ネーム・サーバ」という用語は、以下では、サーバの データベース(例えば、ドメイン・ネーム・サーバまた はディレクトリ・サーバ) 内の情報の照会に応答するサ ーバを意味するために使用され、「ゾーン・データベー ス」という用語は、それが第2レベル・ドメインを包含 するか、もっと小さなゾーンを包含するかに関係なく、 そのデータベースを意味するために使用されている。当 業者ならば理解されるように、「データベース」という 用語は編成された情報の集まり一切を意味することがで きる。

【0006】企業があるゾーン内のマシンのアドレスを 公開して、見えるようにすることを選択していれば、そ のゾーンを収めている第2レベル・ドメインの登録ネー ム・サーバはそのゾーン内のマシンのアドレス照会を権 限をもつゾーン・ネーム・サーバに送るように構成され ている。しかし、企業がゾーンのネットワーク・トポロ ジを隠す必要があるときは、登録ネーム・サーバはゾー ン・ネーム・サーバに関するどの情報ももたないように 構成され、そのゾーン内のマシンだけが照会をゾーン・ ネーム・サーバに送るように構成されている。このよう な可視制限ゾーン(visibility-limited zone)は「保護 ゾーン」と呼ぶことができ、そこに置かれたマシンは 「保護マシン(protected machines)」と呼ぶことができ る。従って、マシンのアドレスが公開されて、見えるよ うにされたかどうかは、ネットワーク上で稼働している プログラム相互間のやりとり(interaction) に影響する ことになる。

【0007】上述したように、クライアント上で実行さ れているアプリケーション・プログラムが別のロケーシ ョンに置かれたホストに連絡する必要があるときは、そ のアプリケーションはそのホストのアドレスを必要とす る。一般に、アプリケーション・プログラムは照会を

「リゾルバ(resolver)」プログラム(これもクライアン 10 ト上で実行されている) に送って、アドレスを要求する ことがある。リゾルバ・プログラムはローカル・ファイ ルをチェックし、ホスト・アドレスを要求するためのデ フォルト・ネーム・サーバが分かると、その照会をデフ オルト・ネーム・サーバに渡すことになる。説明の便宜 上、このデフォルト・ネーム・サーバは、以下ではクラ イアントの「ローカルNS」と呼ぶことにする。ローカ ルNSは要求されたアドレスをすでにもっている場合も あれば、そのアドレスをもつサーバ (例えば、第2レベ ル・ドメインの登録ネーム・サーバまたはゾーンの権限 20 をもつネーム・サーバ) に到達するまで、必要に応じて 他のネーム・サーバに連絡していく場合もある。ローカ ルNSが照会に対する応答を受信すると、ローカルNS はその応答をリゾルバに戻し、リゾルバは応答を処理 し、アドレスをクライアントに引き渡す。Internetドメ イン・ネーム・システムおよびリゾルバの上記説明とそ の他の詳細は当業者には周知であるので、ここでは詳し く説明することは省略する。参考文献としては、例え ば、Sidnie Feit 著「TCP/IP」、McGraw-Hill (1997)があり、第12章に詳しく説明されてい る。

【0008】B 許可クライアント

現在のテクノロジは、ネットワークを利用したコミュニ ケーションをいくつかの側面から見たとき、十分に解決 していない側面がいくつかある。企業のネットワーク・ ポリシを実現するためには、上述したように、ネットワ ーク管理者は、保護マシンのアドレスを他の保護マシン だけに見えるようにすることによってネットワーク・ト ポロジを隠すようにゾーンをセットアップすることがで きる。しかし、ネットワーク管理者は保護ゾーンの外に 40 いる許可クライアントが、保護ゾーンの内側にいるホス トと通信できるようにしたい場合もある。ネットワーク 管理者は許可クライアントが通信できる保護ホストのア ドレスを、そのクライアント上の1つまたは2つ以上の 静的構成ファイルにストアしておくこともできる。その 場合には、これらの構成ファイルは保護ホストのアドレ スが変更されるたびに、すべての許可クライアント側で 更新する必要がある。ネットワーク管理者は置換ファイ ルをすべての許可クライアントに送ることができるが、 別の方法として、ネットワーク管理者は変更された情報 50 イアントからのコミュニケーションがファイアウォール

を、許可クライアントへのアクセス権をもつ人に配布し て「手操作(マニュアル)」で入力させることもでき る。このような人は構成ファイルを直接に編集すること も、プログラム(例えば、コマンドライン・プログラム またはグラフィカル・ユーザ・インタフェース)を使用 して変更情報を入力することもできる。 【0009】 クライアントの数と移動性が増加するに伴 い、これらの構成ファイルを最新に保つことは、不可能 ではないにしても、煩わしい作業である。ネットワーク 管理者は保護ホストのアドレスを使用して許可クライア

- ントを構成し、人間の介入なしですべての許可クライア ント上の構成ファイルを変更できるようにする方法を必 要としている。本発明の種々実施例が提供する解決方法 によれば、許可クライアントは中央ロケーションにスト アされ、維持されている情報を使用して各自のファイル を動的に更新することができる。その場合、ネットワー ク管理者はすべての許可クライアント上のファイルを更 新しなくても、容易にアクセス可能なロケーションに置 かれている情報を更新するだけですむことになる。
- (0010) C  $t=27 \cdot 323 = 57 \cdot 32$ 許可クライアントはコミュニケーションを確立するため に、保護ホストのアドレス以上のものを必要とすること がよくある。このようなことは、クライアントとホスト がコミュニケーションが「セキュア(安全保護)」であ るかを確かめたいときに起こっている。セキュア・コミ ュニケーションには、プライバシ、保全性、および認証 という問題が含まれている。ここでプライバシとは、あ るクライアントがネットワークを利用して機密情報を送 信するとき、意図するホストだけがそれを読み取り、理 30 解できることを意味する。保全性(integrity)とは、送 信中にだれもがメッセージを変更しなかったことを意味 する。認証(authentification)とは、そのメッセージが メッセージが要求するクライアントからのものであるこ とがホストに保証されることを意味する。標準的暗号手 法としては、DESやRSAなどのアルゴリズム、およ びディジタル・シグネーチャ、ディジタル証明、SKI Pなどの、他のテクノロジやプロトコルがある。必要に 応じて、これらの暗号手法(または同等のセキュリティ 手法)は種々側面から見たプライバシ、保全性、および 認証を保証するために使用されているのが普通である。

【0011】保護ホストのアドレスを許可クライアント に提供するのと同じように、セキュア・コミュニケーシ ョンはネットワークを利用したコミュニケーションの1 つの側面であり、この側面も現在のテクノロジでは十分 に解決されていない。ある種のネットワーク構成では、 ネットワーク・セキュリティ・システムであるファイア ウォール(firewall)が保護マシンへのアクセスを管理し ている。許可クライアントが保護マシンと機密に通信で きるようにするためには、ファイアウォールはそのクラ

を経由するように構成されていなければならない。さら に、保護ホストとセキュア・コミュニケーションを行う ためには、ホストのアドレスのほかに、許可クライアン トは追加の情報を必要とする。この追加情報としては、 (1) 保護ホストのために暗号化を行うファイアウォー ルのアドレスとキー、および(2)使用される暗号アル ゴリズム(および他の必要な暗号手法)がある。 【0012】許可クライアントがこの追加情報を取得す ると、その追加情報はホスト・アドレスと一緒に、暗号 化オペレーションを処理するクライアントのコンポーネ 10 ント(例えば、アプリケーション・プログラム、オペレ ーティング・システム、またはハードウェアの暗号プロ セッサ)によって使用されるデータ構造にストアされる のが一般である。例えば、SKIPテクノロジでは、こ のような「アウトバウンド・セキュア・メッセージ」は インバウンド・アクセス情報と一緒に、クライアントの アクセス・コントロール・リストにストアされている。 しかし、当業者ならば理解されるように、アウトバウン ド・メッセージ情報は適切なデータ構造であれば、どの データ構造にもストアすることが可能である。 【0013】 アウトバウンド・セキュア・メッセージ情 報を収めているデータ構造はホストのアドレスまたは暗 号情報が変更されるたびに、すべての許可クライアント 側で更新する必要がある。この場合も、本発明の種々の 実施例によれば、許可クライアントは中央ロケーション にストアされ、維持されている情報を使用して各自のデ ータ構造を動的に更新することができる。説明の便宜 上、「許可クライアント」という用語は、ここでは、本 発明を使用するように構成され、許可クライアントが通 信する保護ホストのファイアウォールを経由してコミュ 30 ニケーションが許されているクライアントを意味するも のとして用いられている。 [0014]

【発明の要約】本発明によれば、保護ホストのアドレス および中間デバイス(例えば、暗号化ファイアウォー ル、暗号化ルータ、セキュア・ゲートウェイ)のキーと アドレスを使用して許可クライアントを動的に構成し、 その中間デバイスがその中間デバイスの背後にトポロジ 状に置かれている私用(private) ネットワーク上の複数 のホストを保護するようした方法および装置が提供され 40 ている。ドメインの登録ネーム・サーバはそのドメイン に置かれた保護ホストとのセキュア・コミュニケーショ ンに必要な情報の要求に応答して、新規のリソース・レ コード・タイプ(ここでは、SXレコードと名づけてい る)を戻すように構成されている。許可クライアントに **置かれた(さもなければ、それと関連づけられた)リゾ** ルバ(resolver)はSXレコード内のデータを 使用して、セキュア・コミュニケーションを処理するた めにクライアントによって使用される情報を動的に更新 するように構成されている。

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【0015】本発明のいくつかの実施例を使用すると、 多数の利点が得られる。そのような利点としては、保護 ホストのアドレスを使用してクライアントを動的に構成 するシステム、保護ホストとのセキュア・コミュニケー ションのためにクライアントを動的に構成するシステ ム、およびネットワーク管理者がセキュア・コミュニケ ーションのために必要なアドレスと暗号情報を中央で膏 理できるようにするシステムがあるが、本発明はこれら に限定されるものではない。本発明のいくつかの実施例 の上記利点およびその他の利点は、下述する詳細な説明 の中で明らかにする。

[0016]

【発明の実施形態】以下、本発明の1つまたはいくつか の実施例の理解を容易にするために、添付図面を参照し て本発明について詳しく説明する。

【0017】ネットワークは種々構成が可能であり、そ の構成はローカル・エリア・ネットワーク(LAN)、 広域ネットワーク(WAN)、イントラネット、インタ ーネット、およびInternetといったように、多彩な名前 20 が付けられている。代表的なインターネット構成は私用 LANおよび公衆(public)Internetの一部を含む、任意 の数のネットワークで構成されている。任意の数のコン ピュータをこれらのネットワークに接続することができ る。これらのコンピュータは様々な機能に利用すること ができが、特定の機能を反映する用語で表されることが よくある。1つの例では、ある人は別のコンピュータと 通信する必要のあるパーソナル・コンピュータ(PC) 上でプログラムを実行している。この場合のPCはクラ イアントと呼ばれ、他方のコンピュータはサーバまたは ホストと呼ばれている。別の例では、2つのネットワー クを接続するコンピュータはゲートウェイと呼ばれてい る。これらの例におけるコンピュータはいずれも、単純 にマシンと呼ばれることもある。当業者ならば理解され るように、本発明はネットワークおよびそこに接続され たコンピュータのどちらの場合も、特定の構成を要求す るものではない。従って、以下では、ある特定の構成 (インターネットを利用したクライアントとホスト間の コミュニケーション)を参照して本発明を説明している が、以下の説明は任意のネットワーク・タイプ上で動作 する、どのコンピュータにも適用されることはもちろん である。

【0018】A 本発明が実施される環境 図1は、本発明の実施例を実施できる代表的なインター ネット構成を示したものである。この構成には、ファイ アウォール110によって公衆(public)ネットワーク1 90に接続されているドメイン100(例えば、sun.co m)が含まれている。ドメイン100は保護ゾーン18 0(「ファイアウォールの内側」と呼ばれることもあ る)を含み、保護ゾーンは任意の数のマシンを任意の構 50 成で含むことができる。この例では、内側ホスト14

0、LAN160、内側クライアント150、および内 側NS130はすべて保護ゾーン180に置かれてい る。外側NSI20はドメイン100の登録ネーム・サ ーバであり、内側NS130は保護ゾーン180の権限 をもつネーム・サーバである。

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【0019】ほとんど無制限の数のマシンとネットワー クが公衆ネットワーク190に接続されている。図1に 示すように、代表的な構成には、外側クライアント18 2、外側ホスト184、LAN186、ローカルNS2 50、および許可クライアント210が含まれている。 図2、図3および図4を参照して以下で明らかにするよ うに、代表的な許可クライアント210には、アプリケ ーション215、そのローカルNS250を示している 構成ファイル220、リゾルバ225、暗号プロセッサ 230、オペレーティング・システム235、およびト ンネル・マップ500が含まれている(詳細は後述す る)。代表例として、これらのコンポーネントは許可ク ライアント210側の1つまたは2つ以上のコンピュー タ可読媒体またはメモリに置かれている。

【0020】B 問題

上述したシステム・アーキテクチャが与えられていると き、許可クライアント210で実行されているアプリケ ーション210が保護ゾーン180内の保護ホスト14 0と機密に通信する必要が起こったとき、どのようなこ とが行われるか。アプリケーション215がそれを行う ためには、その前に、アウトバウンド・セキュア・メッ セージ情報が必要になる。この情報は許可クライアント 210にストアされており、情報としては、内側ホスト 140のアドレス、ファイアウォール110のアドレス とキー、および使用される暗号プロトコルがある。クラ イアントの数と移動性が増加するに伴い、人間の介入に 頼ってアウトバウンド・セキュア・メッセージ情報を最 新に保つことは煩雑な作業であり、あるいは不可能であ る。本発明の種々実施例によれば、この問題は許可クラ イアントが中央ロケーションにストアされ、維持されて いる情報を使用して、各自のアウトバウンド・セキュア ・メッセージ情報を動的に更新できるようにすることに よって解決されている。以下のセクションでは、クライ アントとネーム・サーバ間のメッセージの構造と内容、 仲介の働きをするリゾルバ・プログラム、およびシステ ムがどのように構成されているか、について詳しく説明 する。

【0021】C. ネーム・サーバ・メッセージおよびリ ソース・レコード

ネーム・サーバ・メッセージはヘッダと4つのセクショ ン(1)照会(query)、(2)返答(answer)、(3)権 限(authority)、(4)追加(additional)から構成され ている。返答、権限、および追加セクションは、ネーム ・サーバが照会に応答して送信するリソース・レコード を収めている。リソース・レコード・タイプは多数存在 50 ュア・エクスチェンジャ(secure exchanger)」の1D

し、各々はそのレコード・タイプのデータを収めている データ・フィールドを含んでいる。例えば、要求された ホストのアドレスはAレコードのデータ・フィールドに 入って戻され、権限をもつネーム・サーバの名前はNS レコードのデータ・フィールドに入って戻される。 【0022】セキュア・コミュニケーションの必要性を サポートするために、Internetドメイン・ネーム・シス テム(「セキュアDNS」)のあるバージョンはKEY とSIGリソース・レコード・タイプを含む、セキュリ

ティ拡張機能(extensions)を使用している。KEYリソ 10 ース・レコードは公開キーと関連情報を配布するために 使用できる。つまり、KEYレコードはキー、キー名、 またはアルゴリズムを収めることができる。SIG、つ まり、「シグネーチャ」リソース・レコードは他のリソ ース・レコードに入っているデータを認証するために使 用できる。SIGレコードのデータ・フィールドの1つ は「ラベル(labels)」フィールドである。このフィール ドは、オリジナルSIGレコード所有省名がゾーン・デ ータベースに置かれているときラベルがいくつあるかを 20 カウントしたものである(例えば、*.sun.comが2つの

ラベルをもっているのは、ルートを表すヌル・ラベル (".")とワイルドカード("*")はカウントに含 まれないためである)。従って、このラベル・カウント はワイルドカード置換の結果としてリトリーブされたレ コードのオリジナル名を導き出すために使用される (詳 細は後述する)。このオリジナル名は、例えば、ディジ タル・シグネーチャを検証するために必要になる。 【0023】本発明の一実施例では、セキュアDNSに

よって提供されるKEYとSIGリソース・レコードを 30 使用している。セキュアDNSの詳細は当業者には周知 であるので、ここでは、これ以上詳しく説明することは 省略する。参考文献としては、例えば、RFC 206 5- 「Domain Name System-Security Extensions (ドメ イン・ネーム・システムーセキュリティ拡張機能」(1 997)がある。当業者ならば理解されるように、本発 明の一実施例では、セキュアDNS機能を利用している が(例えば、レコードのオリジナル名を導き出し、シグ ネーチャを検証するために)、すべての実施例がこの機 能を必要とするとは限らない(つまり、これらは十分な 40 能力をもつ他のシステムを使用して実現することが可能 である)。

【0024】D SXレコード ~

セキュリティ拡張機能で上に示したように、Internetド メイン・ネーム・システムはユーザが新規のリソース・ レコード・タイプを自由に作成できる点でオープンエン ド(open-ended)になっている。本発明の種々実施例によ れば、さらに、SXレコードと名づけた別の新規レコー ド・タイプが追加されている。SXレコードのデータ・ フィールドは、そのレコードの所有者に関連する「セキ

(例えば、名前またはアドレス)を収めている。セキュ ア・エクスチェンジャはセキュア・コミュニケーション を自身のために、または別のマシンのために処理するマ シンである(例えば、暗号化または解読を実行する)。 この機能を実行するために、セキュア・エクスチェンジ ャは暗号データ(例えば、キーまたはアルゴリズム)を 使用する。セキュア・エクスチェンジャのIDと暗号デ ータはセキュア・エクスチェンジャのパラメータと総称 することができる。ファイアウォールはセキュア・エク スチェンジャ機能を頻繁に実行するので、「ファイアウ 10 オール110」という用語は、ここでは、セキュア・エ クスチェンジャを意味するために用いられている。当業 者ならば理解されるように、該当の暗号化機能を持つマ シンならば、どのマシンでもセキュア・エクスチェンジ ャとして機能させることができる。

【0025】また、当業者ならば理解されるように、 「SX」は任意のレコード・タイプIDであり、SXレ コード・タイプが定義されていれば、クライアントは明 示的にそのタイプのレコードをネーム・サーバに要求す ることができる。別の方法として、ネーム・サーバは他 20 のレコードの照会に対する返答を含む応答に入れてSX レコードを戻すように構成することも可能である。例え ば、クライアントがホスト・アドレスについて照会する と、ネーム・サーバはホスト・アドレスを応答セクショ ンに、SXレコードを追加セクションに入れて応答を送 信することになる。本発明の他の実施例には、SXレコ ードを追加または権限セクションに入れて戻し、応答の 返答セクションは空のままにしておくようにネーム・サ ーバの振舞をカストマイズすることを含めることも可能 である。言い換えれば、応答は未要求のリソース・レコ 30 ードだけを含むことになる。上述した説明から明らかな ように、当業者ならば理解されるように、本発明はSX レコードが応答のどの特定セクションに入って送られる かには左右されない。SXレコード内のデータは、保護 ホストとのセキュア・コミュニケーションのためにクラ イアントによって使用された情報を更新するために、リ ゾルバと呼ばれるプログラムによって使用される。 【0026】E リゾルバの概要 リゾルバは、ネーム・サーバと、クライアント上で実行

役をするプログラムである。リゾルバは情報の照会をア プリケーション・プログラムから受信し、その照会を該 当のネーム・サーバに送信し、もしあれば、応答を要求 側アプリケーションに戻す。照会のタイプとしては、所 与のホスト名のホスト・アドレス、所与のホスト・アド レスのホスト名、およびネーム・サーバ・データベース にストアされている情報の全体的ルックアップがある。 リゾルバは一般的に照会の処理を次の4ステップで行 う。(1)照会に対する返答がローカルにあれば、その 返答を戻し、返答がなければ(2)返答を要求する最良 50 18

- のサーバを見つけ、(3)いずれかが応答するまでその サーバに照会を送信し、(4)返答を処理する。 【0027】ステップ(2)で照会するのに最良のサー バを見つけるために、リゾルバはサーバ名とゾーンのリ ストを、SLISTと名づけた構造に保存している。S LISTはデフォルト・サーバで初期化される。そのあ とで、リゾルバはサーバとやりとりするたびに、リゾル バはどのサーバが必要とする情報をもっているかのリゾ ルバの「最良の推量(best guess)」でSLISTを更新 する。この「最良の推量」は所与のマシンに関する照会 に対する各サーバの応答性がどの程度であるか(例え ば、応答時間またはサーバが応答した頻度)に基づいて 行われることがよくある。従って、過去の実績に基づく 応答性は将来の照会用にSLISTを最適化するために 使用されている。当業者ならば理解されるように、リゾ ルバはこの基準または他の基準に従ってSLISTを維 持するようにプログラムすることが可能である。 【0028】上述した説明は、リゾルバが実行する機 能、およびその機能の実現方法を髙度にカストマイズで きることを示す一例である。リゾルバのこれらの説明お よび他の詳細は当業者には周知であるので、ここで詳し く説明することは省略する。参考文献としては、例え ば、RFC1034-「Domain Names-Concepts and Fa cilities(ドメイン名-概念と機能)」(1987)お よびRFCIO35-「Domain Names-Implementation and Specification (ドメイン名-実現方法と仕様)」 (1987)がある。 【0029】F リゾルバの機能
- 本発明の種々実施例は、保護ホストとのセキュア・コミ ュニケーションのために使用される情報(つまり、アウ トバウンド・セキュア・メッセージ情報)を収めてい る、クライアント側のデータ構造を動的に更新するよう にリゾルバ機能をカストマイズすることによって実現さ れている。このようなデータ構造はデータ・セットから 構成され、そのフィールドは「トンネル情報」(例え ば、デスティネーションとセキュア・エクスチェンジャ ・アドレス)と関連暗号データ(例えば、セキュア・エ クスチェンジャのキーまたはアルゴリズム)を収めてい るのが代表的である。ここで、「トンネル・マップ」と されているアプリケーション・プログラムとの間の仲介 40 いう用語はそのようなデータ構造を意味するために用い られ、「トンネル・マップ・エントリ」という用語はデ ータ・セットの1つを意味するために用いられている。 【0030】本発明の一実施例によれば、トンネル・マ ップ・エントリはネーム・サーバ・メッセージからのS Xレコードに入っているセキュア・エクスチェンジャの カバレッジ有効範囲(scope of coverage) を示すフィー ルドも含んでいるが、このフィールドは現在この分野で は使用されていないものである。言い換えれば、この新 規フィールドはエントリ内のセキュア・エクスチェンジ ャが暗号化メッセージを、どのマシンに「トンネルから

通過」させるかを示している。詳細は後述するが、この フィールドを使用すると、既存のものから新規のトンネ ル・マップ・エントリを作成できるので、エントリ作成 プロセスを効率化することができる。しかし、本発明の すべての実施例がこのフィールドを必要とするとは限ら

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ないので、これはトンネル・マップ・エントリから省く ことも可能である。このような実施例の1つは「その他 の実施例」のセクションに示されている。

【0031】図9はフィールド4 540を含むトンネ を受 ル・マップ・エントリ500を示す概略図である。図9 10 る。 に示すように、行(row)1はエントリのフィールドの内 【0 容を概略記述し、行2と行3-4は本発明の2実施例の るこ 場合のフィールド・データを具体的に記述している。ト きる ンネル・マップ・エントリ500がどのように作成さ は加 れ、使用されるかの詳細は、「許可クライアントで実現 では される発明」のセクションの後で説明することにする。 自体 本発明の種々実施例では、トンネル・マップ情報はIP 5は SECやSKIPなどの、標準トンネル・プロトコルと ネー 関連づけて使用されている。当業者ならば理解されるよ -フ うに、本発明はトンネル・マップ内の情報の内容または 20 アイ ロケーションに行った変更を容易に受け入れることがで スを もの

【0032】当業者には公知であるように、リソース・ レコードは存続時間(time-to-live(TTL))フィー ルドを含んでおり、これはレコードの情報がいつまで信 頼できるかを示している。SXレコード内のTTLフィ ールドはそのレコードから導き出されたトンネル・マッ プ・エントリの寿命を判断するために使用できる。しか し、マシンのリブート時にトンネル・マップを再初期化 するといった他の手法を用いて、トンエル・マップを最 30 新に保つことも可能である。本発明はどの特定手法にも 限定されないが、本発明によれば、これらの手法および この分野で公知の他の手法を用いてトンネル・マップの 正確性を保つことが可能である。

【0033】G リゾルバのロケーション リゾルバの機能をカストマイズできるだけではなく、そ の機能を1つまたは2つ以上のコンポーネントの中で実 現することも可能である。リゾルバ225という用語 は、ここでは、本発明によって提供される全機能を意味 するために用いられており、かかる機能を実現するため 40 に使用されるコンポーネントの数またはそのコンポーネ ントが置かれるロケーションは無関係である。図2、図 3および図4は許可クライアント210の構成例を示し ている。各構成において、許可クライアント210のア ドレスは例えば199.200.1.9に、そのローカ ルNS250のアドレスは例えば199.200.1. 2になっている。従って、リゾルバ225によって使用 される構成ファイル220は、ローカルNS250のア ドレスを収めている。アプリケーション215は許可ク ライアント210にイシストールされている。暗号プロ 50

セッサ230が必要であれは、これも許可クライアント 210にインストールされる。

【0034】図2に示す構成では、リゾルバの全機能は 1つのコンポーネントに実現されている。このケースで は、アプリケーション215はその照会をリゾルバ22 5に送付する。リゾルバ225は構成ファイル220か らのローカルNS250のアドレスを読み取り、照会を ローカルNS250に転送する。リゾルバ225は応答 を受信すると、ここで説明したようにその応答を処理す ろ.

【0035】図3は、クライアントのリゾルバを変更す ることが望ましくないか、または可能でないとき実現で きる構成を示したものである(例えば、クライアントで はMicrosoft Windows が実行されている)。このケース では、標準スタブ・リゾルバ226が許可クライアント 自体へのループバックと共に使用される。リゾルバ22 5は許可クライアント210にインストールされている ネーム・サーバ・ソフトウェアに組み込まれている。ル ープバックを実現するために、リゾルバ225は構成フ アイル220を読み取り、ローカルNS250のアドレ スを許可クライアント210のアドレスで置き換える。 リゾルバ225はローカルNS250のアドレスを自身 で使用するために保存しておく。このケースでは、アプ リケーション215はその照会をスタブ・リゾルバ22 6へ送付し、リゾルバ226は変更された構成ファイル 220を読み取り、照会をリゾルバ225へ送る。リゾ ルバ225は照会を受信すると、オリジナル構成ファイ ル220に残しておいたアドレスを使用して、その照会 をオリジナル・ローカルNSであるローカルNS250 に転送する。なんらかの応答がリゾルバ225に戻され ると、リゾルバ225はここで説明したように応答を処 理する。

【0036】図4に示す第3の構成では、アプリケーション215はリゾルバ225と一体になるように変更されている。従って、照会を行うには、アプリケーション 215は構成ファイル220を読み取り、照会をローカルNS250に送付する。変更されたアプリケーション 215は応答を受信すると、それを処理する。当業者ならば理解されるように、本発明の精神と範囲から逸脱し

ない限り他の構成を使用することも可能である。 【0037】H システム・セットアップの概要 SXレコードとリゾルバは上述したとおりであるが、そ の説明を前提として、このセクションではシステムの一 実施例がどのようにセットアップされるかの概要を説明 する。以下の概要では、図1がレファレンスとして使用 され、「ネットワーク管理者」という用語はシステム・ セットアップ・タスクのいずれかを実行する一切の個人 を含むように広義に用いられている。これらの個人はネ ットワーク管理者とは別の名称をもっている場合がある (例えば、システム管理者、LAN管理者、データベー

って送られるのが代表的であるが、本発明の実施例で は、追加セクションが使用される。第二は、ネーム・サ ーバがリソース・レコードを応答に追加するとき、該当 のSIGとKEYレコードも追加されることが暗黙にな っていることである(つまり、各レコード・タイプとレ コード所有者名の組み合わせごとに1つのSICレコー ド、およびSIGレコードを生成するために使用される KEYレコード)。さらに、SIGとKEYレコードは 受信時に署名済みレコードを検証するために使用される ことが暗黙になっている。第三は、レコードを応答に追 加する実行ステップがオプションとして記述されている ときは、これらのレコードは追加の照会を行うことでク ライアント側で取得できることを意味することである。 これらの基本点を留意して、図5は、ドメイン100の 登録ネーム・サーバで実行されるときの本発明の一実施 例のフローチャートを示したものである。以下の説明に おいて、外側NS120は図1に示すようにドメイン1 00の登録ネーム・サーバである。

【0042】実行は、外側NS120がドメイン100 20 に置かれているホスト(「登録ホスト」)のアドレスの 照会を受信したときステップ305からスタートする。 ステップ310で、外側NS120は要求されたホスト 名に一致する所有者名をもつSXレコードがそのゾーン ・データベースにあるかどうかをチェックする。そのよ うなレコードがデータベースになければ、実行はステッ プ320にジャンプする。データベースにレコードがあ れば、ステップ315で、外側NS120は要求された ホストのセキュア・エクスチェンジャを示すSXレコー ドを応答に追加する。

- 30 【0043】ステップ320で、外側NS120は要求 されたホストのAレコードがそのゾーン・データベース にあるかどうかを確かめるためにチェックする。要求さ れたホストのAレコードがデータベースにあれば(つま り、要求されたホストのアドレスが公開され、見えるよ うになっている)、外側NS120はステップ335で ホストのAレコードを応答に追加し、ステップ340に 進む。データベースにAレコードがなければ(つまり、 要求されたホストが保護ゾーン180に置かれてい る)、ステップ325で、外側NS120は照会すべき
- 40 他のネーム・サーバがあれば、それを示しているNSレコード(または複数のレコード)を応答に追加する。外側NS120はステップ330で示すように、オプションとしてこれらのネーム・サーバのAレコードを追加してから、ステップ340から続けることができる。
  【0044】SXレコードがステップ315で応答に追加されたときは、ステップ340で外側NS120はオプションとしてSXレコードのデータ・フィールドに入っているセキュア・エクスチェンジャのAレコードとKEYレコードを応答に追加することも可能である。最後50 に、ステップ345で外側NS120は応答をリクエス

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ス管理者、またはゾーン管理者)。実際には、エンドユ ーザおよびプログラマがこれらのタスクの一部を実行す る場合もある。さらに、当業者ならば理解されるよう に、システム・セットアップ・タスクは一人の個人で実 行されるとは限らない。システムをセットアップするこ とは、システムの3つの部分、つまり、(1)外側NS 120である、ドメイン100の登録ネーム・サーバ、 (2) ファイアウォール110、および(3) 許可クラ イアント210を構成することと見ることができる。 【0038】外側NS120を構成するためにネットワ 10 ーク管理者が実行するタスクとしては、SXリソース・ レコードを定義し、該当のレコードを外側NS120用 のネーム・サーバ・データベースに追加することがあ る。この構成には、「登録ネーム・サーバで実現される 発明」のセクションで詳しく説明されているように、外 側NSI20をカストマイズすることも含まれる。 【0039】ファイアウォール110を構成することに は、許可クライアント120と保護ゾーン180内側の マシン間の暗号化コミュニケーションを処理するように ファイルウォールをセットアップすることが含まれる。 また、許可クライアント210からのコミュニケーショ

ンを認識し、許可するようにファイアウォール1102 を構成することも含まれる。当業者に周知であって、こ れらの結果を達成できる手法ならば、どの手法でもファ イアウォール110を構成するために使用することがで きる。

【0040】本発明に従って動作するように許可クライ アント210を構成するためには、次の2つの基本カテ ゴリに属するコンポーネントが必要である。第1のカテ ゴリには、リゾルバ225を実現するコンポーネントが 30 含まれる。リゾルバ・コンポーネントの詳しい説明は 「リゾルバのロケーション」のセクションに記載されて いる。第2のカテゴリには、許可クライアント210の ために暗号オペレーションを実行するコンポーネント (以下では、暗号プロセッサ230と総称する)が含ま れている。暗号オペレーションには、当業者ならば理解 されるように、暗号化、解読、ハッシング(hashing)、 ディジタル証明、ディジタル・シグネーチャ、その他が ある。従って、暗号コンポーネントには、暗号化/解読 ソフトウェアまたは暗号化機能を持つPCMC1Aを含 40 めることができるが、いかなる場合も、これらに限定さ

【0041】1 登録ネーム・サーバで実現される発明 上述した概要セクションを背景として使用して、このセ クションでは本発明の一実施例を実現する詳細について 説明する。以下の説明では、留意すべき点が3つある。 第一は、ネーム・サーバは任意のタイプのレコードを応 答の特定のセクションに入れるのが代表的であるが、本 発明によれば、そのような要件が必ずしも課されないこ とである。例えば、NSレコードは権限セクションに入50

れるものではない。

タに送付する。図10は、要求されたホストのアドレス が公開され、見えるようになっている場合の応答の例を 示す図である。図11は、要求されたホストが保護ゾー ンに置かれている場合の応答の例を示す図である。 【0045】」 許可クライアントで実現される発明 図6、図7および図8は許可クライアント210で実行 されるときの発明の種々実施例のフローチャートを示す 図である。当業者ならば理解されるように、ここで説明 している機能はハードウェアで実現することも、ソフト ウェアで実現することもできる。前者の場合、このハー 10 ドウェアには、汎用プロセッサ、マイクロプロセッサ、 プログラム・ロジック・アレイ、アプリケーション専用 集積回路、およびここで説明している機能を実行するの に十分な処理能力をもつ他のデバイスを含めることが可 能である。後者の場合、このソフトウェアは任意の該当 ハードウェア・プラットフォーム上で実行させることが 可能であり、オブジェクト指向または手続き型プログラ ミング言語を含む、任意の該当プログラミング言語を使 用して実現することが可能である。

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【0046】以下のセクションでは、本発明の2つの実 20 施例を詳しく検討しているが、そこでは許可クライアン ト210上で実行されているアプリケーション215は 内側ホスト140のアドレスの照会を行っている。最初 の実施例では、ドメイン100の1つのネーム・サーバ を使用し、ネットワーク・トポロジは隠されていない

(つまり、内側ホスト140のアドレスは1サーバ実施 例では公開され、見えるようになっている)。言い換え れば、登録ネーム・サーバのデータベースは内側ホスト 1400Aアドレスを含んでいる。第2の実施例では、

ゾーンはネットワーク・トポロジを隠すように定義され 30 ており(つまり、内側ホスト140は保護ゾーン180 に置かれている)、登録ネーム・サーバのデータベース は内側ホスト140のAレコードをもっていない。その 代わりに、このAレコードは第2のサーバによって使用 されるゾーン・データベースに置かれている。これらの 実施例はフローチャートを通る異なった経路をたどって いくが、どちらもステップ405-425からスタート する。

【0047】ステップ405で、リゾルバ225はアプ リケーション215から照会を受信する。ステップ41 40 0で、リゾルバ225は内側ホスト140のドメインの ネーム・サーバまでレフェラルチェーン(referral chai n)をたどっていくことができるが、ローカル・サーバが 再帰的サービスをサポートしていれば、照会をローカル NS250に渡すことも可能である。いずれの場合も、 リゾルバ225にはその後で、ステップ415で照会に 対する応答が戻される。

【0048】ステップ420で、リゾルバ225は応答・マップ・エントリ500を作 にSXレコードがあるかどうかをチェックして確かめ 140へのメッセージを暗号作 る。これらの実施例のどちらの場合も、要求されたホス 50 サ230によって使用される。

ト名に一致する所有者名をもつSXレコードが登録ネーム・サーバのデータベースに含まれていれば、リゾルバ が受信する最初の応答(つまり、登録ネーム・サーバか らの応答)にはSXレコードが入っている。これらの実 施例の以下の説明では、このようなSXレコードが存在 し、応答に含まれているものと想定している。当業者な らば理解されるように、セキュリティ上の目的から、S Xレコードは署名され、そのシグネーチャ(署名)は受 信時に受信側で検証されるのが一般である。図10は要 求されたホストのアドレスが公開されて、見えるように

なっている場合の応答例を示す図であり、図11は要求 されたホストが保護ゾーンに置かれている場合の応答例 を示す図である。

【0049】実行はステップ425から続けられ、そこ でリゾルバ225は内側ホスト140のAレコードが応 答にあるかどうかをチェックして確かめる。2実施例が 異なる経路をたどっていくのはこのステップからであ る。応答にAレコードがなければ、実行はステップ44 0にジャンプするが、その詳細は「2サーバ実施例」の セクションで下述する。Aレコードがあれば、実行はス テップ430から続けられるが、その詳細は以下の「1 サーバ実施例」のセクションで説明する。

[0050]

【実施例】1.1サーバ実施例

要約して説明すると、この実施例では、1ネーム・サー バが使用され、ネットワーク・トポロジは隠されていな い。図1を参照して説明すると、内側NS130は必要 でなく、外側NS120のデータベースは内側ホスト1 40を含めて、ドメイン100に置かれているマシンの レコードを含んでいる。従って、図6のステップ415

では、アプリケーション215からのアドレス照会に対 してリゾルバ225が受信する最初の応答には、内側ホ スト140のAレコードと、ファイアウォール110を 対応するセキュア・エクスチェンジャとして示している SXレコードが含まれている。図10はこの応答の例を 示す図である。

【0051】「登録ネーム・サーバで実現される発明」 のセクションで上述したように、応答はファイアウォー ル110のAレコードとKEYレコードを含んでいる場 合もある。これらの追加レコードが応答になければ、リ ゾルバ225は必要に応じて追加の照会を行う(図6に は図示せず)。また、上述したように、すべての該当S 1Gレコードが応答に含まれている(つまり、各レコー ド・タイプとレコード所有者名の組み合わせごとに1つ のSIGレコード)。リゾルバ225がこれらのレコー ドをすべて受信すると、実行がステップ430から続け れ、そこでリゾルバ225は図5に示すようなトンネル ・マップ・エントリ500を作成し、これは内側ホスト 140へのメッセージを暗号化するために暗号プロセッ サ230によって使用される。

【0052】次に、図9の行2を参照して説明すると、 トンネル・マップ・エントリ500を作成するために、 リゾルバ225は内側ホスト140のAレコード内のデ ータをフィールド1 510内のデスティネーション・ アドレスとして使用する。リゾルバ225は、それぞれ SXレコードに示されているセキュア・エクスチェンジ ャ(つまり、ファイアウォール110)のAレコードと KEYレコード内のデータを使用してフィールド2 5 20とフィールド3 530を埋める。「リゾルバの機 能」のセクションで説明したように、フィールド4 5 10 40はSXレコードに示されているセキュア・エクスチ ェンジャのカバレッジ有効範囲を示すために使用され る。これは、ゾーン・データベースに置かれているとき のSXレコードのオリジナル名を導き出し、それをフィ ールド4 540にストアすることによって行われる。 従って、「オリジナル・データベース名」という用語は ここでは、フィールド4 540の内容を意味するもの として用いられ、以下では、リゾルバ225がどのよう にしてこの名前を導き出すかについて説明する。 【0053】 リゾルバ225はSXレコードのSIGレ 20 コードのラベル・フィールドに入っているカウントを使 用して、応答の中で送られたレコードの所有者名からラ ベルをいくつ残しておくべきかを判断する。例えば、S Xレコード(およびその関連SIGレコード)の所有者 名がeng. sun.com.であり、ラベル・フィールド・カ ウントが2であれば、オリジナル・データベース名は *.sun.com. となる。カウントが3であれば、応答の中 で送られるオリジナル・データベース名とレコードの所 有者名はどちらもeng.sun.com.となる。ゾーン・データ ベースではワイルドカード名が使用されるのが代表的で 30 あるが、当業者ならば理解されるように、ワールドカー ド名は必須ではない。ゾーン・データベースにワイルド カードを使用していない本発明の実施例では、リゾルバ 225はこれに代わる方法として、応答の中で送られた SXまたはSIGレコードから名前を抜き出すといった ように、他の方法でオリジナル・データベース名を導き 出すこともできる。フィールド4 540にオリジナル ・データベース名が満たされると、トンネル・マップ・ エントリ500は完成する。「リゾルバの機能」のセク ションで説明したように、フィールド4 540はデー 40 タ構造の中の新規フィールドであり、そこにはアウトバ ウンド・セキュア・メッセージ情報が収められており、 本発明の一実施例では、この情報を使用してSXレコー ドに示されたセキュア・エクスチェンジャのカバレッジ 有効範囲を示している。

【0054】次に、図6を参照して説明すると、トンネ ル・マップ・エントリ500を作成した後、リゾルバ2 25はステップ435で内側ホスト140のアドレスを アプリケーション215に戻す。実行がここで終わる と、トンネル・マップ・エントリ500には、暗号プロ 50 1つのSIGレコード)。リゾルバ225がこれらのレ

セッサ230が内側ホスト140へのメッセージを暗号 化するために必要な一切の情報が入っているので、アプ リケーション215は内側ホスト140と機密に通信す ることが可能になる。1ネーム・サーバが使用され、ネ ットワーク・トポロジが隠されていない場合の実施例で は、以上によって実行が完了する。

【0055】2.2サーバ実施例

- ネットワーク・トポロジが隠されている場合の実施例 は、2ネーム・サーバを使用して実現することができ
- る。図1を参照して説明すると、外側NS120はドメ イン100の登録ネーム・サーバとなり、ドメイン・デ ータベースは内側ホスト140のAレコードを含まない ことになる。その代わりに、このレコードは保護ゾーン 180の権限をもつネーム・サーバである、内側NS1 30によって使用されるゾーン・データベースに置かれ ることになる。従って、この実施例では、内側ホスト1 40のアドレスに関するアプリケーション215からの 照会に対する最初の応答は外側NSI20から送信され る。図11は、この応答の例を示す図である。外側NS 120のデータベースは内側ホスト140のAレコード を含んでいないので、リゾルバ225がステップ415 で受信した最初の応答にはAレコードが入っていない。 しかし、この実施例では、応答にはファイアウォール1 10をセキュア・エクスチェンジャとして示すSXレコ ードと、内側NS130をゾーンの権限をもつネーム・ サーバとして示す、少なくとも1つのNSレコードが入 っている。従って、リゾルバ225がステップ425で Aレコードがあるかどうか応答をチェックしても、Aレ コードは見つからないので実行はステップ440にジャ ンプする。

【0056】次に、図7を参照して説明すると、ステッ プ440でリゾルバ225はまだ照会されていないネー ム・サーバ、つまり、外側NS120以外のネーム・サ ーバを収めているNSレコードがあるかどうか応答をチ ェックする。従って、この実施例では、実行がステップ 440まで初めて到達すると、リゾルバ225は内側N S130を示すNSレコードとファイアウォール110 を示すSXレコードを応答から探す。なお、この時点で NSレコードがなければ、エラーが発生しているので、 実行は終了する。

【0057】「登録ネーム・サーバで実現される発明」 のセクションで上述したように、応答には内側NS13 0のAレコードのほかに、ファイアウォール110のA レコードとKEYレコードも含まれている場合がある。 これらの追加レコードが応答になければ、リゾルバ22 5は必要に応じて追加の照会(図8には示していない) を行う。また、上述したように、すべての該当SIGレ コードはいずれかの応答に含まれている(つまり、各レ コード・タイプとレコード所有者名の組み合わせごとに 1つのSICレコード)。出び北バ225がこれらのレ

コードすべてを受信すると、実行はステップ445から 統行され、そこでリゾルバ225は図9に示すようにト ンネル・マップ・エントリ500を作成する。

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【0058】次に、図9の行3を参照して説明すると、 トンネル・マップ・エントリ500を作成するために、 リゾルバ225は内側NS130のAレコードに入って いるデータをフィールド1 510内のデスティネーシ ョン・アドレスとして使用する。リゾルバ225は、そ れぞれSXレコードに示されたセキュア・エクスチェン ジャ(つまり、ファイアウォール110)のAレコード 10 とKEYレコードに入っているデータを使用してフィー ルド2 520とフィールド3 530を埋める。フィ ールド4 540を埋めるために、リゾルバ225はゾ ーン・データベースに置かれているときのSXレコード のオリジナル名を導き出す。リゾルバ225がどのよう にしてこのオリジナル・データベース名を導き出すかの 詳しい説明は「1サーバ実施例」のセクションに記載さ れている。

【0059】次に、図7を参照して説明すると、トンネ ル・マップ・エントリ500を作成した後、ステップ4 20 50でリゾルバ225は処理したばかりのNSレコード からのネーム・サーバ(つまり、内側NS130)を 「最良の推量」としてSLIST構造に挿入する。SL ISTの詳細は「リゾルバの機能」のセクションに説明 されている。次に、図6を参照して説明すると、実行は ステップ410にジャンプし、そこでネーム・サーバま でのレフェラルチェインは内側NSI30(内側ホスト 140のゾーンのネーム・サーバ) に通じることにな る。そのあと、内側ホスト140のアドレスに関するア プリケーション215からの照会は最後のトンネル・マ 30 ップ・エントリ500のフィールド1 510、フィー ルド2 520、およびフィールド3 530を使用し て暗号プロセッサ230によって暗号化される。照会が 内側NSI30に到達すると、サーバは標準応答(例え ば、Aレコードおよび対応するSICレコード)をリク エスタに送信する。図12はこの応答の例を示す図であ る。

【0060】ステップ415で、リゾルバ225は応答 を受信し、ステップ420で、リゾルバ225はSXレ コードがあるかどうかをチェックする。SXレコードが 40 ンストールすることができる。そのような実施例では、 なければ、実行はステップ455にジャンプし(図8参 照)、そこでリゾルバ225は内側ホスト140のAレ コードがあるかどうかをチェックする。そのようなAレ コードがなければ、実行は終了する。そうでなければ、 ステップ460で、リゾルバ225はSXレコードによ って作成され、そのオリジナル・データベース名が内側 ホスト140の名前に一致しているエントリがトンネル ・マップにあるかどうかをチェックする。そのようなエ ントリがなければ、ステップ465でリゾルバ225は ホストのアドレスをアプリケーションに戻し、実行は終 50 から保護ネーム・サーバへの照会はホストのアドレス以

了する。一致するエントリがあれば、ステップ470で リゾルバ225は別のトンネル・マップ・エントリ50 0を追加する。

【0061】次に、図9の行4を参照して説明すると、 リゾルバ225は内側ホスト140のAレコード内のデ ータをフィールド1 510内のデスティネーション・ アドレスとして使用する。他のフィールドを完成するた めに、リゾルバ225は、フィールド4 540内のオ リジナル・データベース名が内側ホスト140の名前に

- 最も多くの一致ラベルをもっている、既存のトンネル・ マップ・エントリ500を使用する。例えば、eng.sun. com が内側ホスト140の名前であれば、eng.sun.com は*sun.com.よりも多くの一致ラベルをもつことにな る。リゾルバ225は既存エントリからのフィールドを 使用して、様々な方法で新規エントリを作成することが できる。例えば、リゾルバ225はエントリを既存エン トリから新規エントリにコピーすることも、あるいはリ ゾルバ225は単純にポインタを使用することもでき る。
- 【0062】トンネル・マップ・エントリ500を作成 した後、リゾルバ225はステップ475で内側ホスト 140のアドレスをアプリケーション215に戻す。実 行がここで終了していれば、アプリケーション215 は、暗号プロセッサ230が内側ホスト140へのメッ セージを暗号化するために必要とするすべての情報がト ンネル・マップ・エントリに入っているので、内側ホス ト140と機密に通信することが可能になる。2ネーム ・サーバが使用され、ネットワーク・トポロジが隠され ている場合の実施例では、以上により実行が完了する。 【0063】K その他の実施例

本発明は上述してきた2つの実施例に限定されるもので はない。例えば、本発明は複数のゾーンを含むドメイン で実現することが可能である。そのような実施例では、 登録ネーム・サーバは照会を、権限をもつ複数のゾーン ・ネーム・サーバに送ることができる。

【0064】別の実施例では、本発明は私用ネットワー ク内のセキュリティを保証するように実現することが可 能である。当業者に公知であるように、ネーム・サーバ ・ソフトウェアはスタンドアローン・ネットワークにイ

該当のネーム・サーバは上述した登録ネーム・サーバと 権限をもつネーム・サーバの機能を実行するように構成 されることになる。

- 【0065】さらに別の実施例では、リゾルバはホスト のAレコードを要求する前にSXレコードを要求するこ とも可能である。そのような実施例では、SXレコード は登録ネーム・サーバによって自動的に送信されないこ とになる。
- 【0066】さらに別の実施例では、許可クライアント

を示す図である。

外の情報に対するものにすることが可能である。この実施例では、登録ネーム・サーバからの応答は保護ネーム ・サーバのゾーン・データベース内の情報に関するセキ ュア照会を送信するために使用できる。この実施例で は、セキュア・エクスチェンジャのカバレッジ有効範囲 を示すオリジナル・データベース名は、ネーム・サーバ のトンネル・マップ・エントリだけが使用されるので必 要でない。 【00667】リゾルバ機能がアプリケーションに組み込

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まれているときは他の実施例も可能である。例えば、ア 10 プリケーションが作成するトンネル・マップはプログラ ムが実行中のときだけ存在させることができる。別の方 法として、トンネル・マップを存続させるが、プログラ ムだけがアクセス可能にすることもできる(例えば、オ ペレーティング・システム235にはそのことを知らせ ないようにする)。

【00068】さらに、開示した実施例の種々ステップは 答の例を示す図である。 他の組み合わせで組み合わせることが可能である。登録 【符号の説明】 ネーム・サーバからの応答が要求されたホストのアドレ 100 ドメイン スを含み、トンネル・マップが既存エントリを含んでい 20 110 ファイアウォール て、オリジナル・データベース名が要求されたホストの 120 外側NS 名前と一致している場合には、そのような実施例は実現 130 内側NS 可能である。この実施例では、新規のトンネル・マップ 140 保護ホスト ・エントリは既存エントリを使用して、要求されたホス 150 内側クライアント トのために作成されることになる。 160 LAN

【0069】当業者ならば理解されるように、これまで に説明してきた本発明の精神と範囲から逸脱しない限 り、本発明はさらに別の実施例で実現することも可能で ある。なお、かかる実施例は請求の範囲に記載されてい る本発明の範囲内に属することはもちろんである。 【図面の簡単な説明】

【図1】本発明の実施例を実行させることができる代表 的なインターネット構成を示す図である。

【図2】本発明が実現されているクライアントの構成例 を示す図である。

【図3】本発明が実現されているクライアントの構成例 を示す図である。

【図4】本発明が実現されているクライアントの構成例

【図5】ドメインの登録ネーム・サーバで実行されると きの本発明の一実施例のフローチャートである。 【図6】 クライアントで実行されるときの本発明の一実 施例のフローチャートである。 【図7】 クライアントで実行されるときの本発明の一実 施例のフローチャートである。 【図8】 クライアントで実行されるときの本発明の一実 施例のフローチャートである。 【図9】本発明の一実施例によって使用されるトンネル ・マップの例を示す図である。 【図10】 クライアントからのアドレス照会に対する応 答の例を示す図である。 【図11】クライアントからのアドレス照会に対する応 答の例を示す図である。 【図12】クライアントからのアドレス照会に対する応 答の例を示す図である。 【符号の説明】 100 ドメイン 120 外側NS 130 内側NS 140 保護ホスト 150 内側クライアント 160 LAN 180 保護ゾーン 182 外側クライアント 184 外側ホスト

186 LAN

- 30 190 公衆ネットワーク
  - 210 許可クライアント
  - 215 アプリケーション
  - 220 構成ファイル
  - 225 リゾルバ
  - 230 暗号プロセッサ
  - 250 ローカルNS
  - 500 トンネル・マップ・エントリ



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(18)



[【]図3】

(19)


(20)

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(21)



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エンド

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【図6】

(22)

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(24)



	フィールド1 510	フィールド2 520	- フィールド3 530	フィールド4 540
行 1 (内容の配述)	デスティネーション・ アドレス	ファイアウォールの アドレス	公開キー 法たは 公開キー名	LOHントレ本作成した SXレコードの場き出 さちたオリジナラ・ データスース的
行 2 (1 サーバ実施例)	Aレコード内にあって 要求されたホストの ホスト・プドレスを 使用する	SXレコード内の ファイアウォールの Aレコードを使用する	SXVコード内の ファイアウォールの KEYレコードや 使用する	SX フコードのSIG フコード内のリベデ・ カウントや使用しト ワイドドナード始や 生成する
行 3 (2サーバ実施例の 第1エントリ)	Aレコード内にあって NSレコード内のネーム・ サーバに一致する ネーム・サーバ・ アドレスを使用する	SXレコード内の ファイアウォールの Aレコードを使用する	レィールド4名の値も 多くの一枝リス/1を もし既体エントリ条 原用し、やちをコパーし、 やさや描し示す、など	SXレコードのSIG レコード丸のラベル・ カワントや使用して ワイルドカード的や 住成する
行 4 (2サーバ実施例の 第2エントリ)	Aレコード内にあって 酸状されたホストの 米スト・アドレス	レィールド4月の最も 多くの一数ラベルキ もし既存エントリキ 使用し、それをコピーし、 それを指し示す、など	レメールド480の 勝ち多くの一段しパイ やもし既存エントリネ 夜田し、それをコピーし、それを話します、など	レィールド4内の最も 多くの一致ライルを もつ既存エントリを 使用し、たれをコピーし、

エントリ・マップ・エントリ

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セクション	所有者名	レコード・タイフ	ゲータ
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照会		<照会>	· · · · · · · · · · · · · · · · · · ·
<b>返</b> 答	<内側ホス140> <内側ホス140>	A SIG	<内側ホスト140のアドレス> <sigデータ></sigデータ>
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【図11】

セクション	所有者名	レコード・タイン	ブ データ			
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照会		<照会>				
返答	<ブランク <b>&gt;</b>					
- 特軀β段	<ドメイン100> <ドメイン100> <内側ホスト140> <内側ホスト140>	NS SIG SX SIG	<内側NS 130の名前> <sigデータ> &lt;ファイアウォール110のID&gt; <sigデータ;ラベル・カウント=2></sigデータ;ラベル・カウント=2></sigデータ>			
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照会		<照会>	·				
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権限	〈ブランク〉						
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## Method for controlling a firewall

No documents available for this priority number.

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Classification:	<ul> <li>international:G06F13/00; H04L12/56; H04L12/66; H04L29/06; (IPC1-7): H04L9/32</li> <li>cooperative: <u>H04L29/06; H04L63/0263; H04L63/0272;</u> H04L63/029; H04W8/26; H04W80/04</li> </ul>
Application number:	GB19970018374 19970829
Priority number (s):	<u>JP19960227969 19960829</u>
Also published as:	<u>GB2316841 (B)</u> JPH1070576 (A) JP3662080 (B2)

### Abstract of GB2316841 (A)

When a mobile terminal 21 connected to an Internet service provider (ISP) 30 intends to access an inner network 20 within a firewall 22 via the Internet 10, the ISP sends terminal user information to the inner network. An agent host 32 investigates the Internet protocol (IP) address and the account of the terminal and determines whether the mobile terminal is a terminal moved from the inner network based on this information. If this is the case, a host 23 managing the firewall sets a filter in the



firewall allowing telecommunication between the mobile terminal and the inner network. The communication between the terminal and inner network may be by means of a twoway IP tunnel 40.

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(71) Applicant(s) Kokusai Denshin Denwa Co Ltd (Incorporated in Japan)	(58) Documents Cited INSPEC Abstract No.89502-6210L-059, C9502-5620W-012 & Tenth Comp. Sec. Conference,1994,IEEE,pp212-18
3-2 Nishishinjuku 2-chome, Shinjuku-ku, Tokyo 163, Japan	(58) Field of Search UK CL (Edition O ) <b>H4P PPEB</b> INT CL ⁶ <b>H04L 9/32 12/22 29/06</b>
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#### (54) Method for controlling a firewall

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(57) When a mobile terminal 21 connected to an Internet service provider (ISP) 30 intends to access an inner network 20 within a firewall 22 via the Internet 10, the ISP sends terminal user information to the inner network. An agent host 32 investigates the Internet protocol (IP) address and the account of the terminal and determines whether the mobile terminal is a terminal moved from the inner network based on this information. If this is the case, a host 23 managing the firewall sets a filter in the firewall allowing telecommunication between the mobile terminal and the inner network. The communication between the terminal and inner network may be by means of a two-way IP tunnel 40.



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

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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# 2316841

#### Specification

## TITLE OF THE INVENTION

Method for dynamically controlling a firewall

### FIELD OF THE INVENTION

This invention relates to a method for dynamically controlling a firewall.

### BACKGROUND OF THE INVENTION

In a case of connecting a private network with the Internet, it is necessary to prevent a dishonest access from the Internet. However, if perfectly shut down a telecommunication between an internal network and an external network, it is impossible for a user of the internal network to access to his home network via the Internet.

Therefore, it is necessary to construct a firewall which selectively permits a telecommunication from an outside via the Internet.

In a prior art of a firewall, out of all data packets between the internal network and the external network, a previously permitted packet is only passed, but, another packet is shut down by using a filter.

Generally, such a filter is set by designating an IP (Internet Protokol) address of a terminal sending a packet, an IP address of a terminal receiving the packet, a kind of used protokol and a port number etc. For example, in a case of a telecommunication from an specific external IP address to any internal host (terminal) by using TCP (Transmission Control Protokol), a telecommunication using a specific port number (for example, 110) is permitted.

Wherein, the port number is an identifier for indicating a process of an upper layer in TCP or UDP (User Datagram Protokol).

However, it is difficult to obtain a pertinent filtering when a

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user accesses to his home network, by a dial-up or ppp connection via an ISP (Internet Service Provider) at outside of the home network, by using a mobile computer such as a note-type personal computer (a note-type PC), because upper 4 digits indicates a network with which the mobile PC is connected and lower 4 digits indicates an identifier of the mobile PC in the network, while the IP address used in the Internet telecommunication is indicated by 4 bytes number.

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Namely, in a case of dial-up connection by a mobile host (MH) moved from its home network, the IP address assigned to the mobile host is different every connection, then it is impossible to take a telecommunication using an IP address assigned in its home network.

Therefore, it is difficult to set a filter in the firewall by designating an IP (Internet Protokol) address of the terminal sending a data packet and an IP address of the terminal receiving the data packet, because an IP address of a moved terminal is not constant in the dailup connection.

Furthermore, it is not always possible for the user to use inner resources (a disk, data base and WWW etc.) of the home network to which he usually accesses, even if the filter of the firewall is pertinently set and it is possible only for an authorized mobile host and its user to permit an access from outside to the home network, because an access to the inner resources is individually limited and the access is permitted or is not permitted based on an IP address of a client terminal.

Next, referring to Fig.3, a mobile-IP address is explained, the mobile-IP is under work for standardization.

The mobile IP is a technique which enables to use a same IP address to the mobile terminal which moves anywhere, whenever the mobile terminal connects the Internet.

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However, now, the mobile-IP is not adaptive to a network having the firewall.

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In Fig.3, 100 denotes the Internet, 200 denotes a home network of a mobile terminal 201, 202 denotes a home agent (HA) on the home network 200, 203 denotes a router, 300 denotes an ISP, 400 denotes another network and 401 denotes a terminal on the network 400.

In Fig.3, an IP address of the home network 200 to which the mobile terminal 201 is usually connected is [133.128.8.0], an IP address of the mobile terminal 201 on the home network 200 is [133.128.8. 81], an IP address of the home agent 202 is [133.128.8.100], and, an IP address of the mobile terminal 201 is [130.54.20.199] which is assigned by the ISP when the terminal 201 connects to the ISP by dial-up connection.

Generally, when a packet is sent from the terminal 401 on the network 400 to the terminal 201, as a rout 501 shown in Fig.3, the packet is transferred to the home network 200 to which the terminal 201 is usually connected. Therefore, when the terminal has been moved to another network, for example the ISP 300, it is necessary to transfer the packet to the network 300.

For transferring the packet, in the mobile-IP, an agent host is respectively provided to the network from which the mobile terminal is moved and the network to which the mobile terminal is moved. The agent in the network from which the mobile terminal is moved is called as a home agent and the agent in the network to which the mobile terminal is moved is called as a foreign agent. It is possible that the mobile terminal has a function of the foreign agent. In Fig.3, the mobile terminal 201 has a function of the foreign agent.

When the terminal 201 moved from its home network 200 connects to the ISP 300 by dial-up connection 301, a temporary IP address [130.54.2

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0.199] is assigned to the terminal 201 by the ISP.

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The IP address [130.54.20.199] of the mobile terminal 201 and its IP address [133.128.8.81] in the home network 200 are informed to the home agent 202 in the home network 200 via the ISP and the Internet100. Then, the home agent 202 records that the terminal 201 having the IP [133.

128.8.81] is moving and its temporary IP address is [130.54.20.199] in its data base, based on the received information.

When a packet is sent from the terminal 401 in the network 400 to the terminal 201 by using the usual IP address [133.128.8.81], as shown by route 502, the home agent 202 receives the packet instead of the mobile terminal 201. Then, as shown by the route 503, the home agent 202 transfers the packet from the terminal 401 to the mobile terminal 201 via the Internet 100 and the ISP 300 to the mobile terminal 201, by embedding the packet from the terminal 401 into a packet forwarded to the temporary IP address [130.54.20.199]. The mobile terminal 201 obtains the original packet of the terminal 401 from the received packet, if necessary, as shown by the route 504, any packet to the terminal 401 via the ISP and the Internet.

As mentioned-above, in the mobile-IP, it is possible to a packet from the terminal 401 to the mobile terminal 201 by using the usual IP address [133.128.8.81].

However, the telecommunication using the temporary IP address [130. 54.20.199] is necessary between the mobile terminal 201 and the home agent 202.

Namely, in the mobile-IP, since any process is not applied to the packet send from the mobile terminal 201, an usual routing is necessary.

Therefore, it is impossible for the mobile terminal 201 to another terminal inside the home network 200 except for the home agent 202 under the above-mentioned firewall, because only the telecommunication

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between the mobile terminal 201 and the home agent 202 is allowed. This means that the mobile terminal 201 is limited to access to the resource of its home network 200.

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An object of the present invention is to provide a method for dynamically controlling a firewall which enables to set a filter pertinent to the mobile terminal being connected with the ISP (Internet Service Provider) by the dial-up connection and its user.

An object of embodiments of the present invention is to provide a method for dynamically controlling a firewall which enables to pertinently permit that said mobile terminal and its user access to the resource of the home network from outside.

The present invention enables to set a pertinent filter by obtaining a user information from an Internet service provider. Embodiments of the present invention resolve an limitation of an access to a resource of a home network by combining the filter setting with a mobile-IP.

According to the present invention there is provided a method for enabling a pertinent filter comprising the steps of:

a step for sending a user information of a terminal being connected to an internet service provider by dial-up connection to an inner network inside a firewall from said internet service provider when said terminal accesses to said inner network via the Internet. a step that said inner network determines whether said terminal is a

mobile terminal moved from said inner network, based on said user information;

a step for setting a filter of said firewall to permit a telecommunication between said terminal when said terminal is said mobile terminal moved from said inner network.

In a method embodying the present invention, for resolving an limitation of an access, further an

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IP tunnel is used after setting of said filter for a telecommunication between said terminal and inner network.

In another embodiment for resolving an limitation of an access, said user information is transferred between an agent host provided in said internet service provider and a host for managing said firewall which sets said filter of said firewall provided in said inner network, and said telecommunication using said IP tunnel is done between said terminal and a home agent provided in said inner network.

#### BRIEF DESCRIPTION OF THE DRAWINGS

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Fig. 1 shows a configuration of a system to which a method embodying the present invention is applied.

Fig. 2 shows a mobile-IP which is adaptive to a firewall.

Fig. 3 shows an prior art mobile-IP which is not adaptive to a firewall.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

An embodiment of the present invention will be explained referring to the drawings.

In Fig. 1, 10 denotes the Internet, 20 denotes an inner network having plural home networks 20A, 20B and 20C, 21 denotes a mobile terminal which is usually connected to the inner network 20, 22 denotes a firewall, 23 denotes a host for managing the firewall, 24 denotes a home agent provided in each of home networks 20A, 20B and 20C,

30 denotes an ISP (Internet Sérvice Provider), 31 denotes a server for authentication in the ISP, 32 denotes an agent host in the ISP.

The mobile terminal 21 has a function of a foreign agent for mobile-IP. The mobile terminal 21 is intended to connect the inner network 20 via the Internet, by dial-up connection to the ISP at any location after moving from the home network.

In this embodiment, a mechanism for controlling the firewall based

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on a user information obtained from the ISP and a mobile-IP mechanism adaptive to the firewall are provided.

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The mechanism for controlling the firewall 22 based on the user information obtained from ISP 30 will be explained referring to Fig.1.

A user account (ID) and a pass word are input to the ISP 30, when a user of the mobile terminal 21 intends to connect to the ISP 30 by the dial-up connection. In the ISP 30, the authentication server 31 determines whether the user input data are proper or not. Only when the user input data are proper, an IP address is assigned to the mobile terminal 21, then the mobile terminal 21 is connected to the Internet 100. For this purpose, the ISP 30 can always grasp which user is connecting to the ISP 30 based on the user information and which IP address is assigned to the mobile terminal 21.

When the inner network 20 can know the user and an IP address used by the user, by obtaining the user information from the ISP 30, it is possible to properly set the filter. Then, it is possible to permit a telecommunication from a user who is previously allowed to access to the inner network 20 and to exclude an access from a user who has not authority for the access.

In Fig.1, a mechanism for adding and/or deleting a filter is provided, by providing the host 23 for managing the firewall within the inner network 20. Further, the agent host 32 is provided within the ISP so that only the telecommunication between the agent host 32 and the host 23 for managing the firewall can be allowed. Since the hosts 23 and 32 can use a fixed IP address for this telecommunication, there is no problem on setting the filter for the firewall.

Concretely, the filter is set by the following steps  $(1) \sim (7)$ . The step (n) corresponds to an symbol (n) in Fig.1. (1) When the mobile terminal 21 intends to access to the inner network

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20 from outside of it, the mobile terminal 21 requests an establishment of the connection between the mobile terminal 21 and the inner network 20 via the the agent host 32 in the ISP.

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(2) The agent host 32 investigates an IP address and an account at dialup connection of the mobile terminal 21.

(3) The agent host 32 relays a message from the mobile terminal 21 to the host 23 for managing the firewall, only when the mobile terminal 21 is connected by using a specific account which is allowed to access inside the firewall 22.

(4) An authentication is done by end-to-end method between the mobile terminal 21 and the home agent 24 via the host 23 for managing the firewall, because, in mobile-IP, an authentication must be done between the mobile terminal and the home agent.

(5) If the authentication is successful, the home agent sends a message of the success to the host 23 for managing the firewall.

(6) Then, the host 23 for managing the firewall changes the setting of the firewall 22 so as to permit the telecommunication between the mobile terminal 21 and the home agent 24.

(7) At the time when the host 23 for managing the firewall enables the telecommunication between the mobile terminal 21 and the home agent 24 by changing the setting of the firewall 22, the host 23 informs it to the home agent 24 and the host 23 informs it to the mobile terminal 21 via the agent host 32. After receiving the message, the home agent 24 sets an IP tunnel to the mobile terminal 21 and the mobile terminal 21 and the home agent 24 sets an IP tunnel to the home agent 24, then a two-way IP tunnel 40 is set.

By using the two-way IP tunnel 40, the mobile terminal 21 telecommunicates with each terminal of the inner network 20. Wherein, the mobile terminal 21 periodically sends a message for maintaining the

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connection to the host 23 for managing the firewall. When the message for maintaining the connection from a certain mobile terminal stops, the host 23 for managing the firewall automatically deletes the filter setting to the mobile terminal.

As mentioned above, it is possible to set the firewall 22 only within a necessary term and only for the telecommunication of which start point and end point are distinctly restricted.

A specification of the mobile-IP which is under work for standardization is not adaptive to the network 20 having the firewall 22.

Then, the mobile-IP is improved to adapt to the firewall 22 as follows, and the improved mobile-IP is combined with the abovementioned filter setting.

An combination of the mobile-IP and the dynamic firewall control will be explained referring to Fig.2.

As a route 52 shown in Fig.2, a packet from the mobile terminal 21 to the terminal 25 inside the firewall 22 is embedded in a packet to the home agent 24, then sent out. The home agent 24 obtains an original packet out of the received packet. The home agent 24 sends the obtained packet to the inner terminal 25, as a route 53 shown in Fig.2, by sends again the obtained packet to the Internet. In Fig.2, 26 denotes a router. When the mobile terminal exist in the inner network 20, the mobile terminal 21 telecommunicates with the inner terminal 25 via a route 51.

As mentioned-above, even if an authority is individually allowed in the inner network 20, it is possible to permit the access based on the IP address of the mobile terminal 21 which is usually connected with the network 20 by using the two-way tunnel between the mobile terminal 21 and the home agent 24. Therefore, it is possible to

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communicate between the mobile terminal 21 and the inner terminal 25.

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According to the present invention, it is possible to set the firewall so as to permit the communication from the specific user in connection with the ISP by dail-up connection.

Further, according to embodiments of the present invention, because of an improvement and an combination of the mobile-IP, it is possible to access to the resources of the inner network from outside as same as connected with the inner network.

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#### WHAT IS CLAIMED IS:

1. A method for dynamically controlling a firewall comprising steps of:

a step for sending a user information of a terminal being connected to an internet service provider by dial-up connection to an inner network inside a firewall from said internet service provider when said terminal accesses to said inner network via the Internet;

a step that said inner network determines whether said terminal is a mobile terminal moved from said inner network, based on said user information;

a step for setting a filter of said firewall to permit a telecommunication between said terminal when said terminal is said mobile terminal moved from said inner network.

2. The method claimed in claim 1 wherein, an IP tunnel is used after setting of said filter for a telecommunication between said terminal and said inner network.

3. The method claimed in claim 2 wherein, said user information is transferred between an agent host provided in said internet service provider and a host for managing said firewall which sets said filter of said firewall provided in said inner network, and said telecommunication using said IP tunnel is done between said terminal and a home agent provided in said inner network.

4. A method for dynamically controlling a firewall substantially as hereinbefore described with reference to the accompanying drawings.

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Application No:GB 9718374.3Claims searched:1-4

Examiner: Date of search: Matthew Nelson 20 November 1997

## Patents Act 1977 Search Report under Section 17

### **Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4P (PPEB)

Int Cl (Ed.6): H04L 9/32, 12/22, 29/06

Other: Online:- WPI, JAPIO, INSPEC

#### Documents considered to be relevant:

Сатедоту	Identity of document and relevant passage	Relevant to claims
x	INSPEC Abstract No. B9502-6210L-059, C9502-5620W-012 & "Tenth Annual Computer Security Applications Conference", published 1994, IEEE, pp212-18, Goldberg "The MITRE security perimeter" (see abstract).	

х	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined	P	Document published on or after the declared priority date but before
	with one or more other documents of same category.		the filing date of this invention.
		Ε	Patent document published on or after, but with priority date earlier
&	Member of the same patent family		than, the filing date of this application.

An Executive Agency of the Department of Trade and Industry

# PATENT ABSTRACTS OF JAPAN

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H04L 12/22
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G09C 1/00
G09C 1/00
H04L 9/32
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# (54) ADDRESS INFORMATION MANAGEMENT EQUIPMENT AND NETWORK SYSTEM

#### (57)Abstract:

PROBLEM TO BE SOLVED: To prevent an illicit user from acquiring a correct address by reporting other wrong address to be camouflaged as a normal address to the illicit user.

SOLUTION: Upon the receipt of a packet requesting an address of an LES, an ATM interface driver 21 gives the packet to packet check section 22. The packet check section 22 checks the content of the packet and discriminates it to be valid when the content is in matching with a preset range or to be an illicit request when not and reports the result of discrimination to a LECS protocol processing section 24 with the packet. When the result of discrimination indicates a valid packet, the LECS protocol processing section 24 retrieves an LES table 23 and generates an address notice packet including the LES address and reports the packet to a request source via the ATM interface driver 21.

When the discrimination results indicates an illicit request, the processing section 24 reports an address



notice packet including an address for hacker countermeasure terminal equipment to the request source via the driver 21.

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(11)特許出顧公開發号

(19)日本函物許庁(JP)

特開平9-266475

(43)公開日 平成9年(1997)10月7日

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H04L	12/22		9468-5K	H041.	11/28		
GOGF	15/00	330		GOGF	15/00	830.	A
G09C	1/00	640	72 <b>59</b> —5 J	G09C	1/00	640	2
		660	7259—5 J			660	E
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				審查請求	? 末諸求	請求項の数4	OL (全5頁)
(21)出顧書	<b></b> 身	<b>紡績平3−7360</b> 1		(71)出顧人	0000051	108	
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(22)出版日		平成8年(1996)3月28日			東京都	千代田区栉田腹;	同台四丁目 6 番池
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					会社日日	立殿作所ソフト	フェア開発本部内
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					神奈川	泉横黄市戸塚区戸	可程町5030君地排式
					会社日日	立製作所ソフト	フェア開発本部内
				(74)代理人	、介理上	小川勝易	
•				1			

(54)【発明の名称】 アドレス情報管理接受およびネットワークシステム

#### (57)【要約】

【課題】不正な要求元に対してアドレス情報の通知を追 否したことを知られることなく正しいアドレス情報を渡 すことを防ぎ、不正なアクセスの記録を取ることを可能 にするアドレス情報管理方法を提供する。 【解決手段】アドレス情報管理装置1は通信手段21、

認証手段22.アドレステーブル23.アドレス通知手 段24より構成される。 2



# PATENT ABSTRACTS OF JAPAN

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(51)Int.Cl.	H04L 12/66			
	H04L 12/46			
	H04L 12/28			
(21)Application number : <b>08-203015</b> (22)Date of filing : <b>12.07.1996</b>	(71)Applicant : <b>NEC CORP</b> (72)Inventor : <b>TOMOIKE HIROMOTO</b>			

# (54) VIRTUAL PRIVATE NETWORK CONSTITUTING METHOD IN MOBILE DATA COMMUNICATION

(57)Abstract:

PROBLEM TO BE SOLVED: To execute a data communication by one IP address by connecting a public mobile data network constituting a virtual private network with private branch LAN through a gate way so as to convert data to a mobile terminal to an address. SOLUTION: When a data terminal 3a connected to the subordinate of the LAN emulation server 32 of private branch LAN 3 stops connection with a LAN switch 331 and connects with a mobile equipment 5, the call control part of the mobile equipment 5 is informed of the address of the data terminal 3a. The mobile terminal 5 houses the informed address in a memory to form a mobile data terminal 6 accessable to the public mobile data network 2 and receives the kind of service, the number of the virtual private network and the node number from a location register 23. The server 32 retrieves address information of the terminal 3a and converts data to the mobile terminal 5 to an address to execute data communication by one IP address.



## (12) 公開特許公報(A)

(19)日本国特許广(JP)

(11)特許出關公開發导

#### 特開平10-32610

(43)公開日 平成10年(1998)2月3日

(51) Int.CL		織別記号	庁内整理番号	ΡI			技術表示箇所
H04L	12/66		97445K	H04L	11/20	В	
	12/46				11/00	810C	
	12/28					310B	

審査 前求 有 結求項の数5 FD (全14頁)

(21)出劇番号	<b>坊顧平3-203015</b>	(71)出顧人	00000423 日本戦気	37 I株式≴	社	
(22)出翻日	平成8年(1996)7月12日	(72) 箢明者	東京都海 友地 裕 東京都海 式会社内	基区芝 第元 基区芝 1 マ	訂目7卷1号 訂目7番1号	日本電気株
		(74)代建人	弁理士	加藤	朝道	
			•			

(54)【発明の名称】 移動データ通信における仮想私設嗣の構成方法

#### (57)【要約】

【課題】インターネット接続を許容する移動データ通信 網を利用した仮想私設線を構築する際に問題となる、! Pルーティングの問題を無くし、橋内LAN端末が公衆 移動データ網へアクセスしている移動環境においても構 内LANに接続されている端末と自由に通信可能となる ような仮想私設鋼サービスの提供。

【解決手段】しANエミュレーションサーバを有する構 内しANと公衆移動データ鋼とをしANエミュレーショ ンクライアント機能を有する仮想払設鋼ゲートウェイを 介して接続し、該ゲートウェイは、IPアドレスと公衆 移動データ網内アドレスとの変換機能を増える。公衆移 動データ網は移動データ端末からの位置登録要求受信時 に該移動データ端末が属するゲートウェイに該移動デー タ端末が移動した旨通知する機能を備える。



# PATENT ABSTRACTS OF JAPAN

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(51)Int.Cl.		H04L 12/22
		H04L 12/56
(21)Application number : (22)Date of filing :	: 11-126562 07.05.1999	(71)Applicant : LUCENT TECHNOL INC (72)Inventor : CHUAH MOOI CHOO RAI GIRISH

#### (30)Priority

Priority number : 98 74582 Priority date : 08.05.1998 Priority country : US

#### (54) MOBILE POINT-TO-POINT PROTOCOL

#### (57)Abstract:

PROBLEM TO BE SOLVED: To incorporate a hand-off function of transferring an existing PPP connection from one network access server(NAS) to another NAS by establishing a call through a tunnel to a first packet server connected to a user in response to a call request message, transmitting a disconnection message and disconnecting the tunnel used before. SOLUTION: When providing a virtual private network service for an employee at a distant place to perform access through a network server(NS) 135 to the network of a company by an internet service provider(ISP) A, for example, the remote user is sometimes located at a section to become the object of the service of an ISP B temporarily. At such a time, in response to the call request message, a serve LAC 115 establishes the call through the tunnel to an anchor LAC 155 connected to the user. Then, the disconnection message is transmitted and the tunnel used before is disconnected for supporting a call from the user.



(12)公開特許公報(A)

(19)日本国物許庁(JP)

(11)特許出顧公開發导

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(51) Int.CL		織別記号	ΡI		
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	12/56			11/20	102A

審査請求 末請求 請求項の数15 OL (全 19 頁)

(21)出顧書号	<b>物廠平11-126562</b>	(71)出庭人	596092698
			ルーセント テクノロジーズ インコーボ
(22)出銷日	平成11年(1999)5月7日		レーチッド
			アメリカ合衆国、07974-0836 ニュージ
(31)優先機主張書号	09/074582		ャーシィ, マレイ ヒル, マウンテン ア
(32)優先日	1998年5月8日		ヴェニュー 600
(33)優先權主張国	米国(US)	(72) 発明者	ムーイ チョー チュー
			アメリカ合衆国 07724 ニュージャーシ
			ィ,イートンタウン,イートンクレスト
			ドライヴ 148ピー
		(74)代理人	弁理士 阔部 正夫 (外11名)
			最終夏に続く

(54)【発明の名称】 移動ポイント・ツー・ポイント・プロトコル

#### (57)【夢約】

【課題】 本発明は、通信におけるパケット通信システ ムに関し、特に無線環境における仮想私設網(Vertual P rivate Network)に関する技術を提供する。 【解決手段】 本発明は、呼要求メッセージに応動し

て、ユーザに接続された第1のパケット・サーバへトン ネルを介して呼を確立し、そして、切断メッセージを他 のパケット・サーバに送信して、該ユーザからの該呼を サポートするために以前使用されていたトンネルを切断 する、パケット・サーバからなることを特徴とする。こ れにより、ネットワークアクセスサーバが既存のPPP 接続を1つのNASから別のNASに移転できる「ハン ドオフ」機能がネットワーク・アクセス・サーバに組み 込まれる。



# PATENT ABSTRACTS OF JAPAN

(11)Publication number :10-070576(43)Date of publication of application :10.03.1998

(51)Int.Cl.		H04L 12/66 G06F 13/00	
		G06F 13/00	
		H04L 12/24	
		H04L 12/26	
(21)Application numb	er : 08-227969	(71)Applicant : KOKUSAI DENSHIN DENW. CO LTD <kdd></kdd>	4
(22)Date of filing :	29.08.1996	(72)Inventor : KUBOTA AYUMI KATAGISHI KAZUOKI ASAMI TORU	

## (54) FIRE WALL DYNAMIC CONTROL METHOD

#### (57)Abstract:

PROBLEM TO BE SOLVED: To properly execute the filter setting of a fire wall to a moving terminal dial-up-connected to an internet service provider(ISP) and its user and to properly permit access to a home network resource.

SOLUTION: When the terminal 21 dial-up-connected to ISP 30 access to an internal network 20 within the fire wall 22 through the internet 10, user information of the terminal 21 is sent from ISP 30 to judge whether the terminal 21 is a moving terminal moved from the internal network 20 based on this user information. When it is the moving terminal, the filter of the fire wall 22 is set to permit communication between the terminal 21 and the internal network 20, and communication between the terminal 21 and the internal network 20 is executes through an IP tunnel.



(12) 公開特許公報(A)

(11)特許出願公開番号

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(43)公開日 平成10年(1998)3月10日

					-			
(51) Int.CL		識別記号	庁内整理證母	ΡI			技術表	示箇所
H04L	12/66		9744-5K	H04L I	1/20	-	B	
G06F	13/00	353		G06F 1	3/00	353	Т	
		357				357	Z	
H041	12/24		9744-5K	HO4L I	1/08			
	12/26							
				審查請求	<b>末諸求</b>	訪求項の数3	OL (全	7頁)
(21)出顧書	<b></b>	物廠平3-227969		(71)出碩人	0000012	14		
					国際電信	君電話株式会社		
(22)出験日		平成8年(1995)8	月29日		東京都線	所宿区因新宿 2*	「目3番2号	
				(72) 発明者	建田 步	a de la companya de la compa		
					東京都等	后这团新宿二	「目3番2号	国家
					电信电波	计称式会社内		
				(72) 発明者	片岸 -	-£		
					東京都議	所宿区西新宿二	「目3番2号	国際
					电信律制	言株式会社内		
				(72)発明者	浅見 劉	ά.		
					東京都線	所宿区西新宿二	丁目3番2号	国際
					电信贷制	言株式会社内		
				(74)代理人	护理士	光石一の成都	(外2名)	
				-				

(54) 【発明の名称】 ファイアウォール働的制御方法

(57)【要約】

(19)日本国特許庁 (JP)

【課題】 インターネットサービスプロバイダ(IS P) にダイヤルアップ接続中の移動端末及びそのユーザ に対してファイアウォールのフィルタ設定を適切に行 い。更に、ホームネットワーク資源へのアクセスを適切 に許可できること。

【解決手段】 ISP30にダイアルアップにより接続 中の端末21がインターネット10を経由してファイア ウォール22内の内部ネットワーク20にアクセスする 際に、18P30から端末21のユーザ情報を送り、こ のユーザ情報を基に端末21が内部ネットワーク20か ら移動した移動端末であるか否かを判断し、移動端末で ある場合に、同端末21と内部ネットワーク20との通 信を許可するようにファイアウォール22のフィルタを 設定し、更に、同端末21と内部ネットワーク20との 通信を1Pトンネル40により行う。



## PATENT ABSTRACTS OF JAPAN

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	H04L 12/46
	H04L 12/28
	H04L 12/66
	но4м 3/00
	H04Q 3/545
	н040 3/58
	n an
(21)Application number : 10-061200	(71)Applicant : FUJITSU LTD
(22)Date of filing : 12.03.1998	(72)Inventor : WAKIMOTO TAKESHI OHASHI MASAHIKO

# (54) CONNECTION METHOD FOR VIRTUAL NETWORK AND GATEWAY EXCHANGE

#### (57)Abstract:

PROBLEM TO BE SOLVED: To realize a connection method connected by means of the function of a gateway exchange without revising a numbering plan in the case of connecting prescribed business offices in plural private networks by a virtual network connected by the gateway exchanges as of the connection method and the gateway exchanges in the virtual network where the prescribed business offices in the plural private networks are connected by the gateway exchanges. SOLUTION: This gateway exchange discriminates whether or not an enterprise, an office and an extension number of a caller are registered in a virtual network from an incoming trunk identification number and a caller number of a call (STEP1), discriminates whether or not the connection to an incoming call number is allowed to correspond to the enterprise, the office and the extension number of the caller (STEP2), converts the incoming call number into an incoming call number in a private network by referencing a database when the



connection to the incoming call number is allowed (STEP3) and acquires an outgoing trunk and sends the incoming call number thereto (STEP4).
(12) 公開特許公報(A)

(11)特許出願公開發号

特開平11-261704

(19)日本図特許庁 (JP)

(43)公開日 平成11年(1999)9月24日

(51) Int.CL		識別記号		PI						
H04M	3/42			HO.	4 M	3/42			E	
H04L	12/46					3/00			B	
	12/28			HO	4 Q	3/545				
	12/66					3/58		106		
H04M	3/00			HO	4 L	11/00		310	С	
			審查當求	未該求	調切	2月の数3	OL	(全 11	頁)	最終頁に続く
(21)出朝書	∌	<b>将顧平10-61200</b>		(71)	出項	A 00000!	5223			
						當士過	讲式会	社		
(22)出験日		平成10年(1998)3月12日				神奈川	限川崎	市中原区	上小	田中4丁目1番
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						當士湯	洺古屋	遺信シス	テム	除式会社内
				(72)	発明	計 大樹	正彦			
						爱知明	名古屋	市束区束	茂—	丁目13番3号
						當士湯	名古屋	遺信シス	テム	除式会社内
				(74)	代理	人 弁理士	: 弁桁	貞一		
				1						

(54)【発明の名称】 仮想ネットワークの接触方法およびゲートウェイ交換機

【課題】本発明は、複数の私設線の所定の享業所をゲー トウェイ交換機で接続した仮想ネットワークにおける接 続方法、およびゲートウェイ交換機に関し、複数の私設 網の所定の享業所をゲートウェイ交換機で接続した仮想 ネットワークで接続を行うとき、香号計画の変更を行う ことなく、ゲートウェイ交換機の機能で接続する接続方 法を実現することを目的とする。

【解決手段】ステップ1でゲートウェイ交換機は発呼し てきた入トランク識別香号、発信香号から、発信者の企 葉、事業所、内線香号が仮想ネットワークに登録されて いるかを判定し、ステップ2で発信者の企業、事業所、 内線番号対応に着信香号への接続が許容されているかを 判定し、ステップ3で着信番号への接続が許容の場合、 着信番号をデータベースと参照して、私設網の着信香号 に変換し、ステップ4で出トランクを搞捉して着信香号 を送出するように構成する。 本発明の第1の原理を説明する図



^{(57)【}要約】

# PATENT ABSTRACTS OF JAPAN

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(51)Int.Cl.		H04L 12/56 G06F 13/00 H04L 12/46 H04L 12/28 H04L 12/24 H04L 12/26 H04L 29/06
(21)Application numbe	r : 08–275809	(71)Applicant : <b>HITACHI LTD</b>
(22)Date of filing :	18.10.1996	(72)Inventor : KAYASHIMA MAKOTO TERADA MASATOSHI FUJIYAMA TATSUYA OGINO TAKAAKI

## (54) NETWORK COMMUNICATION METHOD AND EQUIPMENT

### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a virtual network environment in which communication is attained without notifying a relay path in the network communication system where communication between a client and a server is conducted in an environment in which a plurality of fire walls are interposed.

SOLUTION: A communication relay program that relays a communication client program on a client 303 and a communication server program of servers 301, 302 is started on servers 304, 305, 306 such as a fire wall, a relay path control table is provided to the client 303 and the relay servers 304–306, the communication client program is connected to the relay program of the relay server communicated by the client selected from the table in the connection processing to a server whose direct connection is unable due to a fire wall to request the relay of communication with the communication server program on the server to the relay server.



# (12) 公開特許公報(A)

(11)特許出顧公問發号

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(19)	日本国物許庁	(JP)
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(43)公開日 平成10年(1998)5月15日

		•							
(51)Int.CL		織別起号		PI					
H04L	12/56			но	4 L	11/20		102D	
G 0 6 F	13/00	355		GO	6 F	19/00		355	
H04L	12/48			НO	4 L	11/00		310C	
	12/28					11/08			
	12/24					13/00		305B	
			審查菌求	末瀉求	甜菜	秋月の第22	OL	(全 13 頁)	最終頁に続く
(21)出劇書	<b>∌</b>	物樹平3-275309		(71)	出項	A 000005	108		
						株式会	社日立	製作所	
(22)出殿日		平成8年(1996)10月18日				書京京	千代田	区神田駿河台	四丁月6番池
				(72)	発明	<b>計 登島</b>	信		
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						会社日	立契作	所システム関	充研究所内
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						会社日	立與作	所システム開	充研究所内
				(74)	代理	人 弗理士	小川	勝男	
									最終頁に続く
				1					

(54) 【発明の名称】 ネットワーク通信方法および装置

#### (57)【要約】 (修正有)

【課題】複数のファイアウォールが介在する環境でクラ イアントとサーバとの通信を行なうネットワーク通信シ ステムにおいて、中継経路を意識せずに通信できる仮想 ネットワーク環境を得る。

【解決手段】クライアント303上の過信クライアント プログラムと、サーバ301、302の通信サーバプロ グラムの通信を中継する通信中継プログラムをファイア ウォール等中截サーバ304、305、306上で起動 し、クライアントおよび中徹サーバには中継経路制御テ ーブルを持たせ、通信クライアントプログラムは、ファ イアウォールにより直接接続できないサーバへの接続処 週において、前記テーブルより選択したクライアントか ら通信可能な中継サーバの中継プログラムに接続し、通 信サーバプログラムとの通信の中継を依頼する。更に、 サーバへの接続処理において、クライアントの通信クラ イアントプログラムと同様に、中継サーバにサーバ上の 通信サーバプログラムと同様に、中継サーバにサーバ上の 3



http://www4.ipdl.inpit.go.jp/Tokujitu/tjcontentpaj.ipdl?N0000PeticiNoeorsApportEnnesoEx. 10/242014579

# PATENT ABSTRACTS OF JAPAN

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(51)Int.Cl.		H04L 12/22
		H04L 12/56
(21)Application number (22)Date of filing :	: 11-126563 07.05.1999	(71)Applicant : LUCENT TECHNOL INC (72)Inventor : CHUAH MOOI CHOO RAI GIRISH

## (30)Priority

Priority number : 98 74745 Priority date : 08.05.1998 Priority country : US

### (54) MULTIPLE HOP POINT-TO-POINT PROTOCOL

#### (57)Abstract:

PROBLEM TO BE SOLVED: To enable a remote user to perform access through an internet service provider(ISP) under visiting to a virtual private network in addition to a home ISP by establishing a multiple hop packet tunnel with another packet terminal and repeating a message with the other packet terminal through the multiple hop packet tunnel.

SOLUTION: A communication system 100 shows the multiple hop tunnel, one hop comes from an ISP B network to an ISP A network and the other hop comes from the ISP A network to the network of a company. The tunnel and call are established between a serve LAC 115 and an anchor LAC 155. Similarly, the tunnel and call are established between the anchor LAC 155 and an LSN 135. When the tunnel is established, a lot of control message transactions are generated and a point-to-point protocol is set.



# (12)公開特許公報(A)

(11)特許出顧公開發号

特開平11-355272

(43)公開日 平成11年(1999)12月24日

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H04L	12/22		H04L	11/28	
	12/56			11/20	102A

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(21)出顧番号	<b>物顯平11-126563</b>	(71)出폖人	596092698
			ルーセント テクノロジーズ インコーボ
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(54)【発明の名称】 多重ホップ・ポイント・ツー・ポイント・プロトコル

#### (57)【夢狗】

【課題】 本発明は、通信におけるパケット通信システ ムに関し、特に多重トンネルによる私設網への遠隔アク セスを可能にする仮想私設綱(VPN)サービスに関す る技術を提供する。

【解決手段】 本発明は、パケット・サーバで使用され る方法であって、他のパケット終端間に多宣ホップ・パ ケット・トンネルを確立する段階と、該多宣ホップ・パ ケット・トンネルを通じて該他のパケット終端間でメッ セージを中継する段階とからなることを特徴とする。こ れにより、多数のインターネット・サービス・プロバイ ダ(ISP)を通じて仮想ダイヤルアップ・サービスが 提供され、特に、遠陽ユーザはサーブISPへの接続を 確立することによって仮想ダイヤルアップ・サービスに アクセスする。サーブISPは、アンカISPへの第1 トンネルを確立する。アンカISPは、例えば、私設イ ントラネットへのトンネルを確立する。その結果、多重 トンネルによる私設綱への遠隔アクセスを可能にする仮 想私設綱(VPN)サービスが提供される。



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ate	06-06-2013
med Inventor	Victor Larson
	2453
er Name	Krisna Lim
Number	77580-196 (VRNK-0001CP3CNFT9)
t	er Name t Number

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

- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is authorized to charge any required fees to Deposit Account 50-1133.
- [X] Information Disclosure Statement is being filed with the Request for Continued Examination, which was electronically filed on May 19, 2014 and at that time, all fees due, were paid. However, the Commissioner is hereby authorized to charge any further fees which may be due, to Deposit Account 50-1133.

#### 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.

Date: May 19, 2014

/Toby H. Kusmer/ Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

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			e l	Art Un	nit		2453	
		MAY 1 0 2014	MA-	Exami	iner Name	Kri	isna Lim	
		1 3 2010	<del></del>	Dock	et Number	77580-196 (VR	NK-0001CP3CNFT9)	
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				Art U	Init			2453		
				Exan	niner Name		Kri	sna Lim		
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(Use as man	, sheets as ne	cessary)	First Named Inventor	Victor Larson						
			Art Unit	2453						
			Examiner Name	Krisna Lim	<b></b>					
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		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CN	FT9)
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		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)
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D1466	IPR2013-00375; Inter Partes Reviev Petitioner New Bay Capital, LLC., –	v of Patent Number 6,50 Petition for Inter Partes	02,135 filed on June 23, 2013, Review of Patent No. 6,502,135	
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	LOSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	ecessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CI	NFT9)
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D1482	Petitioner Apple Inc. – Exhibit 1003	v of Patent Number 7,41	8,504 filed on July 1, 2013, Fratto, 182 pages (2013)	
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D1490	IPR2013-00394: Inter Partes Review	v of Patent Number 7 41	-ratio, 203 pages (2013) 8 504 filed on July 1, 2013	
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D1492	Pennoner Apple Inc., - Exhibit 1006: IPR2013-00397: Inter Partes Review	v of Patent Number 7 92	1 211 filed on July 1 2013	
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		Application Number	13/911,792	
	USURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as nec	cessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Dockot Number	77590 106 (V/DNK 0001CD2C	
D1405	IDD2012 00207: Inter Parton Deview	DOCKEL Number 7 00	17580-196 (VRINK-000 ICF 3C	NF 1 3)
D1495	Petitioner Apple Inc Exhibit 1006	Declaration of James C	hester 26 pages (2013)	
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D1500	IPR2014-00176; Inter Partes Review	of Patent Number 7,41	8,504 filed on November 20, 2013,	
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D1508	IPR2014-00172; Inter Partes Review	of Patent Number 6,50	2,135 filed on November 20, 2013,	
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	CLIDE STATEMENT VO	Application Number	13/911,792	
	JURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as nece	essary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
	· · · · · · · · · · · · · · · · · · ·	Docket Number	77580-196 (VRNK-0001CP3CNFT9	<u>.</u>
D1517	PR2014-00173; Inter Partes Review	v of Patent Number 7,49	0,151 filed on November 20, 2013,	<u> </u>
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F	Petitioner RPX Corporation; Exhibit U.S. Patent <u>Number 7,490,151, 23 p</u>	1005: Declaration of Ch bages (2013)	ris Hopen Regarding Prior Art and	
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D1522	PR2014-00175; Inter Partes Review	v of Patent Number 7,92	1,211 filed on November 20, 2013,	
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D1523	PR2014-00175; Inter Partes Review	v of Patent Number 7,92	1,211 filed on November 20, 2013,	
D1524	Petitioner RPX Corporation; Exhibit	1006: Declaration of Jar	nes Chester, 26 pages (2013)	
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<i>P</i>	Apple Inc.; Exhibit 1006: Declaration	of James Chester, 26 p	bages (2013)	
D1528	PR2014-00237; Inter Partes Review Apple Inc.; Petition for Inter Partes F	v of Patent Number 8,50 Review, 72 pages	04,697 filed on November 20, 2013,	
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(Use as many sheets as necessary)       First Named Inventor       Victor Larson         Art Unit       2453         Examiner Name       Krisna Lim         D0538       IPR2014-00237; Inter Partes Review of Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1071; How it Works: Cable Modems, 2 pages (1999)         D1539       IPR2014-00237; Inter Partes Review of Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1072; Microsoft Press, Microsoft Computer Dictionary Fourth Edition, 9 pages (1999)         D1540       IPR2014-00237; Inter Partes Review of Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1075; IBM Session Initiation Protocol, 4 pages (2013)         D1541       IPR2014-00233; Inter Partes Review of Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1076; ISnorte Oxford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, 3 pages (2002)         D1542       IPR2014-00238; Inter Partes Review of Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Patibin 1003; Declaration of Michael Frato Regarding U.S. Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005; Declaration of Chris Hopen Regarding U.S. Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005; Declaration of Chris Hopen Regarding Pirc Art and U.S. Patent Number 7, 490, 151,23 pages (2013)         D1544       IPR2014-00238; Inter Partes Review of Patent Number 8, 504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005; Declaration of Jiner Partes Review (20, 2013, Apple Inc; Exhibit 1005; Declaration of Inter Pates Review (20, 2014)		OSURE STATEMENT VS.	Filing Date	06-06-2013
Art Unit         2453           Examiner Name         Krisna Lim           Docket Number         77580-196 (VRNK-0001CP3CNFT9)           D1538         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1071: How it Works: Cable Modems, 2 pages (1999)           D1539         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1072: Microsoft Press, Microsoft Computer Dictionary Fourth Edition, 9 pages (1999)           D1540         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1072: Shorter Oxford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, pages (2002)           D1541         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Michael Frath Regarding U.S. Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Michael Frath Regarding U.S. Patent Number 8,504,697, 240 pages (2013)           D1543         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding U.S. Patent Number 8,504,697, 240 pages (2013)           D1544         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of James Chester, 26 pages (2013)           D1544         IPR2014-00238; Inter Partes Review of Patent Number 7,188,180 filed on November 20, 2013, Apple Inc; Exhibit 1006: Declaration of Dister Partes Review, 42	(Use as many sheets as new	cessary)	First Named Inventor	Victor Larson
Examiner Name         Krisna Lim           Docket Number         77580-196 (VRNK-0001CP3CNFT9)           D1538         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1071: How it Works: Cable Modems, 2 pages (1999)           D1530         IPR2014-00237; Inter Partes Review of Patent Number 6,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1075: IBM Session Initiation Protocol, 4 pages (2013)           D1540         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1075: IBM Session Initiation Protocol, 4 pages (2013)           D1541         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1078: Shorter Oxford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, 3 pages (2002)           D1542         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1003: Declaration of Michael Fratto Regarding U.S. Patent Number 8,504,697, 240 pages (2013)           D1543         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding Piror Art and U.S. Patent Number 7,460, 151,23 pages (2013)           D1544         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Inner Partes Review (20 pages (2013)           D1545         IPR2014-00238; Inter Partes Review of Patent Number 7,188,140 filed on February 4, 2014, Petitioner Microsoft Corporation			Art Unit	2453
Docket Number         77580-196 (VRNK-0001CP3CNFT9)           D1538         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1071: How it Works: Cable Modems, 2 pages (1999)           D1539         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1072: Microsoft Press, Microsoft Computer Dictionary Fourth Edition, 9 pages (1999)           D1540         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1075: IBM Session Initiation Protocol, 4 pages (2013)           D1541         IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1079: Shorter Oxford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, 3 pages (2002)           D1542         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1030: Declaration of Michael Fratto Regarding US. Patent Number 8,504,697, 240 pages (2013)           D1543         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding Prior Art and U.S. Patent Number 7,490,151,23 pages (2013)           D1544         IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of James Chester, 26 pages (2013)           D1545         IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of James Chester, 72 pages (2013)			Examiner Name	Krisna Lim
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<ul> <li>Apple Inc; Exhibit 1071: How it Works: Cable Modems, 2 pages (1999)</li> <li>D1539 IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1072: Microsoft Press, Microsoft Computer Dictionary Fourth Edition, 9 pages (1999)</li> <li>D1540 IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1075: IBM Session Initiation Protocol, 4 pages (2013)</li> <li>D1541 IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1075: Noter OXford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, 3 pages (2002)</li> <li>D1542 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1003: Declaration of Michael Fratto Regarding U.S. Patent Number 8,504,697, 240 pages (2013)</li> <li>D1543 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding U.S. Patent Number 8,504,697, 240 pages (2013)</li> <li>D1545 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding Prior Art and U.S. Patent Number 7,490,151,22 pages (2013)</li> <li>D1545 IPR2014-00238; Inter Partes Review of Patent Number 7,188,180 filed on November 20, 2013, Apple Inc; Exhibit 1006: Declaration of James Chester, 26 pages (2013)</li> <li>D1545 IPR2014-00238; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation, - Patition for Inter Partes Review, 62 pages</li> <li>D1545 IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation, - Exhibit 1005: Kosiur, "Building and Managing Virtual Private Networks," Wiley Computer Publishing, ISBN: 0471295264 (1998)</li> <li>D1549 IPR2014-00401</li></ul>	D1538	IPR2014-00237: Inter Partes Review	v of Patent Number 8.50	4.697 filed on November 20, 2013.
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Apple Inc; Exhibit 1075: IBM Session Initiation Protocol, 4 pages (2013)           D1541         IPR2014-00237, Inter Partes Review of Patent Number 8,504.697 filed on November 20, 2013, Apple Inc; Exhibit 1079: Shorter Oxford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, 3 pages (2002)           D1542         IPR2014-00238, Inter Partes Review of Patent Number 8,504.697 filed on November 20, 2013, Apple Inc; Petition for Inter Partes Review, 72 pages           D1543         IPR2014-00238, Inter Partes Review of Patent Number 8,504.697 filed on November 20, 2013, Apple Inc; Exhibit 1003: Declaration of Michael Fratto Regarding U.S. Patent Number 8,504,697, 240 pages (2013)           D1544         IPR2014-00238, Inter Partes Review of Patent Number 8,504.697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding Prior Art and U.S. Patent Number 7,480,151,23 pages (2013)           D1545         IPR2014-00238, Inter Partes Review of Patent Number 8,504.697 filed on November 20, 2013, Apple Inc; Exhibit 1006: Declaration of James Chester, 26 pages (2013)           D1546         IPR2014-00238, Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Petition for Inter Partes Review, 62 pages           D1547         IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Exhibit 1005: Guillen et al., *an Architecture for Virtual Circuit/QoS Routing," Brussels University, 8 pages (1993)           D1548         IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Exh	D1540	IPR2014-00237; Inter Partes Review	v of Patent Number 8,50	4.697 filed on November 20, 2013,
<ul> <li>D1541 IPR2014-00237; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1079: Shorter Oxford English Dictionary on Historical Principles, Fifth Edition, Volume 1 A-M, 3 pages (2002)</li> <li>D1542 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Pattion for Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1003: Declaration of Michael Fratto Regarding U.S. Patent Number 8,504,697, 240 pages (2013)</li> <li>D1544 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding Prior Art and U.S. Patent Number 7,490,151,23 pages (2013)</li> <li>D1545 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of James Chester, 26 pages (2013)</li> <li>D1545 IPR2014-00238; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., – Petition for Inter Partes Review, 62 pages</li> <li>D1547 IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., – Exhibit 1005: Guillen et al., "An Architecture for Virtual Cricuit/QoS Routing," Brussels University, 8 pages (1993)</li> <li>D1548 IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., – Exhibit 1006: Kosiur, "Building and Managing Virtual Private Networks," Wiley Computer Publishing, ISBN: 0471202264 (1998)</li> <li>D1549 IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., – Exhibit 1005: Redacted Settlement Agreement dated 5/14/2010</li> <li>D1549 IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., – Exhibit 100</li></ul>		Apple Inc; Exhibit 1075: IBM Session	n Initiation Protocol, 4 pa	ages (2013)
<ul> <li>Apple Inc, EXhibit 10/9. Shorter Oxford English Dictionary on Historical Principles, Pitth Edition, Volume 1 A-M, 3 pages (2002)</li> <li>D1542 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Patition for Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1003: Declaration of Michael Fratto Regarding U.S. Patent Number 8,504,697, 240 pages (2013)</li> <li>D1544 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1005: Declaration of Chris Hopen Regarding Prior Art and U.S. Patent Number 7,400,151,23 pages (2013)</li> <li>D1545 IPR2014-00238; Inter Partes Review of Patent Number 8,504,697 filed on November 20, 2013, Apple Inc; Exhibit 1006: Declaration of James Chester, 26 pages (2013)</li> <li>D1546 IPR2014-00238; Inter Partes Review of Patent Number 7,188,180 filed on November 20, 2013, Apple Inc; Exhibit 1006: Corporation., - Petition for Inter Partes Review, 62 pages</li> <li>D1547 IPR2014-00401; Inter Partes Review of Patent Number 7,188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Exhibit 1005: Guillen et al., "An Architecture for Virtual Circuit/QoS Routing," Brussels University, 8 pages (1993)</li> <li>D1548 IPR2014-00401; Inter Partes Review of Patent Number 7, 188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Exhibit 1005: Guillen et al., "An Architecture for Virtual Circuit/QoS Routing," Brussels University, 8 pages (1993)</li> <li>D1548 IPR2014-00401; Inter Partes Review of Patent Number 7, 188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Exhibit 1001: Guerin Declaration for 180 Patent (Provino) dated January 10, 2014</li> <li>D1549 IPR2014-00401; Inter Partes Review of Patent Number 7, 188,180 filed on February 4, 2014, Petitioner Microsoft Corporation., - Exhibit 1011: Guerin Declaration for 180 Patent (Provino) dated January 10, 2014<td>D1541</td><td>IPR2014-00237; Inter Partes Review</td><td>v of Patent Number 8,50</td><td>4,697 filed on November 20, 2013,</td></li></ul>	D1541	IPR2014-00237; Inter Partes Review	v of Patent Number 8,50	4,697 filed on November 20, 2013,
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APPLICAN	IT	COSORE STATEMENT VS.	Filing Date	06-06-2013
(Use as man	y sheets as ne	ecessary)	First Named Inventor	Victor Larson
			Art Unit	2453
			Examiner Name	Krisna Lim
			Docket Number	77580-196 (VRNK-0001CP3CNFT9)
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	D1574	VirnetX vs. Microsoft; Defendant's P 106: NetMeeting vs. Claims of the '5	reliminary Invalidity Con 04 Patent, 48 pages	tentions dated 11/14/2013; Exhibit
	D1575	VirnetX vs. Microsoft; Defendant's P 107: EverLink vs. Claims of the '151	reliminary Invalidity Con Patent, 39 pages	tentions dated 11/14/2013; Exhibit
	D1576	VirnetX vs. Microsoft; Defendant's P 108: Special Anthology vs. Claims of	reliminary Invalidity Con f the '135 Patent, 4 page	tentions dated 11/14/2013; Exhibit es
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APPLICANT	JOSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	ecessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CNFT9)	
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D1587	VirnetX vs. Microsoft; Defendant's P 129: Overview vs. Claims of the '274	reliminary Invalidity Cor Patent, 12 pages	ntentions dated 11/14/2013; Exhibit	
D1588	VirnetX vs. Microsoft; Defendant's P 135: Schulzrinne vs. Claims of the '2	reliminary Invalidity Cor 274 Patent, 14 pages	ntentions dated 11/14/2013; Exhibit	
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D1603	VirnetX vs. Microsoft; Defendant's P 228: Abadi vs. Claims of the '135 Pa	reliminary Invalidity Cor atent, 12 pages	ntentions dated 11/14/2013; Exhibit	
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APPLICANT	LOSORE STATEMENT VS.	Filing Date	06-06-2013
(Use as many sheets as no	ecessary)	First Named Inventor	Victor Larson
		Art Unit	2453
		Examiner Name	Krisna Lim
		Docket Number	77580-196 (VRNK-0001CP3CNFT9)
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(Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
·		Docket Number	77580-196 (VRNK-0001CP3CNF	T9)
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(Use as many sheets as ne	ecessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CNFT9	<u>)</u>
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		Art Unit	2453		
		Examiner Name	Krisna Lim		
		Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)	
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(Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson		
		Art Unit	2453		
		Examiner Name	Krisna Lim		
		Docket Number	77580-196 (VRNK-0001CP3CI	NFT9)	
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D1731	Microsoft Claim Chart of U.S. Patent	t No. 6,502,135; vs. RFC	2543 and Internet Drafts (1999)		
D1732	Microsoft Claim Chart of U.S. Patent Firewall references (1997, 1998)	t No. 6,502,135; vs. Alta	Vista Tunnel and/or the AltaVista		
D1733	Microsoft Claim Chart of U.S. Patent for Multimedia Services in the Intern Distributed Multimedia Systems and	t No. 6,502,135; vs. Hen et, Proceedings of the E Services (1996) ("Schul	ning Schulzrinne, Personal Mobility uropean Workshop on Interactive zrinne 96")		
D1734	Microsoft Claim Chart of U.S. Patent (August 30, 2005)	No. 6,502,135; vs. Sch	ulzrinne U.S. Pat. No. 6,937,597		
D1735	Microsoft Claim Chart of U.S. Patent with Secure DNS," Proceedings of th California (July 1996) ("Galvin")	: No. 6,502,135; vs. J.M. ne Sixth USENIX UNIX S	Galvin, "Public Key Distribution Security Symposium, San Jose,		
D1736	Microsoft Claim Chart of U.S. Patent of Virtual Private Network (VPNs) wi 1997) ("Doraswamy")	No. 6,502, 135; vs. Nag th IP Secrity [sic] <draft-< td=""><td>anand Doraswamy, Implementation ietf-ipsec-vpn-00.txt&gt; (March 12,</td><td></td></draft-<>	anand Doraswamy, Implementation ietf-ipsec-vpn-00.txt> (March 12,		
D1737	Microsoft Claim Chart of U.S. Patent	No. 6,502,135; vs. Free	S/WAN references (1996)		
D1738	Microsoft Claim Chart of U.S. Patent Re: Key Management, Anyone?, IET ("Orman DNS"); J. Gilmore et al., Re Working Group Mailing List Archive	No. 6,502,135; vs. H. C F IPSec Working Group : Key Management, any (8/96 - 9/96)	orman et al., Re: 'Re: DNS? Was Mailing List Archive (8/96 - 9/96) one? (DNS keying) IETF IPSec		
D1739	Microsoft Claim Chart of U.S. Patent ("ANX) references (1997, 1999)	No. 6,502,135; vs. the /	Automotive Network exchange		

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APPLICANT	Filing Date	06-06-2013	
(Use as many sheets as necessary)	First Named Inventor	Victor Larson	
( MAY 1 9 2014 3)	Art Unit	2453	
	Examiner Name	Krisna Lim	
A CHE	Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)
D1740 Microsoft Clans Charlet of U.S. Paten	t No. 6,502,135; vs. The	Defense Information Systems	
D1741 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S	. Patent Application No. 09/399.753	
("the Miller Application") as publishe	d in U.S. Pub. No. 2005	/0055306 (Priority Date: 09/22/98)	
D1742 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. R. A Research Laboratory, Cr	Atkinson, "An Internetwork	
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D1743 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Don	ald Eastlake, Domain Name System	
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D1744 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Gold	dschlag et al., "Privacy on the	
Internet," Naval Research Laborator ("Goldschlag I")	ry, Center for High Assur	ance Computer Systems (1997)	
D1745 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Gold	dschlag et al., "Hiding Routing	
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Anonymous and Private Internet Co	nnection." Naval Resear	ch Laboratory. Center for High	
Assurance Computer Systems (Jan	uary 28, 1999) ("Goldsch	nlag III)	
D1747 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. M.G	. Reed, et al., "Proxies for	
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D1748 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. D. N	lacDonald et al., "PF_KEY Key	
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D1750 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Sco	tt et al., Virtual Private Networks,	
D1751 Microsoft Claim Chart of U.S. Paten	t No. 6.839.759; vs. Svv	erson et al., "Private Web	
Browsing," Naval Research Laborat	ory, Center for High Ass	urance Computer Systems (June 2,	
1997) ("Syverson")	+ No. 6 920 750: vo. Sofe	Not VPN Broducto ("SofeNiet VPN	
Products,") (1999-2000)	(1NO. 0,859,759, VS. Sale		
D1753 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. "Bui	Iding a Microsoft VPN: A	
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D1754 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Pub	licly Available DNS-Related	
Correspondence dated September 7	7, 1993 to September 20	, 1993 ("DNS-related	
D1755 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. DNS	SSRV references (1996, 1998,	
1999, 2000)		· · · · · · · · · · · · · · · · · ·	
D1756   Microsoft Claim Chart of U.S. Paten Patent")	t No. 6,839,759; vs. U.S.	. Pat. No. 5,898,830 ("Wesinger '830	
D1757 Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Glot	pal VPN references (1999)	
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IPsec")			

¹ SIPRNET is a U.S. Government Internet Protocol network for the transport of information classified as SECRET. SIPRNET was built starting in 1995, and contains domain names bearing the ".smil" designation. Microsoft has subpoenaed information from the Department of Defense and others relationg to SIPRNET, and reserves the right to amend its contentions to take any additional information about SIPRNET that it receives into account.Department of Defense and others relationg to SIPRNET, and reserves the right to amend its contentions to take any additional information about SIPRNET that it receives into account.Department of Defense and others relationg to SIPRNET, and reserves the right to amend its contentions to take any additional information about SIPRNET that it receives into account.

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		Application Number	13/911,792	
APPI ICANT		Filing Date	06-06-2013	
(Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
	······································	Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)
D1759	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. PGI	P Security, Finding Your Way	
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51700	World Wide Web Connection, IBM In Surfing")	nt'l Technical Support O	rganization (March 1996) ("Safe	
D1761	Microsoft Claim Chart of U.S. Paten 60/134,547 (filed May 17,1999) ("Sh	t No. 6,839,759; vs. U.S eymov")	. Provisional Patent Application No.	
D1762	Microsoft Claim Chart of U.S. Paten VPN+ Publication")	t No. 6,839,759; vs. Dat	a Fellows F-Secure VPN ("F-Secure	
D1763	Microsoft Claim Chart of U.S. Paten Patent'")	t No. 6,839,759; vs. U.S	. Pat. No. 5,950,195 ("Stockwell '195	
D1764	Microsoft Claim Chart of U.S. Paten IPSEC Tunnel Mode, "IPSEC Worki	t No. 6,839,759; vs. B. F ng Group, Internet Draft	Patel et al., "DHCP Configuration of 02 (10/15/1999) ("Patel")	
D1765	Microsoft Claim Chart of U.S. Paten (1996-1997)	t No. 6,839,759; vs. SSL	VPNs ("SSL VPNs") references	
D1766	Microsoft Claim Chart of U.S. Paten references (19995, 1996, 1999)	t No. 6,839,759; vs. Gau	Intlet Firewall ("Gauntlet FW")	
D1767	Microsoft Claim Chart of U.S. Paten 5,822,434 October 13, 1998 (filed Ju	t No. 6,839,759; vs. Car une 18, 1996) ("'434 pat	onni et al., U.S. Patent No. ent)	
D1768	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S	. Pat. No. 5,311,593 ("'593 patent")	
D1769	Microsoft Claim Chart of U.S. Paten 5,511,122 (April 23, 1996)	t No. 6,839,759; RFC 2	230 (November 1997) U.S. Pat. No.	
D1770	Microsoft Claim Chart of U.S. Patent Goncalves et al., Check Point FireW available at <u>http://www.books24x7.com/book/id</u>	t No. 6,839,759; vs. Che /all-1 Administration Gui 762/viewer_r.asp?booki	ck Point FW as described in: de, McGraw-Hill Companies (2000) d=762&chunkid=410651062	
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D1772	Microsoft Claim Chart of U.S. Patent for Configuration and Administration Internet Draft (October 1999) ("LDAR	t No. 6,839,759; vs. Bha of IPSec Based Virtual P Schema for IPSec bas	ttacharya et al., "An LDAP Schema Private Networks (VPNs)", IETF ed VPNs publication")	
D1773	Microsoft Claim Chart of U.S. Patent 1999)	t No. 6,839,759; vs. Onio	on Routing references (1996, 1997,	
D1774	Microsoft Claim Chart of U.S. Patent	t No. 6,839,759; vs. Ave	ntail references (1996, 1997, 1999)	
D1775	Microsoft Claim Chart of U.S. Patent Control Protocol," Version 1.0 (May	t No. 6,839,759; vs. C. F 5, 1998) ("SGCP")	luitema et al., "Simple Gateway	
D1776	Microsoft Claim Chart of U.S. Patent (1997-1999)	t No. 6,839,759; vs. Mici	rosoft VPN Technology references	
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D1778	Microsoft Claim Chart of U.S. Patent Translation Issues with IPsec," Intern ("Moskowitz")	t No. 6,839,759; vs. R.G net Draft, Internet Engin	. Moskowitz, "Network Address eering Task Force, February 6, 1998	
D1779	Microsoft Claim Chart of U.S. Patent Server and Citrix MetaFrame (New F	t No. 6,839,759; vs. Ted Riders 1999) ("Windows	Harwood, Windows NT Terminal NT Harwood")	
D1780	Microsoft Claim Chart of U.S. Patent Genoway, Windows NT Thin Client S MetaFrame (Macmillan Technical Pu	t No. 6,839,759; vs. Tod Solutions: Implementing Jblishing 1999) ("Windov	d W. Mathers and Shawn P. Terminal Server and Citrix ws NT Mathers")	
D1781	Microsoft Claim Chart of U.S. Patent references (1996-1999)	No. 6,839,759; vs. F-S	ecure VPN and F-Secure VPN+	· .
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	OPA	Filing Date	06-06-2013	
Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson	
	( MAY 1 0 2000 \$)	Art Unit	2453	
		Examiner Name	Krisna Lim	
	The second second	Docket Number	77580-196 (VRNK-0001CP3CNF	T9)
D1783	Microsoft Clain Chamber U.S. Paten	t No. 6,839,759; vs. Atki	nson et al., "Security Architecture for	
	the Internet Protocol," Network Work	king Group, RFC 2401 (	November 1998) ("RFC 2401")	
D1784	Microsoft Claim Chart of U.S. Patent Patent")	t No. 6,839,759; vs. U.S	. Pat. No. 6,079,020 ("VPNet ′020	
D1785	Microsoft Claim Chart of U.S. Patent Patent")	t No. 6,839,759; vs. U.S	. Pat. No. 6,173,399 ("VPNet '399	
D1786	Microsoft Claim Chart of U.S. Patent Patent")	t No. 6,839,759; vs. U.S	. Pat. No. 6,226,748 ("VPNet '748	
D1787	Microsoft Claim Chart of U.S. Patent Patent")	t No. 6,839,759; vs. U.S	. Pat. No. 6,226,751 ("VPNet '751	
D1788	Microsoft Claim Chart of U.S. Paten IPSEC," PPPEXT Working Group, Ir	t No. 6,839,759; vs. Abo nternet Draft (February 2	bba et al., "Securing L2TP using 2, 1999) ("L2TP/IPSEC")	
D1789	Microsoft Claim Chart of U.S. Patent Firewall references (1997, 1998)	t No. 6,839,759; vs. Alta	Vista Tunnel and/or the AltaVista	
D1790	Microsoft Claim Chart of U.S. Patent for Multimedia Services in the Intern Distributed Multimedia Systems and	t No. 6,839,759; vs. Her et, Proceedings of the E Services (1996) ("Schu	nning Schulzrinne, Personal Mobility European Workshop on Interactive Izrinne 96")	
D1791	Microsoft Claim Chart of U.S. Patent Patent")	t No. 6,839,759; vs. U.S	. Pat. No. 6,701,437 ("VPNet '437	
D1792	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Wa	tchGuard references (2000)	
D1793	Microsoft Claim Chart of U.S. Paten with Secure DNS," Proceedings of th California (July 1996) ("Galvin")	t No. 6,839,759; vs. J.M ne Sixth USENIX UNIX	. Galvin, "Public Key Distribution Security Symposium, San Jose,	
D1794	Microsoft Claim Chart of U.S. Patent of Virtual Private Network (VPNs) wi 1997) ("Doraswamy")	t No. 6,839,759; vs. Nag ith IP Secrity [sic.] <draf< td=""><td>ganand Doraswamy, Implementation t-ietf-ipsec-vpn-00.txt&gt; (March 12,</td><td></td></draf<>	ganand Doraswamy, Implementation t-ietf-ipsec-vpn-00.txt> (March 12,	
D1795	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Fre	eS/WAN references (1996)	
D1796	Microsoft Claim Chart of U.S. Paten Re: Key Management, anyone?, IET ("Orman DNS"); J. Gilmore et al., Re Working Group Mailing List Archive	t No. 6,839,759; vs. H. ( F IPSec Working Group : Key Management, an (8/96 – 9/96)	Orman et al., Re: 'Re: DNS? Was o Mailing List Archive (8/96 – 9/96) yone? (DNS keying) IETF IPSec	
D1797	Microsoft Claim Chart of U.S. Paten Agency, Secret Internet Protocol Ro	t No. 6,839,759; vs. The uter Network (SIPRNET	Defense Information Systems ) references (1998, 2000)	
D1798	Microsoft Claim Chart of U.S. Patent Security Extensions, IETF DNS Sec http://www.watersprings.org/pub/id/c	t No. 7,188,180; vs. Dor unty Working Group (De traft-ietf-dnssec-secext2	hald Eastlake, Domain Name System ecember 1998), available at 2-07/txt ("DNSSEC-7")	
D1799	Microsoft Claim Chart of U.S. Patent Internet," Naval Research Laborator ("Goldschlag I")	t No. 7,188,180; vs. Gol y, Center for High Assu	dschlag et al., "Privacy on the rance Computer Systems (1997)	
D1800	Microsoft Claim Chart of U.S. Paten Information," Workshop on Informati	t No. 7,188,180; vs. Gol on Hiding, Cambridge, I	dschlag et al., "Hiding Routing UK (May 1996) ("Goldschlag II")	
D1801	Microsoft Claim Chart of U.S. Patent Anonymous and Private Internet Co Assurance Computer Systems (Janu	t No. 7,188,180; vs. Gol nnection," Naval Resea uary 28, 1999) ("Goldscl	dschlag et al., "Onion Routing for rch Laboratory, Center for High hlag III")	
D1802	Microsoft Claim Chart of U.S. Paten Anonymous Routing," 12th Annual C Dec. 9-13, 1996 ("Reed")	t No. 7,188,180; vs. M.G Computer Security Appli	5. Reed, et al. "Proxies for cations Conference, San Diego, CA	
D1803	Microsoft Claim Chart of U.S. Paten Management API, Version 2," Netwo	t No. 7,188,180; vs. D. M ork Working Group, RFC	McDonald et al., "PF_KEY Key C 2367 (July 1998) ("RFC 2367")	
D1804	Microsoft Claim Chart of U.S. Patent Selection Algorithms," available at <u>h</u> ("Route Selection")	t No. 7,188,180; vs. Oni ttp://www.onion-router.n	on Routing, "Investigation of Route het/Archives/Route/index.html	

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	OSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CNF	T9)
D1805	Microsoft Claim Chart of U.S. Paten	t No. 7,188,180; vs. Sco	tt et al., Virtual Private Networks,	-
D1000	O'Reilly and Associates, Inc., 2nd ed	d. (Jan. 1999) ("Scott VF	'Ns")	
D1806	Browsing," Naval Research Laborate 1997) ("Syverson")	ory, Center of High Assu	rance Computer Systems (June 2,	
D1807	Microsoft Claim Chart of U.S. Paten Working Group Meeting Notes, <u>http:</u>	t No. 7,188,180; vs. "IPS //sandleman.ca/ipsec/19	ec Minutes from Montreal," IPSEC 96/08/msg00018.html (June 1996)	
D1808	Microsoft Claim Chart of U.S. Paten Comprehensive Collection of Micros Microsoft VPN publication")	t No. 7,188,180; vs. "Bui oft Resources," FirstVPI	lding a Microsoft VPN: A N, (Jan 2000) ("First VPN Building a	
D1809	Microsoft Claim Chart of U.S. Paten 1999, 2000)	t No. 7,188,180; vs. DNS	SSRV references (1996, 1998,	
D1810	Microsoft Claim Chart of U.S. Paten Patent")	t No. 7,188,180; vs. U.S	Pat. No. 5,898,830 ("Wesigner '830	
D1811	Microsoft Claim Chart of U.S. Paten Making Security Work on VPNS, Intr IPsec")	t No. 7,188,180; vs. Kau ranets, and Extranets (C	fman et al., Implementing IPsec: opyright 1999) ("Implementing	
D1812	Microsoft Claim Chart of U.S. Paten World Wide Web Connection, IBM In Surfing")	t No. 7,188,180; vs. Safe nt'l Technical Support Or	e Surfing: How to Build a Secure ganization (March 1996) ("Safe	
D1813	Microsoft Claim Chart of U.S. Paten 60/134,547 (filed May 17, 1999) ("Sl	t No. 7,188,180; vs. U.S neymov")	Provisional Patent Application No.	
D1814	Microsoft Claim Chart of U.S. Paten VPN+ Publication)	t No. 7,188,180; vs. Data	a Fellows F-Secure VPN ("F-Secure	
D1815	Microsoft Claim Chart of U.S. Paten Patent")	t No. 7,188,180; vs. U.S	Pat. No. 5,950,195 ("Stockwell '195	
D1816	Microsoft Claim Chart of U.S. Paten IPSEC Tunnel Mode," IPSEC Worki	t No. 7,188,180; vs. B. F ng Group, Internet Draft	atel et al., "DHCP Configuration of 02 (10/15/1999) ("Patel")	
D1817	Microsoft Claim Chart of U.S. Paten (1996, 1999)	t No. 7,188,180; vs. SSL	VPNs ("SSL VPNs") references	
D1818	Microsoft Claim Chart of U.S. Paten references (1995, 1996, 1999)	t No. 7,188,180; vs. Gau	ntlet Firewall ("Gauntlet FW")	
D1819	Microsoft Claim Chart of U.S. Paten	t No. 7,188,180; vs. U.S	. Pat. No. 6,199,171 ("'171 patent")	
D1820	Microsoft Claim Chart of U.S. Paten 5,822,434 October 13, 1998 (filed Ju	t No. 7,188,180; vs. Car une 18, 1996) ("'434 pate	onni et al., U.S. Patent No. ent")	
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D1822	Microsoft Claim Chart of U.S. Paten Records"); U.S. Pat. No. 5,511,122	t No. 7,188,180; vs. RFC (April 23, 1996)	2230 (November 1997) ("KX	
D1823	Microsoft Claim Chart of U.S. Paten Goncalves et al., Check Point FireW available at <u>http://www.books24x7.com/book/id</u> (Goncalves, Check Point FW); Chec	t No. 7,188,180; vs. Che /all -1 Administration Gui 762/viewer_r.asp?booki /k Point Software Techn	ck Point FW as described in: de, McGraw-Hill Companies (2000) <u>d=762&amp;chunkid=410651062</u> blogies Ltd. (1999) (Checkpoint FW)	
D1824	Microsoft Claim Chart of U.S. Paten for Configuration and Administration Internet Draft (October 1999) ("LDAI	t No. 7,188,180; vs. Batt of IPSec Based Virtual P Schema for IPSec bas	acharya et al., "An LDAP Schema Private Networks (VPNs)", IETF ed VPNs publication")	
D1825	Microsoft Claim Chart of U.S. Paten 1999)	t No. 7,188,180; vs. Onio	on Routing references (1996, 1997,	
D1826	Microsoft Claim Chart of U.S. Paten	t No. 7,188,180; vs. Ave	ntail references (1997, 1999)	
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(Use as man	y sheets as ne	cessary)	First Named Inventor	Victor Larson		
			Art Unit	2453		
			Examiner Name	Krisna Lim	_	
	·	• · · · · · · · · · · · · · · · · · · ·	Docket Number	77580-196 (VRNK-0001CP3CNFT	⁻ 9)	
	D1828	Microsoft Claim Chart of U.S. Paten Translation Issues with IPsec," Inter ("Moskowitz")	t No. 7,188,180; vs. R.G net Draft, Internet Engin	. Moskowitz, "Network Address eering Task Force, February 6, 1998		
	D1829	Microsoft Claim Chart of U.S. Paten	t No. 7,188,180; vs. RF0	C 2543 and Internet Drafts (1999)		
	D1830	Microsoft Claim Chart of U.S. Paten Firewall references (1997); Birrell et 1997)	t No. 7,188,180; vs. Alta al., U.S. Pat. No. 5,805	Vista Tunnel and/or the AltaVista 803, Sep. 8, 1998 (filed May 13,		
	D1831	Microsoft Claim Chart of U.S. Paten for Multimedia Services in the Intern Distributed Multimedia Systems and	t No. 7,188,180; vs. Her et, Proceedings of the E Services (1996) ("Schu	ning Schulzrinne, Personal Mobility uropean Workshop on Interactive Izrinne 96")		
	D1832	Microsoft Claim Chart of U.S. Paten with Secure DNS," Proceedings of th California (July 1996) ("Galvin")	No. 7,188,180; vs. J. M ne Sixth USENIX UNIX S	I. Gavin, "Public Key Distribution Security Symposium, San Jose,		
	D1833	Microsoft Claim Chart of U.S. Paten Virtual Private Networks (VPNs) with 1997) ("Doraswamy")	t No. 7,188,180; Nagana IP Secrity [sic.] <draft-i< td=""><td>and Doraswamy, Implementation of etf-ipsec-vpn-00.txt&gt; (March 12,</td><td></td></draft-i<>	and Doraswamy, Implementation of etf-ipsec-vpn-00.txt> (March 12,		
	D1834	Microsoft Claim Chart of U.S. Paten	No. 7,188,180; vs. Free	eS/WAN references (1996)		
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	D1836	Microsoft Claim Chart of U.S. Patent Agency, Secret Internet Protocol Ro	Microsoft Claim Chart of U.S. Patent No. 7,188,180; vs. The Defense Information Systems Agency, Secret Internet Protocol Router Network (SIPRNET) references (1998, 2000)			
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	D2371	Request for Inter Partes Reexamina Requester Cisco Systems., - Origina pages	tion of Patent Number 7 al Petition to Request Int	,490,151 filed on August 16, 2011, er Partes Reexamination, 210		
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	D2373	Eagle Integrated Enterprise; Networ	Eagle Integrated Enterprise; Network Security System, 5.0 Reference Guide (1998)			
[	D2374	Configuration Guide for the Cisco Secure PIX Firewall Version 5.0; Configuration Forms (1999)				
[	D2375	Overview of Access VPNs and Tunr	eling Technologies, 199	8, Cisco Systems, Inc.		
	D2376	Bianca/Brick-XMP; User's Guide – H	ardware and Installation	n, Version 1.3 (1999)		
	D2377	Cisco Multimedia Conference Mana Reliable and Scalable Videoconfere	ger; Provides H.323 Gat ncing and Voice-over-IP	ekeeper and Proxy Services for Deployments (1999)		
	D2378	Cisco Multimedia Conference Mana Documents dated 3/20/14)	ger; Release 11.3 (Micro	osoft Invalidity Contentions		
	D2379	Trial Transcript in VimetX Inc. v. App 2012)	ble Inc., 6:10-cv-417 (E.I	D. Tex. Oct. 31, 2012 to Nov. 6,		
	D2380	VirnetX's Opening Claim Construction (E.D. Tex. Mar. 24, 2014)	on Brief, <i>VimetX Inc. v. A</i>	Apple Inc., 6:11-cv-563, 6:12-cv-855		
C	D2381	IPR2014-00558; Inter Partes Review Petitioner Microsoft Corp., – Petition	v of Patent Number 6,50 for Inter Partes Review	2,135 filed on March 31, 2014, , 56 pages		
	D2382	IPR2014-00558, Ex. 1003, Declarati	on of Dr. Roch Guerin s	ubmitted March 31, 2014 (41 pages)		
	E	EXAMINER		DATE CONSIDERED		

*EXAMINER: Initial if Reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

Doc Code: TRAN.LET

Document Description:	Transmittal Letter
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5-20-14

PTO/SB/21 (07-09)

Under the P	aperwork Reduction Act of 1995	no person	U.S s are required to respond to a c	. Patent and ollection of i	nformation unless it displays a valid OMB control nun
SPAR	-		Application Number	13/911,7	92
ैंशे	RANSMITTAL		Filing Date	06-06-20	013
1 9 2011 a) FORM			First Named Inventor	Victor La	arson
3			Art Unit	2453	
attor			Examiner Name	Krisna Li	im
& TRATE Dised fo	r all correspondence after initial	filing)	Attorney Docket Number		
Total Number of	of Pages in This Submission		Anomey Docket Number	77580-19	96
		ENC	LOSURES (Check a	ll that app	<i>ly</i> )
Fee Trai	nsmittal Form Fee Attached		Drawing(s) Licensing-related Papers		After Allowance Communication to Appeal Communication to Board of Appeals and Interferences
Amendar	hent/Reply After Final Affidavits/declaration(s) on of Time Request Abandonment Request ion Disclosure Statement Copy of Priority nt(s)	Remar	Petition Petition to Convert to a Provisional Application Power of Attorney, Revocati Change of Correspondence Terminal Disclaimer Request for Refund CD, Number of CD(s) Landscape Table on C ks st for Continued Examinatic of \$1 200.00 were paid at t	on Address D D	Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) Proprietary Information Status Letter Other Enclosure(s) (please Identify below): 12 Boxes of Non Patent Literature Documents; 11 Foreign Publication References
Reply to Incomple	Missing Parts/ ate Application Reply to Missing Parts under 37 CFR 1.52 or 1.53	and a fee	e of \$1,200.00 was paid at t	hat time.	
irm Name	JIGNA	IUREU	F AFFLICANT, ATTC	KNET,	
	McDermott, Will and Eme	У			
Signature	/Toby H. Kusmer/			···	
Printed name	Toby H. Kusmer		· · · · · · · · · · · · · · · · · · ·		
Date	May 19, 2014			Reg. No.	26,418
					······

sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:
Signature
Typed or printed name
Date

This collection of information is required by 37 CFR 1.5. 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 1.11 and 1.14. This collection is estimated to 2 hours 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.

## **Privacy Act Statement**

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

- The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
- 2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
- 5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
- 6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
- 7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
- 8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
- 9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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

# NOTICE OF ALLOWANCE AND FEE(S) DUE

23630759005/28/2014McDermott Will & EmeryThe McDermott Building500 North Capitol Street, N.W.Washington, DC 20001

EXAMINER

LIM, KRISNA

ART UNIT PAPER NUMBER
2453

DATE MAILED: 05/28/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/911,792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT1	0) 7953

TITLE OF INVENTION: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	08/28/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. <u>PROSECUTION ON THE MERITS IS CLOSED</u>. 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 <u>THREE MONTHS</u> FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. <u>THIS STATUTORY PERIOD CANNOT BE EXTENDED</u>. 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 ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

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.

Petitioner Apple Inc. - Ex. 1004, p. 627

#### 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

(571)-273-2885 or <u>Fax</u>

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 05/28/2014 McDermott Will & Emery The McDermott Building 500 North Capitol Street, N.W. Washington, DC 20001

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.
13/911.792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT	10) 7953

TITLE OF INVENTION: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE		
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	08/28/2014		
EXAM	IINER	ART UNIT	CLASS-SUBCLASS					
LIM, K	RISNA	2453	709-227000					
<ul> <li>2. For printing on the patent front page, fist</li> <li>CFR 1.363).</li> <li>Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</li> <li>The Address form PTO/SB/122) attached.</li> <li>The Address indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</li> <li>ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)</li> <li>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 recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.</li> <li>(A) NAME OF ASSIGNEE</li> <li>(B) RESIDENCE: (CITY and STATE OR COUNTRY)</li> </ul>								
Please check the appropr	iate assignee category or	categories (will not be p	inted on the patent): $\Box$	Individual 🖵 Corporati	ion or other private group	entity Government		
4a. The following fee(s)	are submitted:	41	D. Payment of Fee(s): (Plea A check is enclosed.	ise first reapply any prev	viously paid issue fee sh	own above)		
<ul> <li>Publication Fee (N</li> <li>Advance Order - #</li> </ul>	No small entity discount p # of Copies	permitted)	<ul> <li>Payment by credit car</li> <li>The Director is hereby overpayment, to Depo</li> </ul>	d. Form PTO-2038 is attac authorized to charge the sit Account Number	ched. required fee(s), any defic (enclose an e	eiency, or credits any extra copy of this form).		
5. Change in Entity Sta	tus (from status indicate	d above)						
Applicant certifying	ng micro entity status. Se	e 37 CFR 1.29	<u>NOTE:</u> Absent a valid centre fee payment in the micro	rtification of Micro Entity entity amount will not be	Status (see forms PTO/S accepted at the risk of ar	SB/15A and 15B), issue polication abandonment.		
Applicant assertin	g small entity status. See	37 CFR 1.27	<u>NOTE:</u> If the application to be a notification of loss	was previously under mic	ro entity status, checking	g this box will be taken		
Applicant changin	ng to regular undiscounte	d fee status.	<u>NOTE:</u> Checking this boy entity status, as applicable	x will be taken to be a noti e.	ification of loss of entitle	ment to small or micro		
NOTE: This form must b	be signed in accordance v	with 37 CFR 1.31 and 1.33	3. See 37 CFR 1.4 for signa	ature requirements and cer	tifications.			
Authorized Signature				Date				
Typed or printed nam	e			Registration No.				
	Page 2 of 3							

PTOL-85 Part B (10-13) Approved for use through 10/31/2013.

OMB 0651-0033

U.SPotitionen Apple Inc. DEExtMO04, por 28 CE

UNITED STATES PATENT AND TRADEMARK OFFICE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov							
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.			
13/911,792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT	10) 7953			
23630 75	90 05/28/2014		EXAM	IINER			
McDermott Will The McDermott Bi	& Emery		LIM, K	RISNA			
500 North Capitol	Street, N.W.		ART UNIT	PAPER NUMBER			
Washington, DC 20	0001		2453				
			DATE MAILED: 05/28/201	4			

# **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**

(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

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.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B 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.

## **Privacy Act Statement**

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The information provided by you in this form will be subject to the following routine uses:

- 1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
- 2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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- 8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
- 9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

	Application No.	Applicant(s	)
	13/911,792	LARSON ET	AL.
Notice of Allowability	KRISNA LIM	2453	File) Status
		2400	No
The MAILING DATE of this communication apper All claims being allowable, PROSECUTION ON THE MERITS IS herewith (or previously mailed), a Notice of Allowance (PTOL-85) NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RI of the Office or upon petition by the applicant. See 37 CFR 1.313	ears on the cover sheet with (OR REMAINS) CLOSED in th or other appropriate communic GHTS. This application is sub and MPEP 1308.	the correspondence is application. If not cation will be mailed ject to withdrawal fro	e address included in due course. THIS om issue at the initiative
1. $\square$ This communication is responsive to <u>the RCE filed 05/19/20</u>	<u>114</u> .		
A declaration(s)/affidavit(s) under <b>37 CFR 1.130(b)</b> was	/were filed on		
2. An election was made by the applicant in response to a rest requirement and election have been incorporated into this ac	riction requirement set forth du ction.	ring the interview on	; the restriction
<ol> <li>3.          A The allowed claim(s) is/are <u>26-50</u>. As a result of the allowed Highway program at a participating intellectual property offic <u>http://www.uspto.gov/patents/init_events/pph/index.jsp</u> or set     </li> </ol>	claim(s), you may be eligible t the for the corresponding applic nd an inquiry to <u>PPHfeedback</u>	to benefit from the <b>P</b> a ation. For more infor @uspto.gov	atent Prosecution mation, please see
4. Acknowledgment is made of a claim for foreign priority under	r 35 U.S.C. § 119(a)-(d) or (f).		
Certified copies:			
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 f	NO	
3. Copies of the certified copies of the priority doo	cuments have been received in	i this national stage a	application from the
* Certified copies not received:			
Applicant has THREE MONTHS FROM THE "MAILING DATE" noted below. Failure to timely comply will result in ABANDONM THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.	of this communication to file a ENT of this application.	reply complying with	the requirements
5. CORRECTED DRAWINGS ( as "replacement sheets") must	be submitted.		
including changes required by the attached Examiner's Paper No./Mail Date	Amendment / Comment or in	the Office action of	
Identifying indicia such as the application number (see 37 CFR 1, each sheet. Replacement sheet(s) should be labeled as such in the structure of the structure	84(c)) should be written on the one header according to 37 CFR 1	drawings in the front ( I.121(d).	(not the back) of
6. DEPOSIT OF and/or INFORMATION about the deposit of B attached Examiner's comment regarding REQUIREMENT FC	IOLOGICAL MATERIAL must	be submitted. Note t SICAL MA <b>T</b> ERIAL.	he
Attachment(s)		mondue out/Commence	
Inolice of References Ciled (PTO-892)	5. Examiner's Al	tatement of Bassons	t for Allowanaa
Paper No./Mail Date		atement of neasons	IOF Allowance
3. Examiner's Comment Regarding Requirement for Deposit	7. 🗌 Other		
4. Interview Summary (PTO-413), Paper No./Mail Date			
/KRISNA LIM/			
Primary Examiner, Art Unit 2453			
U.S. Patent and Trademark Office			

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Issue Classification	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination		
	Examiner KRISNA LIM	<b>Art Unit</b> 2453		
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NONE		Total Claims Allowed:				
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Petitioner Apple Inc. - Ex. 1004, p. 633

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Issue Classification	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

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709			225			G	0	6	F	15 / 173 (2006.01.01)						
CROSS REFERENCE(S)					G	0	6	F	15 / 16 (2006.01.01)							
CLASS	CLASS SUBCLASS (ONE SUBCLASS PER BLOCK)															
700	221	229														
726	15															

NONE		Total Claims Allowed:				
(Assistant Examiner)	(Date)	2	5			
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	Application/Control No.	Applicant(s)/Patent Under Reexamination
Issue Classification	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

	Claims renumbered in the same order as presented by applica								СР	A D	3 T.D.	[	<b>R.1.</b>	17	
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NONE	Total Claims Allowed:				
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	4	29	✓		✓	✓	=	=									
	5	30	✓		$\checkmark$	✓	=	=									
	6	31	✓		✓		=	=									
· · ·	7	32	✓		$\checkmark$	✓	=	=									
	8	33	✓		✓	✓	=	=									
<u> </u>	9	34	<b>↓</b>		✓	✓	=	=									
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Part of Paper No. : 20140521

				A	Application/Control No.					Applicant(s)/Patent Under Reexamination							
	Ina	lex of C	Claim	S	13	13911792					LARSON ET AL.						
					E E	Examiner Art Unit											
					K	RISNA LIM	1			2453							
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	□ Claims renumbered in the same order as presented by applicant □ CPA ☑ T.D. □ R.1.47																
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F	inal	Original	08/25/2	013	01/08/2014	02/07/2014	05/17/2	2014									
	12	37	✓		$\checkmark$	✓	=										
	13	38	~		$\checkmark$	√	=										
	14	39	<ul> <li>✓</li> </ul>		$\checkmark$	✓	=										
	15	40	<ul> <li>✓</li> </ul>		$\checkmark$	✓	=										
	16	41	✓		$\checkmark$	✓	=										
	17	42	<ul> <li>✓</li> </ul>		✓	✓	=										
	18	43	<ul> <li>✓</li> </ul>		$\checkmark$	✓	=										
	19	44	~		$\checkmark$	✓	=										
:	20	45	~		$\checkmark$	✓	=										
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	22	47	<ul> <li>✓</li> </ul>		$\checkmark$	√	=										
	23	48	√		$\checkmark$	✓	=										
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Part of Paper No. : 20140521

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Search Notes	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED									
Symbol	Date	Examiner							

## **US CLASSIFICATION SEARCHED**

Class	Subclass	Date	Examiner
709	227-228	08/25/2013	kl
709	225, 221, 229	05/21/2014	KL
726	15	05/21/2014	KL

SEARCH NOTES									
Search Notes	Date	Examiner							
Inventors	08/25/2013	kl							
Inventors	05/21/2014	kl							

	INTERFERENCE SEARCH										
US Class/	US Class/ US Subclass / CPC Group Date Examiner										
CPC Symbol											
709	225, 221, 229	05/21/2014	kl								
726	15	05/21/2014	kl								



Unit	ed States Patent	AND TRADEMARK OFFICE	UNITED STATES DEPAR United States Patent and Address: COMMISSIONER I P.O. Box 1450 Alexandria, Virginia 22 www.uspto.gov	TTMENT OF COMMERCE Trademark Office FOR PATENTS 313-1450			
APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.			
13/911,792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT1	10) 7953			
23630 McDermott Wil	7590 07/09/2014		EXAMINER				
The McDermot	t Building		LIM, KRISNA				
Washington, D	C 20001		ART UNIT	PAPER NUMBER			
			2453				
			NOTIFICATION DATE	DELIVERY MODE			
			07/09/2014	ELECTRONIC			

## 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

Application No. Applicant(s)									
Supplemental Notice of Allewability	13/911,792 Examiner	LARSON E	AL.						
Notice of Anowability	KRISNA LIM	2453	File) Status						
			NO						
The MAILING DATE of this communication app All claims being allowable, PROSECUTION ON THE MERITS IS herewith (or previously mailed), a Notice of Allowance (PTOL-85 NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT R of the Office or upon petition by the applicant. See 37 CFR 1.313	ears on the cover sheet with (OR REMAINS) CLOSED in ) or other appropriate community RIGHTS. This application is s 3 and MPEP 1308.	th the correspondent this application. If no inication will be mailed ubject to withdrawal fi	<i>ce address</i> ot included d in due course. <b>THIS</b> rom issue at the initiative						
1. This communication is responsive to <u>the RCE filed 05/19/2</u> $\square$ A declaration(s)/affidavit(s) under <b>37 CEB 1 130(b)</b> was	<u>014</u> . s/were filed on								
<ul> <li>2. An election was made by the applicant in response to a restriction requirement set forth during the interview on; the restriction requirement and election have been incorporated into this action.</li> </ul>									
3. ☑ The allowed claim(s) is/are <u>36-50</u> . As a result of the allowed claim(s), you may be eligible to benefit from the <b>Patent Prosecution</b> <b>Highway</b> program at a participating intellectual property office for the corresponding application. For more information, please see <u>http://www.uspto.gov/patents/init_events/pph/index.jsp</u> or send an inquiry to <u>PPHfeedback@uspto.gov</u> .									
4. Acknowledgment is made of a claim for foreign priority und	er 35 U.S.C. § 119(a)-(d) or (	(f).							
Certified copies: a) $\Box$ All b) $\Box$ Some *c) $\Box$ None of the:									
1. Certified copies of the priority documents hav	e been received.								
2. Certified copies of the priority documents hav	e been received in Applicatio	n No							
3. 🔲 Copies of the certified copies of the priority do	ocuments have been received	d in this national stage	e application from the						
International Bureau (PCT Rule 17.2(a)).									
* Certified copies not received:									
Applicant has THREE MONTHS FROM THE "MAILING DATE" noted below. Failure to timely comply will result in ABANDON THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.	' of this communication to file MENT of this application.	a reply complying wit	h the requirements						
5. CORRECTED DRAWINGS ( as "replacement sheets") mus	st be submitted.								
including changes required by the attached Examiner Paper No./Mail Date	's Amendment / Comment or	in the Office action of	F						
Identifying indicia such as the application number (see 37 CFR each sheet. Replacement sheet(s) should be labeled as such in	1.84(c)) should be written on th the header according to 37 CF	ne drawings in the fron R 1.121(d).	t (not the back) of						
6. DEPOSIT OF and/or INFORMATION about the deposit of I attached Examiner's comment regarding REQUIREMENT F	BIOLOGICAL MATERIAL mu OR THE DEPOSIT OF BIOL	st be submitted. Note OGICAL MATERIAL.	the						
Attachment(s)									
1. Notice of References Cited (PTO-892)	5. 🗌 Examiner's	Amendment/Comme	nt						
2. Information Disclosure Statements (PTO/SB/08),	6. 🗌 Examiner's	Statement of Reason	ns for Allowance						
3. Examiner's Comment Regarding Requirement for Deposit	7. 🗌 Other								
4. Interview Summary (PTO-413), Paper No./Mail Date									
/KRISNA LIM/									
Primary Examiner, Art Unit 2453									
U.S. Patent and Trademark Office									

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Notice of Allowability

Part of Paper No./Mail Date 20140701

					A	Application/Control No.					Applicant(s)/Patent Under Reexamination				
	Ind	lex of C	Claim	IS	13	13911792				LARSON ET AL.					
					E	Examiner Art Unit									
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	4	29	✓		✓	✓	=	=							
	5	30	✓		$\checkmark$	√	=	=							
	6	31	✓		✓		=	=							
	7	32	✓		$\checkmark$	✓	=	=							
	8	33	✓		✓	✓	=	=							
<u> </u>	9	34	<b>↓</b>		✓	✓	=	=							
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Part of Paper No. : 20140521

			A	Application/Control No.			Applicant(s)/Patent Under Reexamination								
	Ina	lex of C	Claim	S	13	13911792			LARSON ET AL.						
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□ Claims renumbered in the same order as presented by applicant □ CPA ☑ T.D. □ R.1.47								1.47							
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	14	39	<ul> <li>✓</li> </ul>		$\checkmark$	✓	=								
	15	40	<ul> <li>✓</li> </ul>		$\checkmark$	✓	=								
	16	41	✓		$\checkmark$	✓	=								
	17	42	<ul> <li>✓</li> </ul>		✓	✓	=								
	18	43	<ul> <li>✓</li> </ul>		$\checkmark$	✓	=								
	19	44	~		$\checkmark$	✓	=								
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:	21	46	~		$\checkmark$	✓	=								
	22	47	<ul> <li>✓</li> </ul>		$\checkmark$	√	=								
	23	48	✓		$\checkmark$	✓	=								
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Part of Paper No. : 20140521

Subst. for form 1449/PTO	Complete if Known				
INFORMATION DISCLOSURE STATEMENT VS	Application Number	13/911,792			
APPLICANT	Filing Date	06-06-2013			
(Use as many sheets as necessary)	First Named Inventor	Victor Larson			
( MAY 1 9 2014 \$	Art Unit	2453			
	Examiner Name	Krisna Lim			
The second	Docket Number	77580-196 (VRNK-0001CP3CNFT9)			
MADEMANN CERTIFI	CATION STATEMENT				

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

- [] That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or
- [] That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § <u>1.56(c)</u> more than three months prior to the filing of the information disclosure statement.
- [] The Commissioner is authorized to charge any required fees to Deposit Account 50-1133.
- [X] Information Disclosure Statement is being filed with the Request for Continued Examination, which was electronically filed on May 19, 2014 and at that time, all fees due, were paid. However, the Commissioner is hereby authorized to charge any further fees which may be due, to Deposit Account 50-1133.

#### 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.

Date: May 19, 2014

/Toby H. Kusmer/ Toby H. Kusmer; Reg. No.:26,418 McDermott Will & Emery LLP 28 State Street Boston, MA 02109 Tel. (617) 535-4000 Fax (617) 535-3800

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					139	<u>911792 - GAU: 2</u>	
Subst. for forn	n 1449/PTO				Complete if Know	wn	
			Арр	lication Number	13	/911,792	
APPLICAN	T	STATEMENT VS	S. Filin	g Date	06-06-2013		
(Use as many	/ sheets as necessary)	OPAD	Firs	Named Inventor	Vict	or Larson	
		7	Art	Jnit		2453	
		MAY 1 9 2014	₹ Exa	miner Name	Kr	isna Lim	
				ket Number	77580-196 (VRNK-0001CP3CNFT9)		
		THE OFF	U.S. PAT	ENTS			
EXAMINER'S	CITE NO.	Patent Number	Publication Date	Nome of Date	ntoo or Applicant	Pages Columns Lines Where	
INITIALS				of Cited	Document	Relevant Passages or Relevant Figures Appear	
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/Krisna Lim/

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07/01/2014

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./ Petitioner Apple Inc. - Ex. 1004, p. 644

Subst. for forn	n 1449/PTO			Complete if Known				
				Applica	Application Number		13/911,792	
APPLICAN		USURE STATEMENT VS		Filing I	Date	06-06-2013		
(Use as many	/ sheets as ne	cessary)		First N	Named Inventor Victo		or Larson	
				Art Un	it		2453	
				Exami	ner Name	Kr	isna Lim	
					et Number	77580-196 (VRNK-0001CP3CNFT9)		
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/Krisna Lim/ 07/01/2014 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./ Petitioner Apple Inc. - Ex. 1004, p. 645

Subst. for form 1449/PTO				Complete if Known						
INFORMATION DISCLOSURE STATEMENT VS. APPLICANT (Use as many sheets as necessary)				Application Number			13/911,792			
				Filing Date			06-06-2013			
				First Named Inventor		Victor Larson				
				Art Unit			2453			
				Examiner Name			Krisna Lim			
				Docl	ket Number	77	580-196 (VR	NK-	0001CP30	CNFT9)
	A225	7,275,113	09/25/	/2007	A	raujo				
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		U.S. PATE	NT APPL	ICATI	ION PUBLICATION	ONS				
EXAMINER'S INITIALS	CITE NO.	Patent Number	Publicati	on Date Name of Patentee of Cited Do		ntee Doc	or Applicant ument	Page Rele	es, Columns, L evant Passages Figures Ap	ines, Where s or Relevant pear
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	B25	US2003/0005132	01/2	003	Nguy	ven et	al.			
		FOR	EIGN PAT	TENT	DOCUMENTS					
EXAMINER'S INITIALS	CITE NO.	Foreign Patent Document Country Codes -Number 4 -Kind Codes ( <i>if known</i> )	Publication [	Date	Name of Patentee o Applicant of Cited Docu	or ment	Pages, Column Lines Where Relevant Figure Appear	s, es	s	
									Yes	No
	C29	JP 10-126440	05-15-19	98	Hitachi Ltd.				English Abstract	
	C30	JP 11-355272	12-24-19	99	Lucent Technol Ir	nc.			English Abstract	
	C31	JP 11-355271	12-24-19	99	Lucent Technol Ir	nc.			English Abstract	
	C32	JP 11-261704	09-24-19	99	Fujitsu Ltd.				English Abstract	
	C33	JP 10-70576	03-10-19	98	Kokusai Denshi Denwa Co. Ltd.	n			English Abstract	
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	C35	JP 09-266475	10-07-19	97	Hitachi Ltd.				English Abstract	
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07/01/2014

/Krisna Lim/

Subst. for form 1449/PTO			Complete if Known				
			Application Number	13/911,792			
APPLICANT			Filing Date	06-06-2013			
(Use as many sheets as necessary)			First Named Inventor	Victor Larson			
			Art Unit	2453			
			Examiner Name	Krisna Lim			
			Docket Number	77580-196 (VRNK-0001CP3CNFT9)			
		OTHER ART (Including Autho	r, Title, Date, Pertine	ent 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.					
	D1416	Request for Inter Partes Reexamination of Patent Number 7,490,151 filed on July 25, 2011, Requester Apple Inc. – Exhibit E3: Declaration of James Chester, 13 pages (2011)					
	D1417	Request for Inter Partes Reexamination of Patent Number 7,490,151 filed on July 25, 2011, Requester Apple Inc. – Exhibit A: Curriculum Vitae of James Chester, 4 pages					
	D1418	Request for Inter Partes Reexamination of Patent Number 7,490,151 filed on July 25, 2011, Requester Apple Inc. – Exhibit E1: Declaration of Chris Hopen, 5 pages					
	D1419	Request for Inter Partes Reexamination of Patent Number 7,490,151 filed on July 25, 2011, Requester Apple Inc. – Exhibit E2: Declaration of Michael Fratto, 51 pages (2011)					
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	D1424	Request for Inter Partes Reexamination of Patent Number 6,502,135 filed on July 11, 2011, Requester Apple Inc. – Exhibit E1: Declaration of Chris Hopen, 5 pages (2011)					
	D1425	Request for Inter Partes Reexamination of Patent Number 6,502,135 filed on July 11, 2011, Requester Apple Inc. – Exhibit E2: Declaration of Michael Fratto, 50 pages					
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Subst. for form 1449/PTO		Complete if Known					
INFORMATION DISCI	OSURE STATEMENT VS	Application Number 13/911,792					
APPLICANT		Filing Date	06-06-2013				
(Use as many sheets as n	ecessary)	First Named Inventor	Victor Larson				
		Art Unit	2453				
		Examiner Name	Krisna Lim	(risna Lim			
		Docket Number	77580-196 (VRNK-0001CP3CNF	Т9)			
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INFORMATION DISCL	OSUBE STATEMENT VS	Application Number	er 13/911,792	
APPLICANT	COSORE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	ecessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CN	FT9)
D1455	IPR2013-00348; Inter Partes Review	v of Patent Number 6,50	2,135 filed on June 12, 2013,	
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			Application Number	13/911,792	
	T	OSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many	sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CN	FT9)
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	D1485	IPR2013-00393; Inter Partes Review Petitioner Apple Inc., – Exhibit 1065:	v of Patent Number 7,41 Yeager, Web Server Te	8,504 filed on July 1, 2013, echnology, 54 pages (1996)	
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Subst. for form 1449/PTO		Complete if Known		
	Application Number	13/911,792		
APPLICANT	Filing Date	06-06-2013		
(Use as many sheets as necessary)	First Named Inventor	Victor Larson		
	Art Unit	2453		
	Examiner Name	Krisna Lim		
	Docket Number	77580-196 (VRNK-0001CP3CNET9)		
D1495 IPR2013-00397: Inter Partes	Beview of Patent Number 7 92	21 211 filed on July 1, 2013		
Petitioner Apple Inc., - Exhibit	it 1006: Declaration of James C	chester, 26 pages (2013)		
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D1498 IPR2013-00398; Inter Partes	Review of Patent Number 7.92	21.211 filed on July 1, 2013.		
Petitioner Apple Inc., Exhibit	1005: Declaration of Chris Hop	en, 25 pages (2013)		
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Petitioner Apple Inc., Exhibit	1006: Declaration of James Ch	ester, 26 pages (2013)		
Petitioner RPX Corporation;	Petition for Inter Partes Review	8,504 filed on November 20, 2013, 60 pages		
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Petitioner RPX Corporation;	Exhibit 1003; Declaration of Mic	chael Fratto Regarding U.S. Patent		
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Petitioner RPX Corporation;	Exhibit 1005; Declaration of Ch	8,504 filed on November 20, 2013, rist Hopen, 25 pages (2013)		
D1503 IPR2014-00176; Inter Partes	IPR2014-00176; Inter Partes Review of Patent Number 7,418,504 filed on November 20, 2013,			
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Petitioner RPX Corporation;	Petitioner RPX Corporation; Petition for Inter Partes Review, 60 pages			
D1505 IPR2014-00174; Inter Partes	Review of Patent Number 7,41	8,504 filed on November 20, 2013,		
Petitioner RPX Corporation;	Exhibit 1003: Declaration of Mic	chael Fratto Regarding U.S. Patent		
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Petitioner RPX Corporation;	Exhibit 1005: Declaration of Ch	ris Hopen, 25 pages (2013)		
D1507 IPR2014-00174; Inter Partes	Review of Patent Number 7,41	8,504 filed on November 20, 2013,		
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Petitioner RPX Corporation;	Petition for Inter Partes Review	, 67 pages		
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Petitioner RPX Corporation;	Exhibit 1003:Declaration of Mic	hael Fratto Regarding U.S. Patent		
D1510 IPR2014-00172 Inter Partes	Review of Patent Number 6 50	2 135 filed on November 20, 2013		
Petitioner RPX Corporation;	Exhibit 1005: Declaration of Ch	ris Hopen Regarding Prior Art and		
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D1511   IPR2014-00172; Inter Partes Petitioner RPX Corporation	Review of Patent Number 6,50 Exhibit 1006: Declaration of Jar	2,135 filed on November 20, 2013, nes Chester, 26 pages (2013)		
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Petitioner RPX Corporation;	Petition for Inter Partes Review	73 pages		
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Subst. for form 1449/PTO		Complete if Known		
			Application Number	13/911,792
	TUN DISCL	USURE STATEMENT VS.	Filing Date	06-06-2013
(Use as many	sheets as nee	cessary)	First Named Inventor	Victor Larson
•			Art Unit	2453
			Examiner Name	Krisna Lim
			Docket Number	77580-196 (VRNK-0001CP3CNET9)
T	D1517	IPR2014-00173: Inter Partes Review	of Patent Number 7 49	0 151 filed on November 20, 2013
	DIST	Petitioner RPX Corporation; Exhibit Number 6 502 135, 352 pages (201)	1003:Declaration of Micl	hael Fratto Regarding U.S. Patent
	D1518	IPR2014-00173; Inter Partes Review	of Patent Number 7,49	0,151 filed on November 20, 2013,
		Petitioner RPX Corporation; Exhibit	1005: Declaration of Chi	ris Hopen Regarding Prior Art and
	D1510	U.S. Patent Number 7,490,151, 23 p	ages (2013)	0.151 fied on November 20, 2012
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		Petitioner RPX Corporation; Petition	for Inter Partes Review	, 66 pages
	D1521	IPR2014-00175; Inter Partes Review Petitioner RPX Corporation; Exhibit Number 6,502,135, 209 pages (2013	v of Patent Number 7,92 1003:Declaration of Micl 3)	1,211 filed on November 20, 2013, hael Fratto Regarding U.S. Patent
	D1522	IPR2014-00175; Inter Partes Review Petitioner RPX Corporation; Exhibit U.S. Patent Number 7,490,151, 25 p	v of Patent Number 7,92 1005: Declaration of Chi pages (2013)	1,211 filed on November 20, 2013, ris Hopen Regarding Prior Art and
	D1523	IPR2014-00175; Inter Partes Review Petitioner RPX Corporation; Exhibit	of Patent Number 7,92 1006: Declaration of Jan	1,211 filed on November 20, 2013, nes Chester, 26 pages (2013)
	D1524	IPR2014-00177; Inter Partes Review Petitioner RPX Corporation; Petition	of Patent Number 7,41 for Inter Partes Review	8,504 filed on November 20, 2013, , 63 pages
	D1525	IPR2014-00177; Inter Partes Review	of Patent Number 7,41	8,504 filed on November 20, 2013,
		Petitioner RPX Corporation; Exhibit Number 6,502,135, 208 pages (2013	1003:Declaration of Micl	hael Fratto Regarding U.S. Patent
	D1526	IPR2014-00177; Inter Partes Review Apple Inc.; Exhibit 1005: Declaration Number 7 490 151, 25 pages (2013)	v of Patent Number 7,41 of Chris Hopen Regard	8,504 filed on November 20, 2013, ling Prior Art and U.S. Patent
	D1527	IPR2014-00177; Inter Partes Review Apple Inc.: Exhibit 1006: Declaration	of Patent Number 7,41	8,504 filed on November 20, 2013, pages (2013)
	D1528	IPR2014-00237; Inter Partes Review Apple Inc.: Petition for Inter Partes R	of Patent Number 8,50	4,697 filed on November 20, 2013,
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	OSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
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(Use as man	y sheets as ne	cessary)	First Named Inventor	Victor Larson
			Art Unit	2453
			Examiner Name	Krisna Lim
			Docket Number	77580-196 (VRNK-0001CP3CNFT9)
	D1559	VirnetX v. Microsoft; Defendant's Pr	eliminary Invalidity Cont	entions dated 11/14/2013, 43 pages
	D1560	VirnetX v. Microsoft; Defendant's Pr 37: SecureConnect vs. Claims of the	eliminary Invalidity Cont e '151 Patent, 4 pages	entions dated 11/14/2013; Exhibit
	D1561	VirnetX v. Microsoft, Defendant's Pr 41: SFS-HTTP vs. Claims of the '15	eliminary Invalidity Cont 1 Patent, 10 pages	entions dated 11/14/2013; Exhibit
	D1562	VirnetX v. Microsoft; Defendant's Pr 48: U.S. '132 vs. Claims of the '151	eliminary Invalidity Conte Patent, 15 pages	entions dated 11/14/2013; Exhibit
	D1563	VirnetX v. Microsoft, Defendant's Pro 55: B&M VPNs vs. Claims of the '15	eliminary Invalidity Conte 1 Patent, 12 pages	entions dated 11/14/2013; Exhibit
	D1564	VirnetX v. Microsoft, Defendant's Pre 59: BorderManager vs. Claims of the	eliminary Invalidity Conte e 151 Patent, 18 pages	entions dated 11/14/2013; Exhibit
	D1565	VirnetX vs. Microsoft; Defendant's P 79: Valencia (019) vs. Claims of the	reliminary Invalidity Con '274 Patent, 12 pages	tentions dated 11/14/2013; Exhibit
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	D1567	VirnetX vs. Microsoft; Defendant's P 99: Araujo vs. Claims of the '135 Pa	reliminary Invalidity Con tent, 19 pages	tentions dated 11/14/2013; Exhibit
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	D1569	VirnetX vs. Microsoft; Defendant's P 101: NetMeeting vs. Claims of the '1	reliminary Invalidity Con 35 Patent, 81 pages	tentions dated 11/14/2013; Exhibit
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	D1574	VirnetX vs. Microsoft; Defendant's P 106: NetMeeting vs. Claims of the '5	reliminary Invalidity Con 04 Patent, 48 pages	tentions dated 11/14/2013; Exhibit
	D1575	VirnetX vs. Microsoft; Defendant's P 107: EverLink vs. Claims of the '151	reliminary Invalidity Con Patent, 39 pages	tentions dated 11/14/2013; Exhibit
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APPLICAN	IT	COUL STATEMENT VO.	Filing Date	06-06-2013	
(Use as many	y sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CNFT9)	
	D1586	VirnetX vs. Microsoft; Defendant's P 123: IntraPort System vs. Claims of	reliminary Invalidity Con the '274 Patent, 24 page	itentions dated 11/14/2013; Exhibit es	
	D1587	VirnetX vs. Microsoft; Defendant's P 129: Overview vs. Claims of the '274	reliminary Invalidity Con Patent, 12 pages	tentions dated 11/14/2013; Exhibit	
	D1588	VirnetX vs. Microsoft; Defendant's P 135: Schulzrinne vs. Claims of the '2	reliminary Invalidity Con 274 Patent, 14 pages	tentions dated 11/14/2013; Exhibit	
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	D1592	VirnetX vs. Microsoft; Defendant's P 159: Valencia (213) vs. Claims of the	reliminary Invalidity Con e '274 Patent, 13 pages	tentions dated 11/14/2013; Exhibit	
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(Use as many	sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CNFT	9)
	D1611	VirnetX vs. Microsoft; Defendant's P 252: Wesinger vs. Claims of the '180	reliminary Invalidity Con ) Patent, 42 pages	tentions dated 11/14/2013; Exhibit	_
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	D1613	VirnetX vs. Microsoft; Defendant's P 257: Provino vs. Claims of the '180 I	reliminary Invalidity Con Patent, 17 pages	tentions dated 11/14/2013; Exhibit	
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	D1616	VirnetX vs. Microsoft; Defendant's P 261: Provino vs. Claims of the '274 I	reliminary Invalidity Con Patent, 15 pages	tentions dated 11/14/2013; Exhibit	
	D1617	VirnetX vs. Microsoft; Defendant's P 262: NT4 System vs. Claims of the '	reliminary Invalidity Con 135 Patent, 22 pages	tentions dated 11/14/2013; Exhibit	
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			Art Unit	2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CNF	T9)
	D1638	Using NETBuilder Family Software,	Version 11.0, Published	March 1998, http://www.3com.com/	
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			Art Unit	2453	
			Examiner Name	Krisna Lim	
_			Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)
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	D1684	Shea, "L2TP Implementation and Op (2000)	eration," The Addison-V	Vesley Networking Basics Series	
	D1685	McCormack et al., "An Authentication Institute of Standards and Technolog	n Framework for Web Ad jy (1998)	ccess to Remote Hosts," National	
	D1686	Harney et al., "Group Key Managem	ent Protocol (GKMP) Are	chitecture," RFC 2094 (1997)	
	D1687	Sijben et al., "Bridging the Gap to IP	Telephony," Bell Labs T	echnical Journal (1998)	
	D1688	Hoffman, "SMTP Service Extension f	for Secure SMTP over T	LS," RFC 2487 (1999)	
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	D1690	Using Internet VPN to Bring Job Site (1997)	s and Branch Offices O	nline, Nikkei Communications	
	D1691	ANX CEP Interconnection Options, E	Bellcore/ANXO, October	1, 1998	
	D1692	Microsoft Claim Chart of U.S. Patent Architecture," Naval Research Labor (8/5/93)	6,502,135; vs. Atkinson atory, Center for High A	, "An Internetwork Authentication ssurance Computing Systems	
	D1693	Microsoft Claim Chart of U.S. Patent Extensions, IETF DNS Security Work http://www.watersprins.org/pub/id/dra	6,502,135; vs. Eastlake king Group (December 1 aft-ietf-dnssec-secext2-0	, Domain Name System Security 1998), available at 1 <u>7.txt</u>	
	D1694	Microsoft Claim Chart of U.S. Patent Naval Research Laboratory. Center f	6,502,135; vs. Goldsch or High Assurance Corr	lag et al., "Privacy on the Internet," nputer Systems (1997)	
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	LOSURE STATEMENT VS	Application Number	13/911,792	
APPLICANT	LOSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as	necessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CM	NFT9)
D169	6 Microsoft Claim Chart of U.S. Paten Anonymous and Private Internet Co Assurance Computer Systems (Jap	t 6,502,135; vs. Goldsch nnection," Naval Resear Jary 28, 1999)	lag et al., "Onion Routing for ch Laboratory, Center for High	
D169	<ul> <li>7 Microsoft Claim Chart of U.S. Paten Routing," 12th Annual Computer Sec 13 1996</li> </ul>	ticrosoft Claim Chart of U.S. Patent 6,502,135; vs. M.G. Reed et al., "Proxies for Anonymous touting," 12 th Annual Computer Security Applications Conference, San Diego, CA December 9- 3 1996		
D169	8 Microsoft Claim Chart of U.S. Paten Management API, Version 2," Network	t 6,502,135; vs. Macdon ork Working Group, RFC	ald et al., "PF_KEY key 2367 (July 1998) ("RFC_2367")	
D169	9 Microsoft Claim Chart of U.S. Paten Selection Algorithms," available at <u>h</u> ("Route Selection")	t 6,502,135; vs. Onion R ttp://www.onion-router.n	outing, "Investigation of Route et/Archives/Route/index.html	
D170	0 Microsoft Claim Chart of U.S. Paten O'Reilly and Associates, Inc., 2 nd ed	t 6,502,135; vs. Scott et (Jan. 1999) ("Scott VPN	al., Virtual Private Networks, Is')	
D170	1 Microsoft Claim Chart of U.S. Patent Naval Research Laboratory, Center ("Syverson")	t 6,502,135; vs. Syverso for High Assurance Cor	n et al., "Private Web Browsing," nputer Systems (June 2, 1997)	
D170	2 Microsoft Claim Chart of U.S. Paten Working Group Meeting Notes, <u>http:</u> 1996)	Microsoft Claim Chart of U.S. Patent 6,502,135; vs. "IPSec Minutes From Montreal," IPSEC Working Group Meeting Notes, <u>http://www.sandleman.ca/ipsec/1996/08/msg00018.html</u> (June 1996)		
D170	3 Microsoft Claim Chart of U.S. Patent Comprehensive Collection of Micros Microsoft VPN Publication")	Microsoft Claim Chart of U.S. Patent 6,502,135; vs. "Building a Microsoft VPN: A Comprehensive Collection of Microsoft Resources," FirstVPN, (Jan 2000) ("First VPN Building a Microsoft VPN Publication")		
D170	4 Microsoft Claim Chart of U.S. Patent Correspondence dated September 7 Correspondence")	t 6,502,135; vs. Publicly 7, 1993 to September 20	Available DNS-Related , 1993 ("DNS-Related	
D170	5 Microsoft Claim Chart of U.S. Patent Products")	t 6,502,135; vs. Assured	Digital Incorporated Products ("ADI	
D170	6 Microsoft Claim Chart of U.S. Patent 2000)	6,502,135; vs. DNS SR	V references (1996, 1998, 1999,	
D170	7 Microsoft Claim Chart of U.S. Patent '830 Patent")	t6,502,135; vs. U.S. Pat	ent Number 5,898,830 ("Wesinger	
D170	8 Microsoft Claim Chart of U.S. Patent	6,502,135; vs. Global V	PN ("GVPN") references (1999)	
D170	9 Microsoft Claim Chart of U.S. Patent Security Work on VPNs, Intranets, a	6,502,135; vs. Kaufmar nd Extranets, (Copyright	n et al., Implementing IPsec: Making t 1999) ("Implementing IPsec")	
D171	0 Microsoft Claim Chart of U.S. Patent Wide Web Connection, IBM Int'I Tec	: 6,502,135; vs. Safe Sui hnical Support Organiza	rfing: How to Build a Secure World ttion (March 1996) ("Safe Surfing")	
D171	1 Microsoft Claim Chart of U.S. Patent 60/134,547 (filed May 17, 1999) ("Sh	: 6,502,135; vs. U.S. Pro neymov")	vision Patent Application No.	
D171	2 Microsoft Claim Chart of U.S. Patent VPN+ Publication")	6,502,135; vs. Data Fel	lows F-Secure VPN ("F-Secure	
D171	3   Microsoft Claim Chart of U.S. Patent Patent")	: 6,502,135; vs. U.S. Pat	. No. 5,950,195 ("Stockwell '195	
D171	4 Microsoft Claim Chart of U.S. Patent IPSEC Tunnel Mode," IPSEC Workin	6,502,135; vs. B. Patel ng Group, Internet Draft	et al., "DHCP Configuration of 02 (10/15/1999) ("Patel")	
D171	5 Microsoft Claim Chart of U.S. Patent 1997, 1998)	6,502,135; vs. SSL VP	Ns ("SSL VPNs") references (1996,	
D171	6   Microsoft Claim Chart of U.S. Patent (1995, 1996, 1999)	6,502,135; vs. Gauntlet	Firewall ("Gauntlet FW") references	
D171	7 Microsoft Claim Chart of U.S. Patent	6,502,135; vs. U.S. Pat	. No. 6,119,171 ("171 patent")	
D171	8 Microsoft Claim Chart of U.S. Patent October 13, 1998 (filed June 18, 199	6,502,135; vs. Caronni 6) ("'434 patent)	et al., U.S. Patent No. 5,822,434	

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INFORMATION DISCLOSURE STATEMENT VS.		Application Number	13/911,792			
APPLICANT		COOKE STATEMENT VS.	Filing Date	06-06-2013		
(Use as many she	ets as ne	cessary)	First Named Inventor	Victor Larson		
			Art Unit	2453		
			Examiner Name	Krisna Lim		
			Docket Number	77580-196 (VRNK-0001CP3CN	FT9)	
	D1719	Microsoft Claim Chart of U.S. Patent No. 5,511,122 (April 23, 1996)	licrosoft Claim Chart of U.S. Patent 6,502,135; vs. RFC 2230 (November 1997) U.S. Patent Io. 5,511,122 (April 23, 1996)			
	D1720	Microsoft Claim Chart of U.S. Patent	t 6,502,135; vs. Check F	Point FW as described in: Goncalves		
		http://www.books24x7.com/book/id	762/viewer r.asp?booki	d=762&chunkid=410651062		
		(Goncalves, Check Point FW); Chec FW)	k Point Software Techn	ologies Ltd. (1999) (Check Point		
	D1721	Microsoft Claim Chart of U.S. Patent Cariplo: Distributed Component Obje	Ariplo: Distributed Component Object Model, references (1996-1999)			
	D1722	Microsoft Claim Chart of U.S. Patent Configuration and Administration of	t 6,502,135; vs. Bhattacl IPSec Based Virtual Priv	narya et al., "An LDAP Schema for vate Networks (VPNs)" IFTF		
		Internet Draft (October 1999) ("LDAF	Schema for IPSec bas	ed VPNs publication")		
	D1723	Microsoft Claim Chart of U.S. Patent 1999	t 6,502,135; vs. Onion R	outing references (1996, 1997,		
	D1724	Microsoft Claim Chart of U.S. Patent	t 6,502,135; vs. Aventail	references (1997-1999)		
	D1725	Microsoft Claim Chart of U.S. Patent Control Protocol," Version 1.0 (May	Microsoft Claim Chart of U.S. Patent No. 6,502,135; vs. C. Huitema et al., "Simple Gateway Control Protocol," Version 1.0 (May 5, 1998) ("SGCP")			
	D1726	Microsoft Claim Chart of U.S. Patent No. 6,502,135; vs. Microsoft VPN Technology references (1997-1999)				
	D1727	Microsoft Claim Chart of U.S. Patent No. 6,502,135; vs. Dynamic VPN ("DVPN") references (1997-2001)				
	D1728	Microsoft Claim Chart of U.S. Patent Translation Issues with IPsec," Interr ("Moskowitz")	: No. 6,502,135; vs. R.G net Draft, Internet Engine	. Moskowitz, "Network Address eering Task Force, February 6, 1998		
	D1729	Microsoft Claim Chart of U.S. Patent references (1996, 1998, 1999)	: No. 6,502,135; vs. F-Se	ecure VPN and F-Secure VPN		
	D1730	Microsoft Claim Chart of U.S. Patent the Internet Protocol," Network Work	No. 6,502,135; vs. Atkii ing Group, RFC 2401 (N	nson et al., "Security Architecture for November 1998) ("RFC_2401")		
	D1731	Microsoft Claim Chart of U.S. Patent	No. 6,502,135; vs. RFC	2543 and Internet Drafts (1999)		
	D1732	Microsoft Claim Chart of U.S. Patent Firewall references (1997, 1998)	No. 6,502,135; vs. Alta	Vista Tunnel and/or the AltaVista		
	D1733	Microsoft Claim Chart of U.S. Patent for Multimedia Services in the Interne Distributed Multimedia Systems and	No. 6,502,135; vs. Hen et, Proceedings of the E Services (1996) ("Schul	ning Schulzrinne, Personal Mobility uropean Workshop on Interactive zrinne 96")		
	D1734	Microsoft Claim Chart of U.S. Patent (August 30, 2005)	No. 6,502,135; vs. Sch	ulzrinne U.S. Pat. No. 6,937,597		
	D1735	Microsoft Claim Chart of U.S. Patent with Secure DNS," Proceedings of th California (July 1996) ("Galvin")	No. 6,502,135; vs. J.M. ie Sixth USENIX UNIX S	Galvin, "Public Key Distribution Security Symposium, San Jose,		
	D1736	Microsoft Claim Chart of U.S. Patent of Virtual Private Network (VPNs) wit 1997) ("Doraswamy")	No. 6,502, 135; vs. Nag th IP Secrity [sic] <draft-< td=""><td>anand Doraswamy, Implementation ietf-ipsec-vpn-00.txt&gt; (March 12,</td><td></td></draft-<>	anand Doraswamy, Implementation ietf-ipsec-vpn-00.txt> (March 12,		
	D1737	Microsoft Claim Chart of U.S. Patent	No. 6,502,135; vs. Free	S/WAN references (1996)		
	D1738	Microsoft Claim Chart of U.S. Patent Re: Key Management, Anyone?, IET ("Orman DNS"); J. Gilmore et al., Re Working Group Mailing List Archive (	No. 6,502,135; vs. H. C F IPSec Working Group : Key Management, any 8/96 - 9/96)	rman et al., Re: 'Re: DNS? Was Mailing List Archive (8/96 - 9/96) one? (DNS keying) IETF IPSec		
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Subst. for form 1449/PTO			Complete if Known	
		Application Number	13/911,792	
	OSURE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	ecessary)	First Named Inventor	Victor Larson	
	MAY 1 0 204 3	Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CN	FT9)
D1740	Microsoft Claire Charles of U.S. Paten	t No. 6.502.135: vs. The	Defense Information Systems	
	Agency, Secret Internet Protocol rou	iter Network (SIPRNET)	¹ references (1998, 2000)	
D1741	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S.	Patent Application No. 09/399,753	
D1742	("the Miller Application") as publishe	d in U.S. Pub. No. 2005/	10055306 (Priority Date: 09/22/98)	
01742	Authentication Architecture," Naval I	Research Laboratory, Ce	enter for High Assurance Computing	
	Systems (8/5/93) ("Atkinson NRL")			
D1743	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Don	ald Eastlake, Domain Name System	
	http://www.watersprings.org/pub/id/	unty working Group (De traff-ietf-dossec-secevt2	-07 txt ("DNSSEC-7")	
D1744	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Gold	dschlag et al., "Privacy on the	
	Internet," Naval Research Laborator	y, Center for High Assur	ance Computer Systems (1997)	
D4745	("Goldschlag I")	NI- 0.000 750		
D1/45	Information." Workshop on Informati	on Hiding, Cambridge, L	JSchlag et al., Hiding Routing JK (May 1996) ("Goldschlag II")	
D1746	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Gold	Ischlag et al., "Onion Routing for	
	Anonymous and Private Internet Co	nnection," Naval Resear	ch Laboratory, Center for High	
D1747	Assurance Computer Systems (Jani	Jary 28, 1999) ("Goldsch	Ilag III) Road at al. "Dravias for	
01/4/	Anonymous Routing," 12th Annual C	Computer Security Applic	ations Conference, San Diego, CA	
	Dec. 9-13, 1996 ("Reed")		,	
D1748	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. D. N	acDonald et al., "PF_KEY Key	
D1749	Microsoft Claim Chart of U.S. Paten	No. 6 839 759 vs. Opic	2367 (July 1998) ("RFC 2367")	
01743	Selection Algorithms," available at h	ttp://www.onion-router.n	et/Archives/Route/index.html	
	("Route Selection")			
D1750	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Scot	tt et al., Virtual Private Networks,	
D1751	Microsoft Claim Chart of U.S. Paten	No 6 839 759 vs. Svv	erson et al "Private Web	
	Browsing," Naval Research Laborate	ory, Center for High Assi	urance Computer Systems (June 2,	
	1997) ("Syverson")			
D1/52	Products,") (1999-2000)	t No. 6,839,759; vs. Safe	eNet VPN Products ("SafeNet VPN	
D1753	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. "Bui	Iding a Microsoft VPN: A	
	Comprehensive Collection of Micros	oft Resources," FirstVPN	N, (Jan 2000) ("First VPN Building a	
D1754	Microsoft Claim Chart of U.S. Patent	No. 6,839,759; vs. Pub	licly Available DNS-Related	
	Correspondence dated September 7 Correspondence")	7, 1993 to September 20	, 1993 ("DNS-related	
D1755	Microsoft Claim Chart of U.S. Patent 1999, 2000)	t No. 6,839,759; vs. DNS	SRV references (1996, 1998,	
D1756	Microsoft Claim Chart of U.S. Patent Patent")	No. 6,839,759; vs. U.S.	Pat. No. 5,898,830 ("Wesinger '830	
D1757	Microsoft Claim Chart of U.S. Patent	No. 6,839,759; vs. Glob	oal VPN references (1999)	
D1758	Microsoft Claim Chart of U.S. Patent Making Security Work on VPNs, Intr IPsec")	t No. 6,839,759; vs. Kau anets, and Extranets, (C	fman et al., Implementing IPsec: opyright 1999) ("Implementing	

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¹ SIPRNET is a U.S. Government Internet Protocol network for the transport of information classified as SECRET. SIPRNET was built starting in 1995, and contains domain names bearing the ".smil" designation. Microsoft has subpoenaed information from the Department of Defense and others relationg to SIPRNET, and reserves the right to amend its contentions to take any additional information about SIPRNET that it receives into account.Department of Defense and others relationg to SIPRNET, and reserves the right to amend its contentions to take any additional information about SIPRNET that it receives into account. ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.L./

Subst. for form 1449/PTO		Complete if Known		
	OSLIDE STATEMENT VS	Application Number	13/911,792	
APPLICANT	OSORE STATEMENT VS.	Filing Date	06-06-2013	
(Use as many sheets as ne	cessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)
D1759	Microsoft Claim Chart of U.S. Patent	No. 6,839,759; vs. PGF	P Security, Finding Your Way	
D1760	Microsoft Claim Chart of U.S. Patent	r) No. 6 839 759): vs. Sat	e Surfing: How to Build a Secure	
	World Wide Web Connection, IBM Ir Surfing")	nt'l Technical Support O	rganization (March 1996) ("Safe	
D1761	Microsoft Claim Chart of U.S. Patent 60/134,547 (filed May 17,1999) ("Sh	t No. 6,839,759; vs. U.S eymov")	. Provisional Patent Application No.	
D1762	Microsoft Claim Chart of U.S. Patent VPN+ Publication")	: No. 6,839,759; vs. Data	a Fellows F-Secure VPN ("F-Secure	
D1763	Microsoft Claim Chart of U.S. Patent Patent'")	t No. 6,839,759; vs. U.S	. Pat. No. 5,950,195 ("Stockwell '195	
D1764	Microsoft Claim Chart of U.S. Patent IPSEC Tunnel Mode, "IPSEC Workir	t No. 6,839,759; vs. B. P ng Group, Internet Draft	atel et al., "DHCP Configuration of 02 (10/15/1999) ("Patel")	
D1765	Microsoft Claim Chart of U.S. Patent (1996-1997)	: No. 6,839,759; vs. SSL	. VPNs ("SSL VPNs") references	
D1766	Microsoft Claim Chart of U.S. Patent references (19995, 1996, 1999)	: No. 6,839,759; vs. Gau	Intlet Firewall ("Gauntlet FW")	
D1767	Microsoft Claim Chart of U.S. Patent 5,822,434 October 13, 1998 (filed Ju	: No. 6,839,759; vs. Caro ine 18, 1996) ("'434 pate	onni et al., U.S. Patent No. ent)	
D1768	Microsoft Claim Chart of U.S. Patent	No. 6,839,759; vs. U.S	. Pat. No. 5,311,593 ("'593 patent")	
D1769	Microsoft Claim Chart of U.S. Patent 5,511,122 (April 23, 1996)	No. 6,839,759; RFC 2	230 (November 1997) U.S. Pat. No.	
D1770	Microsoft Claim Chart of U.S. Patent Goncalves et al., Check Point FireW available at <u>http://www.books24x7.com/book/id</u> (Goncalves, Check Point FW): Chec	No. 6,839,759; vs. Che all-1 Administration Guid 762/viewer_r.asp?booki k Point Software Technology	ck Point FW as described in: de, McGraw-Hill Companies (2000) <u>d=762&amp;chunkid=410651062</u> plogies Ltd. (1999) (Checkpoint FW)	
D1771	Microsoft Claim Chart of U.S. Patent 1998, 1999)	No. 6,839,759; vs. CIS	DCOM references (1996, 1997,	
D1772	Microsoft Claim Chart of U.S. Patent for Configuration and Administration Internet Draft (October 1999) ("LDAF	No. 6,839,759; vs. Bha of IPSec Based Virtual Schema for IPSec bas	ttacharya et al., "An LDAP Schema Private Networks (VPNs)", IETF ed VPNs publication")	
D1773	Microsoft Claim Chart of U.S. Patent 1999)	No. 6,839,759; vs. Onio	on Routing references (1996, 1997,	
D1774	Microsoft Claim Chart of U.S. Patent	No. 6,839,759; vs. Ave	ntail references (1996, 1997, 1999)	
D1775	Microsoft Claim Chart of U.S. Patent Control Protocol," Version 1.0 (May s	No. 6,839,759; vs. C. H 5, 1998) ("SGCP")	luitema et al., "Simple Gateway	
D1776	Microsoft Claim Chart of U.S. Patent (1997-1999)	No. 6,839,759; vs. Micr	osoft VPN Technology references	
D1777	Microsoft Claim Chart of U.S. Patent (1997-2001)	No. 6,839,759; vs. Dyn	amic VPN ("DVPN") references	
D1778	Microsoft Claim Chart of U.S. Patent Translation Issues with IPsec," Interr ("Moskowitz")	No. 6,839,759; vs. R.G net Draft, Internet Engine	. Moskowitz, "Network Address eering Task Force, February 6, 1998	
D1779	Microsoft Claim Chart of U.S. Patent Server and Citrix MetaFrame (New F	No. 6,839,759; vs. Ted Riders 1999) ("Windows	Harwood, Windows NT Terminal NT Harwood")	
D1780	Microsoft Claim Chart of U.S. Patent Genoway, Windows NT Thin Client S MetaFrame (Macmillan Technical Pu	No. 6,839,759; vs. Tod Solutions: Implementing Iblishing 1999) ("Window	d W. Mathers and Shawn P. Terminal Server and Citrix vs NT Mathers")	
D1781	Microsoft Claim Chart of U.S. Patent references (1996-1999)	No. 6,839,759; vs. F-Se	ecure VPN and F-Secure VPN+	
D1782	Microsoft Claim Chart of U.S. Patent Secure VPNs" (1998) ("TimeStep")	No. 6,839,759; vs. Time	eStep, "The Business Case for	

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		F	<u>13911792 - G</u>	AU: 2453
Subst. for form 1449/P1O		Application Number		
INFORMATION DISCL	OSURE STATEMENT VS.	Application Number		
APPLICANT	OPAD	Filing Date	00-00-2013	
(Use as many sheets as ne	cessary)	First Named Inventor		
	( MAY 1 9 2014 🛓)	Art Unit	2453	
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Examiner Name	Krisna Lim	
	City of the	Docket Number	77580-196 (VRNK-0001CP3CN	FT9)
D1783	Microsoft Clain Change U.S. Paten	t No. 6,839,759; vs. Atking Group, REC 2401 (1	nson et al., "Security Architecture for November 1998) ("REC, 2401")	
D1784	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S.	. Pat. No. 6,079,020 ("VPNet '020	
D1785	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S.	. Pat. No. 6,173,399 ("VPNet '399	
D1786	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S.	. Pat. No. 6,226,748 ("VPNet '748	
D1787	Patent") Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. U.S.	. Pat. No. 6,226,751 ("VPNet '751	
D1788	Patent") Microsoft Claim Chart of LLS Paten	t No. 6.839 759: vs. Abo	ha et al. "Securing L2TP using	
D1700	IPSEC," PPPEXT Working Group, In	nternet Draft (February 2	2, 1999) ("L2TP/IPSEC")	
D1789	Firewall references (1997, 1998)	t No. 6,839,759; VS. Aita		
D1790	Microsoft Claim Chart of U.S. Paten for Multimedia Services in the Intern Distributed Multimedia Systems and	t No. 6,839,759; vs. Hen let, Proceedings of the E I Services (1996) ("Schul	ning Schulzrinne, Personal Mobility uropean Workshop on Interactive Izrinne 96")	
D1791	Microsoft Claim Chart of U.S. Paten Patent")	t No. 6,839,759; vs. U.S	. Pat. No. 6,701,437 (*VPNet '437	
D1792	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Wat	chGuard references (2000)	
D1793	Microsoft Claim Chart of U.S. Paten with Secure DNS," Proceedings of t California (July 1996) ("Galvin")	t No. 6,839,759; vs. J.M. he Sixth USENIX UNIX \$. Galvin, "Public Key Distribution Security Symposium, San Jose,	
D1794	Microsoft Claim Chart of U.S. Paten of Virtual Private Network (VPNs) w 1997) ("Doraswamy")	t No. 6,839,759; vs. Nag ith IP Secrity [sic.] <draft< td=""><td>anand Doraswamy, Implementation -ietf-ipsec-vpn-00.txt> (March 12,</td><td></td></draft<>	anand Doraswamy, Implementation -ietf-ipsec-vpn-00.txt> (March 12,	
D1795	Microsoft Claim Chart of U.S. Paten	t No. 6,839,759; vs. Free	eS/WAN references (1996)	
D1796	Microsoft Claim Chart of U.S. Paten Re: Key Management, anyone?, IE ⁻ ("Orman DNS"); J. Gilmore et al., Ro Working Group Mailing List Archive	t No. 6,839,759; vs. H. C FF IPSec Working Group e: Key Management, any (8/96 – 9/96)	Orman et al., Re: 'Re: DNS? Was Mailing List Archive (8/96 – 9/96) vone? (DNS keying) IETF IPSec	
D1797	Microsoft Claim Chart of U.S. Paten Agency, Secret Internet Protocol Ro	t No. 6,839,759; vs. The puter Network (SIPRNET	Defense Information Systems) references (1998, 2000)	
D1798	Microsoft Claim Chart of U.S. Paten Security Extensions, IETF DNS Sec	t No. 7,188,180; vs. Don urity Working Group (De	ald Eastlake, Domain Name System cember 1998), available at	
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(Use as many	sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CN	IFT9)
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APPLICAN	IT		Filing Date	06-06-2013	
(Use as man	y sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
		· · · · · · · · · · · · · · · · · · ·	Examiner Name	Krisna Lim	
	D (000		Docket Number	77580-196 (VRNK-0001CP3C)	NFT9)
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(Use as man	y sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
	D (05)	·····	Docket Number	77580-196 (VRNK-0001CP3CN	FT9)
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			Art Unit	2453	
			Examiner Name	Krisna Lim	
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(Use as mar	ıy sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
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(Use as man	y sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
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	•••		Docket Number	77580-196 (VRNK-0001CP3CNF	·T9)
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INFORMATION DISCLOSURE STATEMENT VS.		Application Number	13/911,792		
INFORMATION DISCLOSURE STATEMENT VS.			Filing Date	06-06-2013	
(Use as many sheets as necessary)			First Named Inventor	Victor Larson	
				2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CNFT9)
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INFORMATION DISCLOSURE STATEMENT VS.		Application Number	13/911,792	
APPLICANT		Filing Date	06-06-2013	
(Use as many sheets as n	ecessary)	First Named Inventor	Victor Larson	
		Art Unit	2453	
		Examiner Name	Krisna Lim	
		Docket Number	77580-196 (VRNK-0001CP3CM	NFT9)
D2350	Remote Access VPN User Authentic	cation Model – VPN/VLA	N Textbook, September 11, 1999."	
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D2354	IPR2014-00482; Inter Partes Revie Petitioner Apple Inc., – Petition for I	w of Patent Number 7,18 nter Partes Review, 68 p	38,180 filed on March 7, 2014, bages	
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	Petitioner Apple Inc., – Exhibit 1029 Number 7 188 180, 233 pages (201	: Declaration of Michael	Fratto Regarding U.S. Patent	
D2356	IPR2014-00483: Inter Partes Review	+) v of Patent Number 7.98	7 274 filed on March 7 2014	
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	Number 7,188,180, 191 pages (2014	Declaration of Michael I	Fratto Regarding U.S. Patent	
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	Petitioner Apple Inc., – Petition for Ir	ter Partes Review, 63 p	ages	
D2359	Petitioner Apple Inc. – Exhibit 1029	Declaration of Michael J	7,274 filed on March 7, 2014,	
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	Petitioner Apple Inc., – Exhibit 1011:	Declaration of Dr. Roch	Guerin, 24 pages (2014)	
D2362	IPR2014-00485; Inter Partes Review Petitioner Apple Inc., – Exhibit 1029;	of Patent Number 8,05 Declaration of Michael I	1,181 filed on March 7, 2014, Fratto, 448 pages (2014)	
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	Petitioner Apple Inc., – Exhibit 1014:	US District Court Civil D	ocket 6:10cv94, Virnetx Inc. v.	
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07/01/2014
Subot for form 1440/DTO					
Subst. for form	A 1449/PTO		Complete if Known		
		OSURE STATEMENT VS.	Application Number	13/911,792	
APPLICAN	IT		Filing Date	06-06-2013	
(Use as man _j	y sheets as ne	cessary)	First Named Inventor	Victor Larson	
			Art Unit	2453	
			Examiner Name	Krisna Lim	
			Docket Number	77580-196 (VRNK-0001CP3CNFT9)	
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EXAMINER /Krisna Lim/ DATE CONSIDERED 07/01/2014				DATE CONSIDERED 07/01/2014	

*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.

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Search Notes	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED				
Symbol	Date	Examiner		

US CLASSIFICATION SEARCHED							
Class	Class Subclass Date Examiner						
709709726	227-228225, 221, 22915	08/25/201305/21	kIKLKL				
		/201405/21/2014					

SEARCH NOTES		
Search Notes	Date	Examiner
InventorsInventors	08/25/201305/2	klkl
	1/2014	

	INTERFERENCE SEARCH		
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
709	225, 221, 229	05/21/2014	kl
726	15	05/21/2014	kl

Part of Paper No. : 20140521

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Issue Classification	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

CPC					
Symbol				Туре	Version
H04L	12	4641		I	2013-01-01
H04L	41	00		I	2013-01-01
H04L	45	28		Ι	2013-01-01
H04L	45	00		Ι	2013-01-01
H04L	61	35		Ι	2013-01-01
H04L	61	2007		Ι	2013-01-01
H04L	63	164		А	2013-01-01
H04L	63	1466		Ι	2013-01-01
H04L	45	24		I	2013-01-01
G06F	21	606		Ι	2013-01-01
H04L	67	/ 14		F	2013-01-01
H04L	29	12594		Ι	2013-01-01
H04L	29	/ 12066		Ι	2013-01-01
H04L	63	08		Ι	2013-01-01
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H04L	61	1511		I	2013-01-01
H04L	29	12301		I	2013-01-01
H04L	63	0227		Ι	2013-01-01
H04L	61	2076		Ι	2013-01-01
H04L	63	0407		Ι	2013-01-01
H04L	63	1408		Ι	2013-01-01
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H04L	61	303		Ι	2013-01-01
H04L	63	105		А	2013-01-01
H04L	63	1416		I	2013-01-01
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H04L	29	12216		Ι	2013-01-01
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H04L	63	/ 0428		Ι	2013-01-01
NONE				Total Clain	ns Allowed:
(Assistant Examiner) (Date)		э)	2	5	
/KRISNA LIM/ Primary Examine	er.Art Unit 2453	07/01/2	2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examir	ner)	(Date	e)	1	26, 27

Part of Paper No. 20140701

	Application/Control No.	Applicant(s)/Patent Under Reexamination		
Issue Classification	13911792	LARSON ET AL.		
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	KRISNA LIM	2453		
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NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	2	5
/KRISNA LIM/ Primary Examiner.Art Unit 2453	07/01/2014	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	26, 27
U.S. Patent and Trademark Office Part of Paper No. 20140			

Petitioner Apple Inc. - Ex. 1004, p. 688

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Issue Classification	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

US ORIGINAL CLASSIFICATION					INTERNATIONAL CLASSIFICATION									
	CLASS			SUBCLASS					С	LAIMED		NON-CLAIMED		
709			225			G	0	6	F	15 / 173 (2006.01.01)				
CROSS REFERENCE(S)				G	0	6	F	15 / 16 (2006.01.01)						
CLASS	SUB	CLASS (ONE	SUBCLAS	S PER BLO	CK)									
700	221	229												
726	15													

NONE		Total Claims Allowed:				
(Assistant Examiner)	(Date)	25				
/KRISNA LIM/ Primary Examiner.Art Unit 2453	07/01/2014	O.G. Print Claim(s)	O.G. Print Figure			
(Primary Examiner)	(Date)	1	26, 27			

Part of Paper No. 20140701

	Application/Control No.	Applicant(s)/Patent Under Reexamination
Issue Classification	13911792	LARSON ET AL.
	Examiner	Art Unit
	KRISNA LIM	2453

] Claims renumbered in the same order as presented by applicant								СР	A D] Т.D.	[] R.1.4	47	
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	10	1	26	17	42										
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	15	6	31	22	47										
	16	7	32	23	48										

NONE		Total Claims Allowed:				
(Assistant Examiner)	(Date)	2	5			
/KRISNA LIM/ Primary Examiner.Art Unit 2453	07/01/2014	O.G. Print Claim(s)	O.G. Print Figure			
(Primary Examiner)	(Date)	1	26, 27			

Part of Paper No. 20140701

PART B - FEE(S) TRANSMITTAL

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/911.792	06/06/2013	Victor Larson 77	580-196(VRNK1CP3CNFT	10) 7953

TITLE OF INVENTION: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	08/28/2014
EXAMINER ART UNIT			CLASS-SUBCLASS			
LIM, K	RISNA	2453	709-227000			
 Change of corresponde CFR 1.363). Change of corresp Address form PTO/SI "Fee Address" ind PTO/SB/47; Rev 03-C Number is required. 	ence address or indication ondence address (or Cha 3/122) attached. ication (or "Fee Address' 12 or more recent) attach	n of "Fee Address" (37 nge of Correspondence ' Indication form ed. Use of a Customer	 For printing on the p The names of up to or agents OR, alternativ The name of a singl registered attorney or a 2 registered patent attoi listed, no name will be 	atent front page, list 3 registered patent attorr rely, e firm (having as a memb gent) and the names of u rneys or agents. If no nam printed.	er a 2 p to le is 3	ill & Emery LLP
 ASSIGNEE NAME A PLEASE NOTE: Uni recordation as set fort (A) NAME OF ASSIG VirnetX, Inc. 	ND RESIDENCE DAT less an assignee is ident h in 37 CFR 3.11. Comp GNEE iate assignee category or	A TO BE PRINTED ON 7 ified below, no assignee oletion of this form is NO categories (will not be pr	THE PATENT (print or typ data will appear on the pa T a substitute for filing an (B) RESIDENCE: (CITY Zephyr Cove, NV	ee) atent. If an assignee is ic assignment. and STATE OR COUNT Individual X Corporati	lentified below, the doct 'RY) on or other private group	ument has been filed for
4a. The following fee(s)	are submitted: No small entity discount p t of Copies	4ł permitted)	 Payment of Fee(s): (Pleat A check is enclosed. Payment by credit car The Director is hereby overpayment, to Depo 	se first reapply any prev d. Form PTO-2038 is atta authorized to charge the sit Account Number 50-1	riously paid issue fee sh ched. required fee(s), any defic 133 (enclose an e	own above) iency, or credits any xtra copy of this form).
 5. Change in Entity Sta Applicant certifyin Applicant assertin Applicant changin 	tus (from status indicated ng micro entity status. Se g small entity status. See g to regular undiscounted	1 above) e 37 CFR 1.29 37 CFR 1.27 1 fee status.	<u>NOTE:</u> Absent a valid ce fee payment in the micro <u>NOTE:</u> If the application to be a notification of loss <u>NOTE:</u> Checking this boo entity status, as applicable	rtification of Micro Entity entity amount will not be was previously under mic of entitlement to micro e x will be taken to be a noti e.	Status (see forms PTO/S accepted at the risk of ap ro entity status, checking nity status. fication of loss of entitle	6B/15A and 15B), issue oplication abandonment. g this box will be taken ment to small or micro
NOTE: This form must b	e signed in accordance v	vith 37 CFR 1.31 and 1.33	3. See 37 CFR 1.4 for signa	ture requirements and cer	tifications.	
Authorized Signature Typed or printed nam	/Toby H. Kusmer/ e _Toby H. Kusmer			Date <u>August</u> 7, 20 Registration No. <u>2</u>	6,418	

Page 2 of 3

PTOL-85 Part B (10-13) Approved for use through 10/31/2013.

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Electronic Patent Application Fee Transmittal								
Application Number: 13911792								
Filing Date:	06-	Jun-2013						
Title of Invention: SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES								
First Named Inventor/Applicant Name:	Vic	tor Larson						
Filer:	er: Toby H. Kusmer./Tricia Tedesco							
Attorney Docket Number:	Attorney Docket Number: 77580-196(VRNK1CP3CNFT10)							
Filed as Large Entity								
Utility under 35 USC 111(a) Filing Fees								
Description		Fee Code	Quantity	Amount	Sub-Total in USD(\$)			
Basic Filing:								
Pages:								
Claims:								
Miscellaneous-Filing:								
Petition:								
Patent-Appeals-and-Interference:								
Post-Allowance-and-Post-Issuance:								
Utility Appl Issue Fee		1501	1	960	960			
Extension-of-Time:								

Petitioner Apple Inc. - Ex. 1004, p. 692

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
	Tot	al in USD:) (\$)	960

Electronic Acknowledgement Receipt						
EFS ID:	19807273					
Application Number:	13911792					
International Application Number:						
Confirmation Number:	7953					
Title of Invention:	SYSTEM AND METHOD EMPLOYING AN AGILE NETWORK PROTOCOL FOR SECURE COMMUNICATIONS USING SECURE DOMAIN NAMES					
First Named Inventor/Applicant Name:	Victor Larson					
Customer Number:	23630					
Filer:	Toby H. Kusmer./Tricia Tedesco					
Filer Authorized By:	Toby H. Kusmer.					
Attorney Docket Number:	77580-196(VRNK1CP3CNFT10)					
Receipt Date:	07-AUG-2014					
Filing Date:	06-JUN-2013					
Time Stamp:	16:56:26					
Application Type:	Utility under 35 USC 111(a)					

Payment information:

Submitted with Payment	yes				
Payment Type	Deposit Account				
Payment was successfully received in RAM	\$960				
RAM confirmation Number	3557				
Deposit Account	501133				
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1	lssue Fee Payment (PTO-85B)	lssueFeePayment.pdf	90451	no	1			
			da7784f52cd2639629503c3dbef52fbf0eea 04dd					
Warnings:								
Information								
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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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.								

Subst. 1	for form 1	449/PTO	g		Complete	if Known	
			_	Application Number		13/911,792	
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UNITED STATES PATENT AND TRADEMARK OFFICE



APPLICATION NO.		ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/911,792		09/30/2014	8850009	77580-196(VRNK1CP3CNFT10)	7953
23630	7590	09/10/2014			

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

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 0 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):

VIRNETX, INC., Zephyr Cove, NV, Assignee (with 37 CFR 1.172 Interest); Victor Larson, Fairfax, VA; Robert Dunham Short III, Lexington, VA; Edmund Colby Munger, Tarpon Springs, FL; Michael Williamson, South Riding, VA;

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