

(12) United States Patent

Larson et al.

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

(71) Applicant: Virnetx, Inc., Zephyr Cove, NV (US)

(72) Inventors: Victor Larson, Fairfax, VA (US);

Robert Dunham Short, III, Lexington, VA (US); Edmund Colby Munger, Tarpon Springs, FL (US); Michael Williamson, South Riding, VA (US)

(73) Assignee: VirnetX, Inc., Zephyr Cove, NV (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35

U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-

claimer.

(21) Appl. No.: 13/911,792

Filed: (22)Jun. 6, 2013

(65)Prior Publication Data

> US 2013/0268683 A1 Oct. 10, 2013

Related U.S. Application Data

(63) Continuation of application No. 13/903,788, filed on May 28, 2013, which is a continuation of application

(Continued)

(51) Int. Cl.

G06F 15/173 (2006.01)G06F 15/16 (2006.01)

(Continued)

(52) U.S. Cl.

CPC H04L 67/14 (2013.01); H04L 29/12216 (2013.01); H04L 45/00 (2013.01); H04L 63/1416 (2013.01); H04L 45/24 (2013.01);

(Continued)

(10) **Patent No.:**

US 8,850,009 B2

(45) Date of Patent:

*Sep. 30, 2014

(58) Field of Classification Search

USPC 709/227–228, 225, 221, 229; 726/15 See application file for complete search history.

References Cited (56)

U.S. PATENT DOCUMENTS

2,895,502 A 7/1959 Roper et al. 4,405,829 A 9/1983 Rivest (Continued)

FOREIGN PATENT DOCUMENTS

DE 19924575 12/1999 4/1988 0838930

(Continued)

OTHER PUBLICATIONS

Office Action dated Jan. 28, 2014 from Corresponding U.S. Appl. No. 13/620,550.

(Continued)

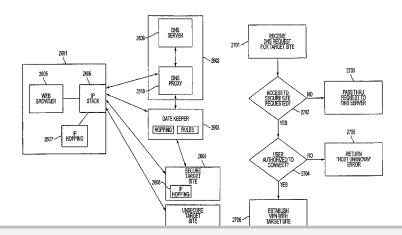
Primary Examiner — Krisna Lim

(74) Attorney, Agent, or Firm — McDermott Will & Emery

(57)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.

25 Claims, 40 Drawing Sheets





No. 13/336,790, filed on Dec. 23, 2011, now Pat. No. 8,438,341, which is a continuation of application No. 13/039,525, filed on Mar. 16, 2011, which is a continuation of application No. 11/840,660, filed on Aug. 17, 2007, now Pat. No. 79,12,111, which is a continuation of application No. 10/714,849, filed on Nov. 18, 2003, now Pat. No. 7418,204, which is a continuation of application No. 10/714,849, filed on Apr. 26, 2000, now Pat. No. 6,202,135, which is a continuation-in-part of application No. 09/58,210, filed on Apr. 26, 2000, now Pat. No. 6,202,135, which is a continuation-in-part of application No. 09/504,783, filed on Peter 15, 2000, now Pat. No. 6,202,135, which is a continuation-in-part of application No. 09/404,643, filed on Cet. 29, 1999, now Pat. No. 6,202,135, which is a continuation-in-part of application No. 09/404,643, filed on Cet. 29, 1999, now Pat. No. 5,000,429,643, filed on Cet. 29, 1999, now Pat. No. 6,202,135, which is a continuation-in-part of application No. 09/404,643, filed on Cet. 29, 1999, now Pat. No. 6,202,135, which is a continuation-in-part of application No. 60/137,704, filed on Jun. 7, 1999. (60) Provisional application No. 60/106,261, filed on Oct. 30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Cl. 1044, 129/12 (2006,01) 5776,950 A 1999 McManis McM		Related U.S. Application Data	5,341,426 A		Barney et al.
8,458,341, which is a continuation of application No. 13/049-552. filled on Mar. 16, 2011, which is a continuation of application No. 11840,560, filled on Aug. 17, 2007, now Pat. No. 7,921,211, which is a continuation of application No. 10/714,849, filled on Nov. 18, 2003, now Pat. No. 7,418,504, which is a continuation of application No. 09/758,210, filled on Apr. 26, 2000, now abandoned, which is a continuation-in-part of application No. 09/7588,210, filled on Apr. 26, 2000, now abandoned, which is a continuation-in-part of application No. 09/504785, filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09/504785, filled on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09/504785, filled on Ct. 29, 1999, now Pat. No. 7,010,004. (60) Provisional application No. 60/106,261, filed on Oct. 20, 1999, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Ct. H04L 29/12 (2006,61) 5,704,906 A (1997) McManis No. 60/106,261, filed on Jun. 7, 1999. (51) Int. Ct. H04L 29/12 (2006,61) 5,704,906 A (1998) Expoise at June 11,2701 (2013,01) 5,704,906 A (1998) Exposite at		No. 13/336.790, filed on Dec. 23, 2011, now Pat. No.	5,345,439 A 5 367 643 A		
13/049.552, filed on Mar 16, 2011, which is a continuation of application No. 118.0560, filed on Aug. 17, 2007, now Pat. No. 7, 921.211, which is a continuation of application No. 10/714,849, filed on Nov. 18, 2003, now Pat. No. 7, 193.504, which is a continuation of application No. 10/714,849, filed on Apr. 26, 2000, now bandoned, which is a continuation of application No. 09/558,210, filed on Apr. 26, 2000, now Pat. No. 65,021,35, which is a continuation-in-part of application No. 09/504,783, filed on Peb. 15, 2000, now Pat. No. 65,021,35, which is a continuation-in-part of application No. 09/504,783, filed on Peb. 15, 2000, now Pat. No. 65,021,35, which is a continuation-in-part of application No. 09/504,783, filed on Peb. 15, 2000, now Pat. No. 65,021,35, which is a continuation-in-part of application No. 09/504,783, filed on Cet. 29, 1999, now Pat. No. 7,010,604. (60) Provisional application No. 60/106,261, filed on Oct. 30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (52) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (54) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (55) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (56) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (57) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (58) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (59) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (50) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (50) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Ct. 5,000,804, No. 60/137,704, filed on Jun. 7, 1999. (52) U.S. Ct. 6,000,804, No. 60/137,704, filed on Jun. 7, 1999. (52) U.S. Ct. 6,000,804, No. 60/137,704, filed on Jun. 7, 1999. (54) Int. Ct. 6,000,804, No. 60/137,704, filed on Jun. 7, 1999. (55) Int. Ct. 6,000,804, No. 60/137,704, filed on Jun.					
continuation of application No. 11/840,560, filed on Aug. 17, 2007, now Pat. No. 7,921,211, which is a continuation of application No. 10/714,849, filed on Nov. 18, 2003, now Pat. No. 7,418,504, which is a continuation of application No. 09/558,210, filed on Apr. 26, 2000, now abandoned, which is a continuation-in-part of application No. 09/504,783, filed on Teb. 12, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09/504,783, filed on Teb. 2, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09/504,783, filed on Teb. 2, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09/504,783, filed on Oct. 29, 1999, now Pat. No. 7,010,604. (60) Provisional application No. 60/106,261, filed on Oct. 30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Ct. 50, 1999. (51) Int. Ct. 50, 1999. (52) Us. Ct. 60, 1999. (52) Us. Ct. 60, 1999. (53) Int. Ct. 50, 1999. (54) Int. Ct. 50, 1999. (55) Int. Ct. 50, 1999. (56) Pat. 1999. (57) Us. Ct. 60, 1999. (58) Int. Ct. 50, 1999. (59) Int. Ct. 50, 1999. (50) Int. Ct. 50,					
Aug. 17, 2007, now Pat. No. 7,921,211, which is a continuation of application No. 1071,484,9 filed on Nov. 18, 2003, now Pat. No. 7,418,504, which is a continuation of application No. 90,950,4783, 5140,606 A 5,510,758 A 6,1906 Marino, Jr. et al. 25,508,864 A 1999 Marino					
continuation of application No. 10/714,849, filed on Nov. 18, 2003, now Patt. No. 7418,8504, which is a continuation of application No. 09/558,210, filed on Apr. 26, 2000, now abandoned, which is a continuation-in-part of application No. 09/504,783, filed on Feb. 15, 2000, now Patt. No. 6,502,135, which is a continuation-in-part of application No. 10/504,783, filed on Oct. 29, 1999, now Pat. No. 09/429,643, filed on Oct. 29, 1999, now Pat. No. 7,010,604. (60) Provisional application No. 60/106,261, filed on Oct. 30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Cl. 5,600, now Pat. No. 1,600,103,704, filed on Jun. 7, 1999. (51) Int. Cl. 5,700, now Pat. No. 60/106,261, filed on Oct. 5,64,695 A. 8,1097 McManis McLaughline et al. 1,100,100,100,100,100,100,100,100,100,1					
Nov. 18, 2003, now Pat. No. 7-418,504, which is a continuation of application No. 09558,210, filed on Apr. 26, 2000, now abandoned, which is a continuation-in-part of application No. 09504,783, filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09504,783, filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 5,528,660 A 41997 Viv. 1997, viv. 1998, pp. 1999, now Pat. No. 5,625,662 A 41997 Viv. 1997, viv. 1998, pp. 1999, now Pat. No. 5,625,662 A 41997 Viv. 1997, viv. 1998, pp. 1999, now Pat. No. 5,625,662 A 41997 Viv. 1997, pp. 1998, pp. 1999, now Pat. No. 5,625,662 A 41997 Viv. 1997, pp. 1999, now Pat. No. 5,624,693 A 1999 Viv. 1999, now Pat. No. 5,624,693 A 1999 Viv. 1999, now Pat. No. 5,624,693 A 1999 Viv. 1999, now Pat. No. 5,624,694 A 1999 Viv. 1999, now Pat. No. 5,624,694 A 1999 Viv. 1999 Viv. 1999, now Pat. No. 5,624,694 A 1999 Viv. 1999 Vi					
continuation of application No. 09/558,210, filed on Apr. 26, 2000, now abandoned, which is a continuation—in-part of application No. 09/504,783, filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation—in-part of application No. 590,4783, filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation—in-part of application No. 590,236,48, filed on Oct. 29, 1999, now Pat. No. 7,010,604					
Apr. 26, 2000. now abandoned, which is a continuation-in-part of application No. 09/504,783, 5,61,669 A 101995 Millions of the continuation-in-part of application No. 5021,35, which is a continuation-in-part of application No. 5,622,135, which is a continuation-in-part of application No. 5,622,135, which is a continuation-in-part of application No. 5,622,360 A 4,1997 Vu					
continuation-in-part of application No. 09/504,783, filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 6,262,616 A (1997 Value) (1998 Agrae) (1999 Agrae					
filed on Feb. 15, 2000, now Pat. No. 6,502,135, which is a continuation-in-part of application No. 09/429,643, filed on Oct. 29, 1999, now Pat. No. 7,010,604. (60) Provisional application No. 60/106,261, filed on Oct. 30, 1998, provisional application No. 60/137,704, 5634,605 A 3/1997 Unekitia 30, 1998, provisional application No. 60/137,704, 5634,605 A 3/1997 Olnowich et al. 8,000,000,000,000,000,000,000,000,000,0		1			
is a continuation-in-part of application No. 09/429,643, filed on Oct. 29, 1999, now Pat. No. 7,010,604. 5636,130 A 4/1997 Vinockita 7,010,604. 5625,626 A 4/1997 Vinockita 7,010,604. 5625,626 A 4/1997 Vinockita 5629,984 A 5/1997 McLaughlin et al. 5636,139 A 6/1997 McLaughlin et al. 5636,139 A 6/1998 McDowch et al. 5636,139 A 6/1999 McDow					
09/429,643, filed on Oct. 29, 1999, now Pat. No. 7,010,604.			, ,		
(60) Provisional application No. 60/106.261, filed on Oct. 30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Cl. 40, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1		1 11			
(60) Provisional application No. 60/106,261, filed on Oct. 30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. (51) Int. Cl. (52) Int. Cl. (54) Int. Cl. (54) Int. Cl. (55) Int. Cl. (56) Int. Cl. (57) Int. Cl. (57) Int. Cl. (57) Int. Cl. (58) Sep. Sep. Sep. Sep. Sep. Sep. Sep. Sep.					
30, 1998, provisional application No. 60/137,704, filed on Jun. 7, 1999. 5,662,480 1011997 Nakagawa 11997 Nayagawa				5/1997 6/1997	McLaughlin et al
30, 1998, provisional application No. 60/137,704, filled on Jun. 7, 1999. (51) Int. Cl. H04L 29/12 (2006.01) 5,735,7325 A 111997 Ludwig et al. 5,740,375 A 141998 Unme et al. 5,740,375 A 141998 Walker et al. 6,006,272 A 1,71998 Faybishenko 6,640,278 A 1,71998 Faybishenko 6,740,376 A 1,71998 Faybishenko 7,747,670 A 1,71998 Moroney et al. 5,740,376 A 1,71998 Faybishenko 6,740,476 A 1,71998 Faybishenko 7,747,670 A 1,71998 Moroney et al. 5,740,376 A 1,71998 Faybishenko 7,747,670 A 1,71998 Moroney et al. 5,740,376 A 1,71998 Faybishenko 7,747,670 A 1,71998 Faybishenko 7,747,747 A 1,71998 Faybishenko 7,747,747 A 1,71998 A 1,740,470 A 1,740,	(60)				
(51) Int. Cl. H04L 29/12 (2006.01) 5,740,375 A 41999 Meles at 1. H04L 12/701 (2013.01) 5,774,526 A 61998 Equivalence at 1. H04L 12/707 (2013.01) 5,771,239 A 61998 Moroney at 1. H04L 12/707 (2013.01) 5,771,239 A 61998 Moroney at 1. H04L 12/707 (2013.01) 5,771,239 A 61998 Moroney at 1. H04L 12/707 (2013.01) 5,781,550 A 71998 Moroney at 1. H04L 12/708 (2006.01) 5,781,150 A 71998 Moroney at 1. H04L 29/08 (2006.01) 5,781,150 A 71998 Moroney at 1. H04L 29/08 (2006.01) 5,796,942 A 81998 Sistanizade at 2. H04L 29/08 (2006.01) 5,805,801 A 91998 Holloway at 1. H04L 29/08 (2006.01) 5,805,801 A 91998 Holloway at 1. Experimental at 2. Exp				10/1997	Nakagawa
STOP		filed on Jun. 7, 1999.			
Hold 19912 (2006.01)	(54)	V . C			
H04L 12701 (2013.01)	(51)				
H04L 29/06 (2006.01) 5.774.660 A (6)1998 Brendel et al.					
H04L 12707 (2013.01)					
H04L 1224 (2006.01) S.787.172 A 7/1998 Amfold G06F 21/60 (2013.01) S.796.942 A 8 11998 Sistanizadeh et al. S.796.942 A 8 11999 Sistanizadeh et al. S.796.942 A 8 11999 Sistanizadeh et al. S.796.942 A 9 11998 Holloway et al. S.796.803 A 9 11998 Micali al. S.796.803 A 9 11998 Micali al. S.796.703 A 9 11998 Micali al. S.796.703 A 9 11999 Micali al. S.796.705 A 11999 Micali al. S.796.		· /			
G06F 21/60 (2013.01)					
H04L 29/08		· /			
		· /		8/1998	Esbensen
(52) U.S. CI. CPC		· /			
(52) U.S. CI. CPC		H04L 12//03 (2013.01)			
CPC	(50)	TLC CI			
(2013.01); H04L 61/35 (2013.01); H04L 14/00	(52)				
(2013.01); H04L 61/2076 (2013.01); H04L 5,884.5091 A 12/1998 Dunne et al. 1/1999 Shrader (2013.01); H04L 63/0272 (2013.01); H04L 63/0272 (2013.01); H04L 63/0428 (2013.01); H04L 63/0272 (2013.01); H04L 63/0488 (2013.01); H04L 5,870.610 A 2/1999 Beyda et al. 63/04 (2013.01); H04L 63/088 (2013.01); G06F 5,884.038 A 3/1999 Bachr et al. 63/04 (2013.01); H04L 63/458 (2013.01); 5,884.270 A 3/1999 Walker et al. 63/0407 (2013.01); H04L 61/2007 (2013.01); H04L 29/12783 (2013.01); H04L 61/2007 (2013.01); H04L 29/12783 (2013.01); H04L 5,898.830 A 4/1999 Weisnger, Jr. et al. 63/105 (2013.01); H04L 61/303 (2013.01); H04L 5,918.018 A 6/1999 Holloway et al. 63/105 (2013.01); H04L 61/6004 (2013.01); 5,918.019 A 6/1999 Urine et al. 63/105 (2013.01); H04L 61/6004 (2013.01); 5,918.019 A 6/1999 Valencia Dure et al. 63/105 (2013.01); H04L 29/127866 (2013.01) 5,950.519 A 9/1999 Stockwell et al. 61/05.014 A 1/1999 Polymore et al. 61/06.014 (2013.01) 5,950.519 A 9/1999 Anatoli Control of C				11/1998	Mittenthal
29/1232 (2013.01); H04L 63/0227 (2013.01); 5,864,666 A 1/1999 Osterman H04L 63/0428 (2013.01); H04L 63/0272 (5,867,650 A 2/1999 Osterman 63/04 (2013.01); H04L 63/1408 (2013.01); G06F 21/606 (2013.01); H04L 63/1458 (2013.01); 5,884,231 A 3/1999 Bachr et al. 63/04 (2013.01); H04L 63/1458 (2013.01); 5,884,270 A 3/1999 Walker et al. Weber (2013.01); H04L 29/12783 (2013.01); H04L 5,882,903 A 4/1999 Weber (2013.01); H04L 29/12783 (2013.01); H04L 5,582,903 A 4/1999 Wesinger, Jr. et al. 63/1466 (2013.01); H04L 61/303 (2013.01); H04L 5,918,018 A 6/1999 Hammond et al. 63/105 (2013.01); H04L 61/304 (2013.01); H04L 5,918,018 A 6/1999 Valencia (2013.01); H04L 61/2092 (2013.01); H04L 5/28 (2013.01) H04L 61/2092 (2013.01); H04L 5/28 (2013.01) USPC					
### H04L 63/0428 (2013.01); H04L 63/0272					
(2013.01); H04L 63/1408 (2013.01); H04L 5,878,231 A 3/1999 Bachr et al. 63/04 (2013.01); H04L 63/08 (2013.01); G06F 5,884,038 A 3/1999 Walker et al. H04L 63/0407 (2013.01); H04L 61/2007 5,889,863 A 3/1999 Walker et al. (2013.01); H04L 29/12783 (2013.01); H04L 5,882,803 A 4/1999 Weber Klaus 63/1466 (2013.01); H04L 29/12801 (2013.01); 5,905,859 A 5/1999 H04L 29/12594 (2013.01); H04L 61/1511 (2013.01); H04L 61/303 (2013.01); H04L 5,181,818 A 6/1999 Gooderum et al. (2013.01); H04L 61/303 (2013.01); H04L 5,181,818 A 6/1999 Gooderum et al. (2013.01); H04L 61/6004 (2013.01); 5,940,393 A 8/1999 Uscockwell et al. (2013.01); H04L 29/12266 (2013.01) USPC					
63/04 (2013.01); H04L 63/08 (2013.01); G06F 5,884,038 A 3/1999 Kapoor 21/606 (2013.01); H04L 63/1458 (2013.01); 5,884,270 A 3/1999 Walker et al. H04L 63/0407 (2013.01); H04L 61/2007 5,892,003 A 4/1999 Weber Klaus 63/1466 (2013.01); H04L 29/12783 (2013.01); H04L 5,898,830 A 4/1999 Wesinger, Jr. et al. 63/1466 (2013.01); H04L 29/12801 (2013.01); 5,905,859 A 5/1999 Holloway et al. H04L 29/12594 (2013.01); H04L 61/1511 5,915,087 A 6/1999 Gooderum et al. (2013.01); H04L 61/303 (2013.01); H04L 5,918,018 A 6/1999 Gooderum et al. 63/105 (2013.01); H04L 61/6004 (2013.01); 5,940,393 A 8/1999 Ouree et al. 63/105 (2013.01); H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Anatoli VISPC (2013.01); H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Anatoli VISPC (2013.01) H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Apfel et al. (2013.01) H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Apfel et al. (2013.01) H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Apfel et al. (2013.01) H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Apfel et al. (2013.01) H04L 29/12066 (2013.01) 5,950,159 A 9/1999 Apfel et al. (2013.01) H04L 29/12066 (2013.01) 5,996,016 A 11/1999 Apfel et al. (2013.01) H04L 29/12060 Aprel H04L 29/12000 Apfel et al. (2013.01) H04L 29/12000 Apfel et al. (2013.01) H04L 29/12060 Aprel H04L 29/12000 Apfel et al. (2013.01) H04L 29/12060 Aprel					
21/606 (2013.01); H04L 63/1458 (2013.01); 5.884,270 A 3/1999 Weber 4.04					
H04L 63/0407 (2013.01); H04L 61/2007					
(2013.01); H04L 29/12783 (2013.01); H04L 5,898,830 A 4/1999 Weisinger, Jr. et al. H04L 29/12594 (2013.01); H04L 61/1511 (2013.01); H04L 61/1511 (2013.01); H04L 61/303 (2013.01); H04L 61/1511 (5,915,087 A 6/1999 Gooderum et al. 63/105 (2013.01); H04L 61/6004 (2013.01); 5,918,019 A 6/1999 Valencia (2013.01); H04L 61/2002 (2013.01); H04L 61/2003 (2013.01); H04L 5/28 (2013.01); H04L 29/12066 (2013.01) (2013.01) (2013.01); H04L 61/2002 (2013.01) (2013.01); H04L 61/2002 (201					
63/1466 (2013.01); H04L 29/12801 (2013.01); 5,905,859 A 5/1999 Holloway et al. H04L 29/12594 (2013.01); H04L 61/1511 5,915,087 A 6/1999 Gooderum et al. (2013.01); H04L 61/303 (2013.01); H04L 5,918,019 A 6/1999 Valencia (2013.01); H04L 61/2092 (2013.01); H04L 45/28 5,950,195 A 9/1999 Valencia (2013.01); H04L 29/12066 (2013.01) 5,940,393 A 8/1999 Duree et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 10/1999 Gabber et al. (2013.01); H04L 29/12066 (2013.01) 5,950,518 A 1/2000 Apfel et al. (2013.01); H04L 29/12062 (2					
### H04L 29/12594 (2013.01); H04L 61/1511 (2013.01); H04L 61/303 (2013.01); H04L 5/918,018 A 6/1999 Gooderum et al. 63/105 (2013.01); H04L 61/6004 (2013.01); 5/918,018 A 6/1999 Valencia 5/918,019 A 6/1999 Valencia 63/105 (2013.01); H04L 61/6004 (2013.01); 5/940,393 A 8/1999 Durce et al. (2013.01); H04L 29/12066 (2013.01) 5/950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5/950,519 A 9/1999 Gabber et al. 5/961,593 A 10/1999 Green et al. 5/960,204 A 12/1999 Adelman et al. 6/006,259 A 12/1999 Adelman et al. 6/006,272 A 12/1999 Adelman et al. 6/006,272 A 12/1999 Aravamudan et al. 4,8761,334 A 8/1988 Sagoi et al. 6/011,579 A 1/2000 Newlin 4,885,778 A 12/1989 Weiss 6/016,318 A 1/2000 Tomoike 4,912,762 A 3/1990 Lee et al. 6/016,504 A 1/2000 Tomoike 4,920,484 A 4/1990 Ranade 6/016,504 A 1/2000 Arnold et al. 4,933,846 A 6/1990 Humphrey et al. 6/032,118 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6/032,118 A 2/2000 Epstein 5/007,051 A 4/1991 Dolkas et al. 6/052,788 A 4/2000 Wesinger et al. 5/164,988 A 11/1992 Matyas 6/055,518 A 4/2000 Franklin et al. 5/276,735 A 1/1994 Boebert et al. 6/055,574 A 4/2000 Smorodinsky et al.					
(2013.01); H04L 61/303 (2013.01); H04L 5,918.018 A 6/1999 Gooderum et al. 63/105 (2013.01); H04L 61/6004 (2013.01); 5,918.019 A 6/1999 Valencia H04L 61/2092 (2013.01); H04L 45/28 (2013.01); H04L 29/12066 (2013.01) 5,940,393 A 8/1999 Duree et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Anatoli 7.961,393 A 10/1999 Gabber et al. (2013.01) 5,961,593 A 10/1999 Gabber et al. (2013.01) 5,960,016 A 11/1999 Gabber et al. (2013.01) 5,960,016 A 11/1999 Green et al. (2013.01) 5,960,016 A 11/1999 Green et al. (2013.01) 5,960,016 A 11/1999 Green et al. (2013.01) 6,006,259 A 12/1999 Green et al. (2013.01) 6,006,259 A 12/1999 Green et al. (2013.01) 6,006,272 A 12/1999 Green et a					
63/105 (2013.01); H04L 61/6004 (2013.01); 5,918,019 A 8/1999 Duree et al. Stockwell et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Anatoli Yinger et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Anatoli Yinger et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Anatoli Yinger et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Anatoli Yinger et al. (2013.01); H04L 29/12066 (2013.01) 5,950,519 A 9/1999 Anatoli Yinger et al. (2013.01); H04L 29/12066 (2013.01) 5,960,204 A 9/1999 Apfel et al. (2013.01) 5,961,593 A 10/1999 Apfel et al. (2013.01) 5,961,610 A 11/1999 Apfel et al. (2013.01) 5,961,610 A 11/1999 Adelman et al. (2013.01) 5,961,610 A 1/2000 Arayamudan et al. (2013.01) 5,061,610 A 1/2000 Arayamudan et al. (2013.01) 5,061,610 A 1/2000 Arayamudan et al. (2013.01) 5,061,610 A 1/2000 Arayamudan et al. (2013.01) 5,070,510 A 4/1991 Advisor Alignment (2013.01) 5,070,528 A 12/1991 Barlow (2013.01) 5,070,610 A 1/1994 Barlo				6/1999	Gooderum et al.
H04L 61/2092 (2013.01); H04L 45/28					
(2013.01); H04L 29/12066 (2013.01) USPC					
USPC					
S,961,593 A 10/1999 Gabber et al.			5,960,204 A	9/1999	Yinger et al.
U.S. PATENT DOCUMENTS 6,003,084 A 12/1999 Green et al.					
U.S. PATENT DOCUMENTS 6,003,084 A 12/1999 Green et al. 6,006,259 A 12/1999 Adelman et al. 4,677,434 A 6/1987 Fascenda 6,011,579 A 1/2000 Newlin 6,012,088 A 1/2000 Li et al. 4,885,778 A 12/1989 Weiss 6,016,318 A 1/2000 Tomoike 4,912,762 A 3/1990 Lee et al. 6,016,504 A 1/2000 Arnold et al. 4,920,484 A 4/1990 Ranade 6,016,512 A 1/2000 Huitema 4,933,846 A 6/1990 Humphrey et al. 6,023,510 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Epstein 5,007,051 A 4/1991 Dolkas et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Wesset et al. 5,204,961 A 4/1993 Barlow 6,055,574 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.	(56)	References Cited			
4,677,434 A 6/1987 Fascenda 6,006,272 A 12/1999 Aravamudan et al. 4,677,434 A 6/1987 Fascenda 6,011,579 A 1/2000 Newlin 4,761,334 A 8/1988 Sagoi et al. 6,012,088 A 1/2000 Li et al. 4,885,778 A 12/1989 Weiss 6,016,318 A 1/2000 Tomoike 4,912,762 A 3/1990 Lee et al. 6,016,504 A 1/2000 Arnold et al. 4,920,484 A 4/1990 Ranade 6,016,512 A 1/2000 Huitema 4,933,846 A 6/1990 Humphrey et al. 6,023,510 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Franklin et al. 5,204,961 A 4/1993 Barlow 6,055,574 A 4/200 Smorodinsky et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.		LLO DATENTE DOCUMENTO			
4,677,434 A 6/1987 Fascenda 6,011,579 A 1/2000 Newlin 4,761,334 A 8/1988 Sagoi et al. 6,012,088 A 1/2000 Li et al. 4,885,778 A 12/1989 Weiss 6,016,318 A 1/2000 Tomoike 4,912,762 A 3/1990 Lee et al. 6,016,514 A 1/2000 Arnold et al. 4,920,484 A 4/1990 Ranade 6,016,512 A 1/2000 Huitema 4,933,846 A 6/1990 Humphrey et al. 6,023,510 A 2/2000 Epstein 4,952,930 A 8/1990 Franaszek et al. 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,041,342 A 3/2000 Yamaguchi 5,007,0528 A 12/1991 Hawe et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Franklin et al. 5,204,961 A 4/1993 Barlow 6,055,574 A 4/200 Smorodinsky et al.		U.S. PATENT DOCUMENTS		12/1999	
4,761,334 A 8/1988 Sagoi et al. 6,012,088 A 1/2000 Li et al. 4,885,778 A 12/1989 Weiss 6,016,318 A 1/2000 Tomoike 4,912,762 A 3/1990 Lee et al. 6,016,504 A 1/2000 Arnold et al. 4,920,484 A 4/1990 Ranade 6,016,512 A 1/2000 Huitema 4,933,846 A 6/1990 Humphrey et al. 6,023,510 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Vessett et al. 5,204,961 A 4/1993 Barlow 6,055,574 A 4/200 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/200 Smorodinsky et al.		4.677.434 A 6/1987 Fascenda			
4,885,778 A 12/1989 Weiss 6,016,318 A 1/2000 Tomoike 4,912,762 A 3/1990 Lee et al. 6,016,504 A 1/2000 Arnold et al. 4,920,484 A 4/1990 Ranade 6,016,512 A 1/2000 Huitema 4,933,846 A 6/1990 Humphrey et al. 6,023,510 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Franklin et al. 5,204,961 A 4/1993 Barlow 6,055,574 A 4/200 Smorodinsky et al.					
4,912,762 A 3/1990 Lee et al. 6,016,504 A 1/2000 Arnold et al. 4,920,484 A 4/1990 Ranade 6,016,512 A 1/2000 Huitema 4,933,846 A 6/1990 Humphrey et al. 6,023,510 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,052,788 A 4/2000 Wesinger et al. 5,070,528 A 12/1991 Hawe et al. 6,055,236 A 4/2000 Nessett et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Franklin et al. 5,204,961 A 4/1993 Barlow 6,055,574 A 4/2000 Smorodinsky et al.		4,885,778 A 12/1989 Weiss			
4,933,846 A 6/1990 Humphrey et al. 6,015,512 A 1/2000 Fullerina 4,952,930 A 8/1990 Franaszek et al. 6,023,510 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,041,342 A 3/2000 Yamaguchi 5,070,528 A 12/1991 Hawe et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Franklin et al. 5,204,961 A 4/1993 Barlow 6,055,518 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.					
4,952,930 A 8/1990 Franaszek et al. 6,032,118 A 2/2000 Epstein 4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,041,342 A 3/2000 Yamaguchi 5,070,528 A 12/1991 Hawe et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Nessett et al. 5,204,961 A 4/1993 Barlow 6,055,518 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.					
4,988,990 A 1/1991 Warrior 6,032,118 A 2/2000 Tello et al. 5,007,051 A 4/1991 Dolkas et al. 6,041,342 A 3/2000 Yamaguchi 5,070,528 A 12/1991 Hawe et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Franklin et al. 5,204,961 A 4/1993 Barlow 6,055,518 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.		4,952,930 A 8/1990 Franaszek et al.			
5,007,051 A 4/1991 Bolkas et al. 6,052,788 A 4/2000 Wesinger et al. 5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Nessett et al. 5,204,961 A 4/1993 Barlow 6,055,518 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.		4,988,990 A 1/1991 Warrior			
5,164,988 A 11/1992 Matyas 6,055,236 A 4/2000 Nessett et al. 5,204,961 A 4/1993 Barlow 6,055,518 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.					
5,204,961 A 4/1993 Barlow 6,055,518 A 4/2000 Franklin et al. 5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.					
5,276,735 A 1/1994 Boebert et al. 6,055,574 A 4/2000 Smorodinsky et al.			6,055,518 A		
5,303,302 A 4/1994 Burrows 6,055,5/5 A 4/2000 Paulsen et al.		5,276,735 A 1/1994 Boebert et al.			
		5,303,302 A 4/1994 Burrows	6,055,575 A	4/2000	raulsen et al.



US 8,850,009 B2

Page 3

(56)		Referen	ces Cited	6,490,290			Zhang et al.
	II C	DATENIT	DOCUMENTS	6,496,491 6,496,867			Chuah et al. Beser et al.
	U.S.	FAILINI	DOCUMENTS	6,499,108		12/2002	
6,061,736			Rochberger et al.	6,502,135 6,505,232		12/2002 1/2003	
6,065,049 6,073,175			Beser et al. Tavs et al.	6,510,154			Mayes et al.
6,079,020		6/2000		6,546,003	B1	4/2003	Farris
6,081,900) A		Subramaniam et al.	6,549,516			Albert et al. Provino
6,092,200 6,101,182			Muniyappa et al. Sistanizadeh et al.	6,557,037 6,560,634			Broadhurst
6,111,883			Terada et al.	6,564,261	B1	5/2003	Gudjonsson et al.
6,119,171	A		Alkhatib	6,571,296 6,571,338		5/2003 5/2003	
6,119,234 6,131,121			Aziz et al. Mattaway et al.	6,581,166			Hirst et al.
6,147,976			Shand et al.	6,590,588	B2		Lincke et al.
6,148,342		11/2000		6,591,306 6,606,660			Redlich Bowman-Amuah
6,151,628 6,154,839		11/2000	Au et al. Arrow et al.	6,606,708		8/2003	Devine et al.
6,157,957			Berthaud	6,609,196			Dickinson, III et al.
6,158,011			Chen et al.	6,615,357 6,618,761			Boden et al. Munger et al.
6,168,409 6,173,399		1/2001	Fare Gilbrech	6,636,505			Wang et al.
6,175,867			Taghadoss	6,640,302		10/2003	Subramaniam et al.
6,178,409		1/2001	Weber et al.	6,643,701 6,671,702			Aziz et al. Kruglikov et al.
6,178,505 6,179,102			Schneider et al. Weber et al.	6,687,551		2/2004	Steindl
6,182,072	B1		Leak et al.	6,687,746			Shuster et al.
6,182,141	B1		Blum et al.	6,687,823 6,693,878			Al-Salqan et al. Daruwalla et al.
6,182,227 6,195,677			Blair et al. Utsumi	6,701,437			Hoke et al.
6,199,112		3/2001		6,714,970			Fiveash et al.
6,199,122	B1		Kobayashi	6,717,949 6,751,729			Boden et al. Giniger et al.
6,202,081 6,222,842			Naudus Sasyan et al.	6,751,729			Wesinger, Jr. et al.
6,223,287			Douglas et al.	6,752,166	B2	6/2004	Lull et al.
6,225,993			Lindblad et al.	6,754,212 6,757,740			Terada et al. Parekh et al.
6,226,748 6,226,751			Bots et al. Arrow et al.	6,760,766			Sahlqvist
6,233,618			Shannon	6,801,509	B1	10/2004	Rai et al.
6,243,360			Basilico	6,804,783 6,813,777			Wesinger, Jr. et al. Weinberger et al.
6,243,749 6,243,754			Sitaraman et al. Guerin et al.	6,826,616			Larson et al.
6,246,670			Karlsson et al.	6,829,242			Davison et al.
6,256,671		7/2001	Strentzsch et al.	6,834,271 6,839,759	Bl B2		Hodgson et al. Larson et al.
6,262,987 6,263,445			Mogul Blumenau	6,917,600			Chuah et al.
6,266,699		7/2001	Sevcik	6,930,998			Sylvain
6,269,099			Borella et al.	6,937,597 6,959,184			Rosenberg et al. Byers et al.
6,286,047 6,298,341			Ramanathan et al. Mann et al.	7,010,604			Munger et al.
6,298,383			Gutman et al.	7,028,182			Killcommons
6,301,223			Hrastar et al.	7,039,713 7,065,784			Van Gunter et al. Hopmann et al.
6,308,213 6,308,274		10/2001	Valencia Swift	7,072,964			Whittle et al.
6,311,207	B1	10/2001	Mighdoll et al.	7,100,195			Underwood
6,314,463			Abbott et al.	7,103,770 RE39,360			Conrath Aziz et al.
6,324,161 6,330,562		11/2001 12/2001	Boden et al.	7,133,930			Munger et al.
6,332,158			Risley et al.	7,167,904			Devarajan et al.
6,333,272			McMillin et al.	7,188,175 7,188,180	BI B2		McKeeth Larson et al.
6,335,966 6,338,082			Toyoda Schneider	7,197,563	B2		Sheymov et al.
6,345,361	B1		Jerger et al.	7,203,190			Ruban et al.
6,353,614			Borella et al.	7,225,249 7,249,377		5/2007 7/2007	Barry et al 709/227 Lita et al.
6,366,912 6,367,009			Wallent et al. Davis et al.	7,275,113		9/2007	
6,421,732	B1	7/2002	Alkhatib et al.	7,307,990			Rosen et al.
6,425,003			Herzog et al.	7,353,841 7,418,504			Kono et al. Larson et al.
6,426,955 6,430,155			Gossett et al. Davie et al.	7,413,304			Lu et al.
6,430,176	B1	8/2002	Christie	7,490,151	B2	2/2009	Munger et al.
6,430,610		8/2002		7,493,403			Shull et al.
6,434,600 6,438,127			Waite et al. Le Goff et al.	7,584,500 7,669,049			Dillon et al. Wang et al.
6,449,272			Chuah et al.	7,764,231			Karr et al.
6,449,657	B2	9/2002	Stanbach	7,852,861	B2	12/2010	Wu et al.



(56) References Cited

U.S. PATENT DOCUMENTS

8,051,181	B2	11/2011	Larson et al.
8,504,696	B2	8/2013	Larson et al.
8,504,697	B2	8/2013	Larson et al.
2001/0049741	A1	12/2001	Skene et al.
2002/0002675	A1	1/2002	Bush
2002/0004826	A1	1/2002	Waite et al.
2002/0004898	A1	1/2002	Droge
2002/0006132	A1	1/2002	Chuah et al.
2003/0005132	A1	1/2003	Nguyen et al.
2003/0196122	A1	10/2003	Wesinger, Jr. et al.
2004/0199493	A1	10/2004	Ruiz et al.
2004/0199520	A1	10/2004	Ruiz et al.
2004/0199608	A1	10/2004	Rechterman et al.
2004/0199620	A1	10/2004	Ruiz et al.
2005/0055306	A1	3/2005	Miller et al.
2005/0108517	A1	5/2005	Dillon et al.
2006/0059337	A1	3/2006	Poyhonen et al.
2006/0123134	A1	6/2006	Munger et al.
2007/0208869	A1	9/2007	Adelman et al.
2007/0214284	A1	9/2007	King et al.
2007/0266141	A1	11/2007	Norton
2008/0005792	A1	1/2008	Larson et al.
2008/0144625	A1	6/2008	Wu et al.
2008/0235507	A1	9/2008	Ishikawa et al.
2009/0193498	A1	7/2009	Agarwal et al.
2009/0193513	A1	7/2009	Agarwal et al.
2009/0199258	A1	8/2009	Deng et al.
2009/0199285	A1	8/2009	Agarwal et al.

FOREIGN PATENT DOCUMENTS

EP	0814589	12/1997
EP	836306	4/1998
EP	0858189	8/1998
GB	2316841	3/1998
GB	2317792	4/1998
GB	2334181	8/1999
GB	2340702	2/2000
JP	62-214744	9/1987
JP	04-117826	4/1992
JР	04-363941	12/1992
JP	09-018492	1/1997
JP	09-266475	10/1997
JP	09-270803	10/1997
JP	09-275404	10/1997
JP	10-32610	2/1998
JP	10-070531	3/1998
JP	10-70576	3/1998
JP	10-111848	4/1998
JP	10-126440	5/1998
JP	10-215244	8/1998
JP	11-167536	6/1999
JР	11-261704	9/1999
JP	11-355271	12/1999
JР	11-355272	12/1999
WO	WO9827783	6/1998
WO	WO9843396	10/1998
WO	WO9855930	12/1998
WO	WO9859470	12/1998
WO	WO9911019	3/1999
WO	WO9938081	7/1999
WO	WO9948303	9/1999
WO	WO 0014938	3/2000
WO	WO0017775	3/2000
WO	WO0070458	11/2000
WO	WO01/61922	2/2001
WO	WO0116766	3/2001
WO	WO0150688	7/2001

OTHER PUBLICATIONS

U.S. Appl. No. 09/399,753, filed Sep. 22, 1998, Graig Miller et al.

Alan 0. Frier et al., "The SSL Protocol Version 3.0", Nov. 18, 1996, printed from http://www.netscape.com/eng/ss13/ draft302.txt on Feb. 4, 2002, 56 pages.

August Bequai, "Balancing Legal Concerns Over Crime and Security in Cyberspace", Computer & Security, vol. 17, No. 4, 1998, pp. 293-298

D. B. Chapman et al., "Building Internet Firewalls", Nov. 1995, pp. 278-375.

D. Clark, "US Calls for Private Domain-Name System", Computer, IEEE Computer Society, Aug. 1, 1998, pp. 22-25.

Davila J et al, "Implementation of Virtual Private Networks at the Transport Layer", Information Security, Second International Workshop, ISW'99. Proceedings (Lecture Springer-Verlag Berlin, Germany, [Online] 1999, pp. 85-102, XP002399276, ISBN 3-540-666. Dolev, Shlomi and Ostrovsky, Rafil, "Efficient Anonymous Multicast and Reception" (Extended Abstract), 16 pages.

Donald E. Eastlake, 3rd, "Domain Name System Security Extensions", Internet Draft, Apr. 1998, pp. 1-51.

F. Halsall, "Data Communications, Computer Networks and Open Systems", Chapter 4, Protocol Basics, 1996, pp. 198-203.

Glossary for the Linux FreeS/WAN project, printed from http:// liberty.freeswan.org/freeswan_trees/freeswan-1.3/ doc/glossary. html on Feb. 21, 2002, 25 pages.

J. Gilmore, "Swan: Securing the Internet against Wiretapping", printed from http://liberty.freeswan.org/freeswan_trees/freeswan-1. 3/doc/rationale.html on Feb. 21, 2002, 4 pages.

James E. Bellaire, "New Statement of Rules-Naming Internet Domains", Internet Newsgroup, Jul. 30, 1995, 1 page.

Jim Jones et al., "Distributed Denial of Service Attacks: Defenses", Global Integrity Corporation, 2000, pp. 1-14.

Laurie Wells (LancasterBibelMail MSN COM); "Subject: Security Icon" USENET Newsgroup, Oct. 19, 1998, XP002200606, 1 page. Linux FreeS/WAN Index File, printed from http://liberty.freewan,org/freeswan_trees/freeswan-1,3/doc/ on Feb. 21. 2002, 3 Pages

P. Srisuresh et al., "DNS extensions to Network address Translators (DNS_ALG)", Internet Draft, Jul. 1998, pp. 1-27.

Reiter, Michael K. and Rubin. Aviel D. (AT&T Labs-Research), "Crowds: Anonymity for Web Transactions", pp. 1-23.

RFC 2401 (dated Nov. 1998) Security Architecture for the Internet Protocol (RTP).

RFC 2543-SIP (dated Mar. 1999): Session Initiation Protocol (SIP or SIPS).

Rich Winkel, "CAQ: Networking With Spooks; The NET & The Control of Information", Internet Newsgroup, Jun. 21, 1997, 4 pages. Rubin, Aviel D., Geer, Daniel, and Ranum, Marcus J. (Wiley Computer Publishing), "Web Security Sourcebook", pp. 82-94.

Search Report (dated Aug. 20, 2002), International Application No. PCT/US01/04340.

Search Report (dated Aug. 23, 2002), International Application No. PCT/US01/13260.

Search Report (dated Oct. 7, 2002), International Application No. PCT/US01/13261.

Search Report. IPER (dated Nov. 13, 2002), International Application No. PCT/US01/04340.

Search Report, IPER (dated Feb. 6, 2002), International Application No. PCT/US01/13261.

Search Report, IPER (dated Jan. 14, 2003), International Application No. PCT/US01/13260.

Shankar, A.U. "A verified sliding window protocol with variable flow control". Proceedings of ACM SIGCOMM conference on Communications architectures & protocols. pp, 84-91, ACM Press, NY, NY

Shree Murthy et al., "Congestion-Oriented Shortest Multi-path Routing", Proceedings of IEEE INFOCOM, 1996, pp. 1028-1036.

W. Stallings, "Cryptography and Network Security", 2nd, Edition, Chapter 13, IP Security, Jun. 8, 1998, pp. 399-440.

Microsoft Corporation's Fourth Amended Invalidity Contentions dated Jan. 5, 2009, VirnetX Inc. and Science Applications International Corp. v. Microsoft Corporation.



(56) References Cited

OTHER PUBLICATIONS

Concordance Table for the References Cited in Tables on pp. 6-15, 71-80 and 116-124 of the Microsoft Corporation's Fourth Amended Invalidity Contentions dated Jan. 5, 2009.

I. P. Mockapetris, "DNS Encoding of Network Names and Other Types," Network Working Group, RFC 1101 (Apr. 1989) RFC1101, DNS SRV).

R. Atkinson, "An Internetwork Authentication Architecture," Naval Research Laboratory, Center for High Assurance Computing Systems (Aug. 5, 1993). (Atkinson NRL, KX Records).

Henning Schulzrinne, *Personal Mobility for Multimedia Services in the Internet*, Proceedings of the Interactive Distributed Multimedia Systems and Services European Workshop at 143 (1996). (Schulzrinne 96).

Microsoft Corp., Microsoft Virtual Private Networking: Using Pointto-Point Tunneling Protocol for Low-Cost, Secure, Remote Access Across the Internet (1996) (printed from 1998 PDC DVD-ROM). (Point to Point, Microsoft Prior Art VPN Technology).

"Safe Surfing: How to Build a Secure World Wide Web Connection," IBM Technical Support Organization, (Mar. 1996). (Safe Surfing, Website Art).

Goldschlag, et al., "Hiding Routing Information," Workshop on Information Hiding, Cambridge, UK (May 1996). (Goldschlag II, Onion Routing).

"IPSec Minutes From Montreal", IPSec Working Group Meeting Notes, http://www.sandleman.ca/ipsec/1996/08/msg00018.html (Jun. 1996). (IPSec Minutes, FreeS/WAN).

J. M. Galvin, "Public Key Distribution with Secure DNS," Proceedings of the Sixth USENIX UNIX Security Symposium, San Jose, California, Jul. 1996. (Galvin, DNSSEC).

J. Gilmore, et al. "Re: Key Management, anyone? (DNS Keying)," IPSec Working Group Mailing List Archives (Aug. 1996). (Gilmore DNS, FreeS/WAN).

H. Orman, et al. "Re: 'Re: DNS? was Re: Key Management, anyone?" IETF IPSec Working Group Mailing List Archive (Aug. 1996-Sep. 1996). (Orman DNS, FreeS/WAN).

Arnt Gulbrandsen & Paul Vixie, *ADNS RR for specifying the location of services (DNS SRV)*, IETF RFC 2052 (Oct. 1996). (RFC 2052, DNS SRV).

Freier, et al. "The SSL Protocol Version 3.0," Transport Layer Security Working Group (Nov. 18, 1996), (SSL, Underlying Security Technology).

M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (Dec. 2, 1996). (RFC 2543 Internet Draft 1). M.G. Reed, et al. "Proxies for Anonymous Routing," 12th Annual Computer Security Applications Conference, San Diego, CA, Dec. 9-13, 1996. (Reed, Onion Routing).

Kenneth F. Alden & Edward P. Wobber, *The AltaVista Tunnel: Using the Internet to Extend Corporate Networks*, Digital Technical Journal (1997) (Alden, AltaVista).

Automotive Industry Action Group, "ANX Release 1 Document Publication," AIAG (1997). (AIAG, ANX).

Automotive Industry Action Group, "ANX Release 1 Draft Document Publication," AIAG Publications (1997). (AIAG Release, ANX).

Aventail Corp. "Aventail VPN Data Sheet," available at http://www.archive.org/web/19970212013043/www.aventail.com/prod/vpndata.html (1997). (Data Sheet, Aventail).

Aventail Corp.. "Directed VPN Vs. Tunnel," available at http://web.archive.org/web/19970620030312/www.aventail.com/educate/directvpn.html (1997). (Directed VPN, Aventail).

Aventail Corp., "Managing Corporate Access to the Internet," Aventail AutoSOCKS White Paper available at http://web.archive.org/199706200300312/www.aventail.com/educate/whitepaper/ipmw.html (1997). (Corporate Access, Aventail).

Aventail Corp., "VPN Server V2.0 Administration Guide," (1997). (VPN, Aventail).

Goldschlag, et al, "Privacy on the Internet," Naval Research Labo-

Microsoft Corp., Installing Configuring and Using PPPTP with Microsoft Clients and Servers (1997). (Using PPTP, Microsoft Prior Art VPN Technology).

Microsoft Corp., IP Security for Microsoft Windows NT Server 5.0 (1997) (printed from 1998 PDC DVD-ROM). (IP Security, Microsoft Prior Art VPN Technology).

Microsoft Corp., *Microsoft Windows NT Active Directory: An Introduction to the Next Generation Directory Services* (1997) (printed from 1998 PDC DVD-ROM). (Directory, Microsoft Prior Art VPN Technology).

Microsoft Corp., Routing and Remote Access Service for Windows NT Server New Opportunities Today and Looking Ahead (1997) (printed from 1998 PDC DVD-ROM). Routing, Microsoft Prior Art VPN Technology).

Microsoft Corp., *Understanding Point-to-Point Tunneling Protocol PPTP* (1997) (printed from 1998 PDC DVD-ROM). (Understanding PPTP, Microsoft Prior Art VPN Technology).

J. Mark Smith et.al., *Protecting a Private Network: The AltaVista Firewall*, Digital Technical Journal (1997). (Smith, AltaVista).

Naganand Doraswamy Implementation of Virtual Private Networks (VPNs) with IPSecurity, <draft-ietf-ipsec-vpn-00.txt> (Mar. 12, 1997). (Doraswamy).

M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (Mar. 27, 1997). (RFC 2543 Internet Draft 2). Aventail Corp., "Aventail and Cybersafe to Provide Secure Authentication for Internet and Intranet Communication," Press Release, Apr. 3, 1997. (Secure Authentication, Aventail).

D. Wagner, et al. "Analysis of the SSL 3.0 Protocol," (Apr. 15, 1997). (Analysis, Underlying Security Technologies).

Automotive Industry Action Group, "ANXO Certification Authority Service and Directory Service Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Definition, ANX).

Automotive Industry Action Group, "ANXO Certification Process and ANX Registration Process Definition for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (May 9, 1997). (AIAG Certification, ANX).

Aventail Corp., "Aventail Announces the First VPN Solution to Assure Interoperability Across Emerging Security Protocols." Jun. 2, 1997. (First VPN, Aventail).

Syverson, et al. "Private Web Browsing," Naval Research Laboratory, Center for High 8 Assurance Computer Systems (Jun. 2, 1997), (Syverson, Onion Routing).

Bellcore, "Metrics, Criteria, and Measurement Technique Requirements for ANX Release 1," AIAG Telecommunications Project Team and Bellcore (Jun. 16, 1997). (AIAG Requirements, ANX).

M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (Jul. 31, 1997). (RFC 2543 Internet Draft 3). R. Atkinson, "Key Exchange Delegation Record for the DNS," Network Working Group, RFC 2230 (Nov. 1997). (RFC 2230, KX Records).

M. Handley, H. Schulzrinne, E. Schooler, Internet Engineering Task Force, Internet Draft, (Nov. 11, 1997), (RFC 2543 Internet Draft 4). 1998 Microsoft Professional Developers Conference DVD ("1998 PDC DVD-ROM") (including screenshots captured there from and produced as MSFTVX 00018827-00018832), (Conference, Microsoft Prior Art VPN Technology).

Microsoft Corp., *Virtual Private Networking An Overview* (1998) (printed from 1998 PDC DVD-ROM) (Overview, Microsoft Prior Art VPN Technology).

Microsoft Corp., Windows NT 5.0 Beta Has Public Premiere at Seattle Mini-Camp Seminar attendees get first look at the performance and capabilities of Windows NT 5.0 (1998) (available at http://www.microsoft.com/presspass/features/1998/10-19nt5.

mspxpftrue). (NT Beta, Microsoft Prior Art VPN Technology).

"What ports does SSL use" available at stason.org/TULARC/security/ssl-talk/3-4-What-ports-does-ssl-use.html (1998). (Ports, DNA SRV)

Aventail Corp., "Aventail VPN V2.6 Includes Support for More Than Ten Authentication Methods Making Extranet VPN Development



DOCKET

Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.

