

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

ST. LUKE TECHNOLOGIES, LLC ,

Plaintiff,

v.

**VERIZON COMMUNICATIONS INC.; VERIZON
SERVICES CORP.; AND VERIZON ONLINE
LLC,**

Defendants.

Civil Action No. _____

JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff St. Luke Technologies, LLC (“St. Luke” or “Plaintiff”), by and through its attorneys, brings this action and makes the following allegations of patent infringement relating to U.S. Patent Nos. 8,316,237 (“the ‘237 patent”); 7,181,017 (“the ‘017 patent”); 7,869,591 (“the ‘591 patent”); 7,587,368 (“the ‘368 patent”); 8,498,941 (“the ‘941 patent”); 8,830,630 (“the ‘630 patent”); and 8,600,895 (“the ‘895 patent”) (collectively, the “patents-in-suit”). Defendants Verizon Communications Inc.; Verizon Services Corp.; and Verizon Online LLC (collectively, “Verizon” or “Defendant”) infringes the patents-in-suit in violation of the patent laws of the United States of America, 35 U.S.C. § 1 *et seq.*

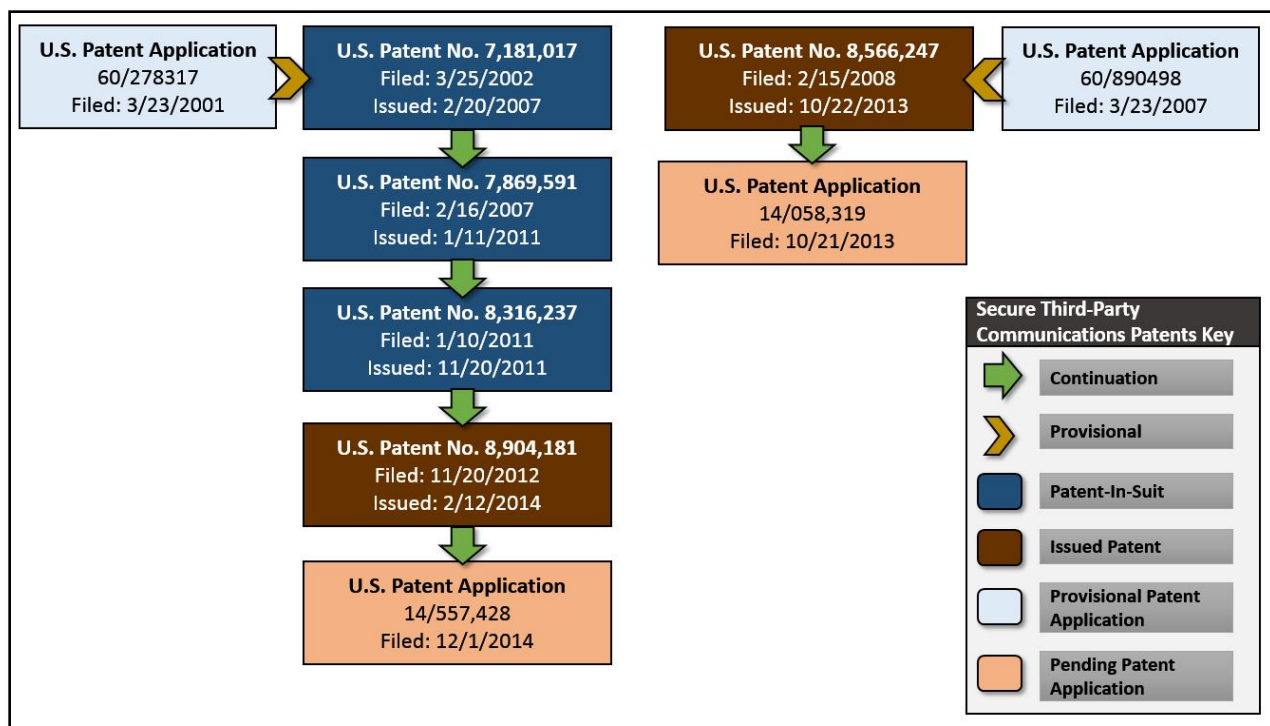
INTRODUCTION

1. In an effort to expand its product base and profit from the sale of infringing cloud computing encryption technologies and information record infrastructure technologies, Verizon has unlawfully and without permission copied the technologies and inventions of Dr. Robert H. Nagel, David P. Felsher, and Steven M. Hoffberg.

2. Dr. Nagel, Mr. Felsher, and Mr. Hoffberg are the co-inventors of the ‘237 patent, ‘017 patent; ‘591 patent; and U.S. Patent Nos. 8,904,181 (“the ‘181 patent”); and 8,566,247 (“the ‘247 patent”) (collectively, the “Secure Third-Party Communications Patents” or “STPC

patents”). The STPC patents have been cited in over 550 United States patents and patent applications as prior art before the United States Patent and Trademark Office. The STPC patents disclose systems and methods for secure communications over a computer network where a third party (intermediary) performs a requisite function with respect to the transaction without requiring the intermediary to be trusted with respect to the private information or cryptographic keys for communicated information. The inventions taught in the STPC patents employ secure cryptographic schemes, which drastically reduce the risk of unauthorized disclosure of encrypted data.

3. The below diagram shows St. Luke’s STPC patents, pending STPC patent applications, and the STPC patents Verizon infringes.¹



¹ St. Luke’s STPC patents are in two patent families claiming priority to U.S. Patent Applications 60/278,317 and 60/890,498.

4. Nearly 15 years after Dr. Nagel and his co-inventors conceived of the inventions disclosed in the STPC patents, Verizon described in its own Data Sheets as “important and “new.”

These services also encrypt the data on PCs and servers to help you protect information, and to minimize liability from unauthorized access to the data. Encrypted messages and electronically stored data are ***important new strategies that complement existing virus detection and intrusion prevention strategies***. Data privacy is not only important, but it is mandated by laws and regulations around the world.

Verizon Data Protection Pak, VERIZON ENCRYPTED EMAIL DATA SHEET at 1 (emphasis added).

5. Verizon’s Global Senior Vice President in charge of its cloud computing products, Siki Giunta, explicitly recognized that the use of encryption technologies is crucial to Verizon’s business: “There are a lot of cloud providers, but if you have an application to execute in many regions and have data privacy and security concerns, your choice becomes rather small.” Katherine Noyes, *To the Cloud? Si, Per Favore!*, FORTUNE MAGAZINE, Oct. 30, 2014.

6. Mr. Felsher is the inventor of the ‘368 patent, the ‘630 patent, the ‘941 patent, the ‘895 patent, and U.S. Patent No. 7,805,377 (“the ‘377 patent”) (collectively, “Information Record Infrastructure Patents” or “IRI patents”). The IRI patents have been cited by over 970 United States patents and patent applications as prior art before the United States Patent and Trademark Office.

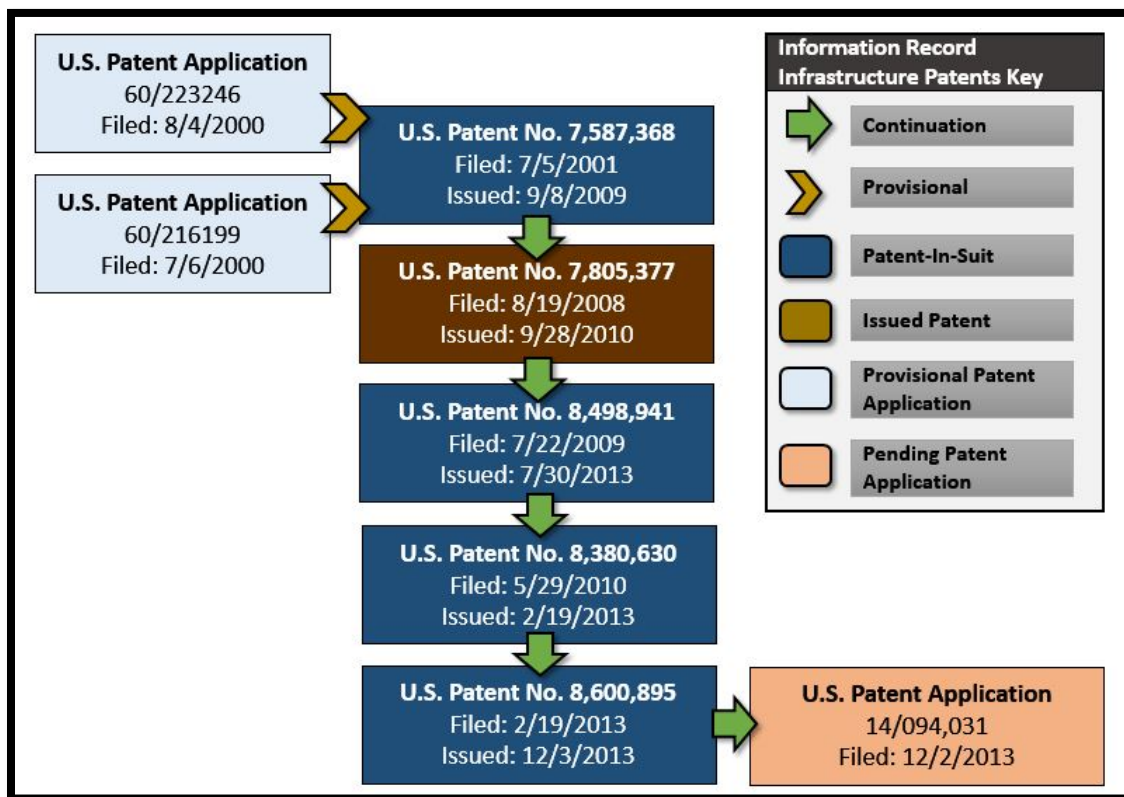
7. The IRI patents disclose systems and methods for distributing and granting access to data where data is stored in multiple external computer databases. The IRI patents address the difficult problem of authorizing access to protected information records where authorization will depend based on the access privileges of the user.

8. Mike Denning, Verizon’s vice president of global security stated the need to control access to protected information was critical to business customers.

“With the massive growth of the internet of things and the use of connectivity to make devices smarter, businesses require a simple, scalable and effective way to manage identity and data integrity.” said Mike Denning, vice president of global security for Verizon Enterprise Solutions, in a statement. . . . “We are at the tip of the iceberg when it comes to the growth of the internet of things.” Denning said. “A lot of enterprises are asking about the best way to secure connected objects.”

Tara Seals, *Verizon Tackles Certificates for IoT*, INFOSECURITY MAGAZINE (February 2, 2015).

9. The below diagram shows the IRI patent family tree, a pending IRI patent application, and the IRI patents Verizon is accused of infringing.



THE INVENTORS’ LANDMARK SECURE COMMUNICATION SYSTEMS

10. Mathematician Dr. Robert Nagel, the named inventor of three patents-in-suit, pioneered development of large-scale computer-based data distribution systems. In the 1970s Dr. Nagel developed some of the first computer systems for distributing encrypted data over computer networks. Dr. Nagel is the named inventor of twenty-three United States Patents. Dr. Nagel’s patents have been cited thousands of times by various companies, including Verizon. Later in life, Dr. Nagel founded two publicly traded companies, and served as a representative to the United Nations.

11. In 1975, Dr. Nagel developed a system harnessing burgeoning microprocessor power to broadcast stock prices and related data over coaxial cable and telephone networks. Dr.

Nagel's patented system was the foundation of Reuters's high-speed transmission technologies for distributing real-time market information.

Computer power behind the new information system is provided by a Digital Equipment Corp. PDP-8E with 32K memory and a multiprocessor system consisting of one PDP-11/35 with 64K memory and 2 PDP-11/50s, each with 96K memory.
The system was developed by Robert H. Nagel of IDR. Another patent for the high-speed transmission technique is expected to be issued shortly.

Reuters Gets News System Patent, COMPUTERWORLD at 36, April 23, 1975 (describing Dr. Nagel's development of one of the first terminals for displaying real-time stock market data).²

12. The data distribution system developed by Dr. Nagel in the mid-1970s was commercialized by Reuters and allowed the rapid transmission of market and news information over coaxial cable and telephone lines.³

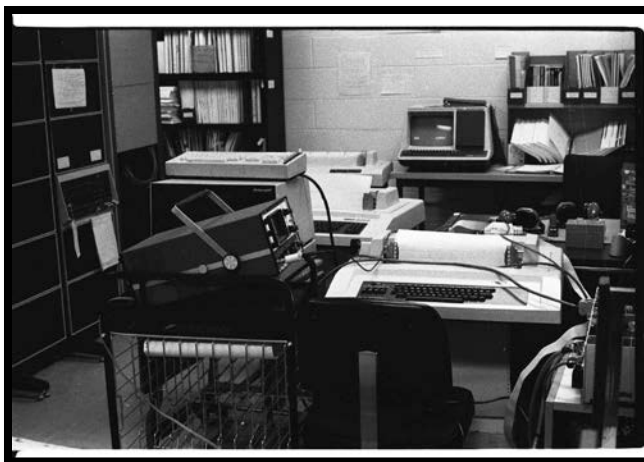
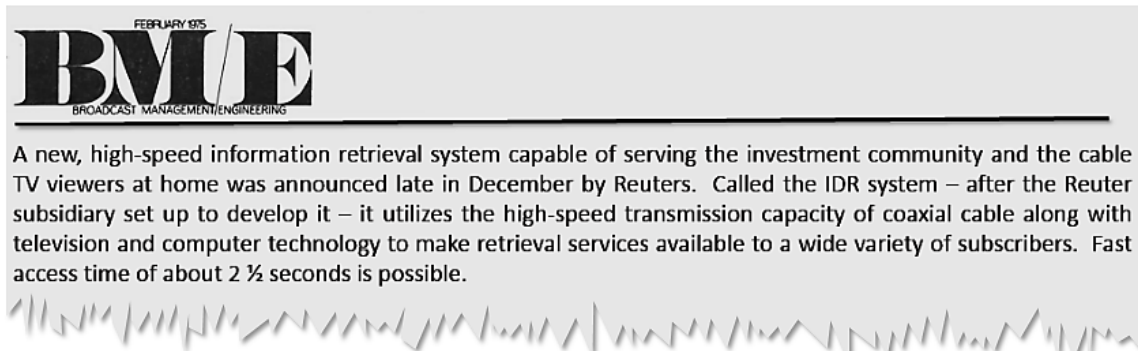


IMAGE OF THE DEC PDP-11/50 SYSTEM, COLUMBIA UNIVERSITY COMPUTING HISTORY ARCHIVE (circa 1976), <http://www.columbia.edu/cu/computinghistory/> (showing an installed PDP-11/50 device that was a component in Dr. Nagel's data distribution system).

² See U.S. Patent Nos. 3,875,329, which issued on April 1, 1975. Dr. Nagel's work at IDR, Inc. (a subsidiary of then Reuters Group PLC) led to the development of U.S. Patent Nos. 3,889,054; 4,042,958; 4,064,494; 4,120,003, 4,135,213; and 4,148,066. These patents have been cited in over 830 patent applications and issued patents of companies including Cisco Technology, Inc., Sony Corporation, Intel Corporation, etc.

³ REUTERS TECHNICAL DEVELOPMENT CHRONOLOGY 1975-1979, THE BARON, July 13, 2015). <http://thebaron.info/archives/technology/reuters-technical-development-chronology-1975-1979>.

13. Reuters sold thousands of information systems modeled on Dr. Nagel's patented inventions.⁴ Hundreds of companies including IBM, Intel, and Xerox cite Dr. Nagel's groundbreaking inventions described in his patents as relevant prior art in their own patents.⁵



Reuters Announces Retrieval System For Cable TV Subscribers, BROADCAST MANAGEMENT/ENGINEERING MAGAZINE at 9, February 1975.

14. In the 1990s, Dr. Nagel was the Chief Technology Officer of eSecure Docs, Inc., Founder of Digits Corporation, and Executive Vice President and Chief Technology Officer of InfoSafe Systems, Inc.⁶ Publications including Fortune Magazine and ComputerWorld

⁴ REUTERS TECHNICAL DEVELOPMENT CHRONOLOGY 1975-1979, THE BARON, July 13, 2015), <http://thebaron.info/archives/technology/reuters-technical-development-chronology-1975-1979> (More than 10,000 units are eventually produced. It revolutionizes the Monitor product financials and field staffing and provides valuable cash flow for IDR.”).

⁵ PROCEEDINGS OF THE DIGITAL EQUIPMENT USERS SOCIETY, DIGITAL EQUIPMENT CORPORATION PROCEEDINGS Vol. 3 Issue 1 at 1 (1977) (“Reuters has developed a network to assist stock and commodity brokers and foreign exchange dealers by giving them the latest prices and rate of exchange via terminals in this book.”); ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY, AMERICAN SOCIETY OF INFORMATION SCIENCE, AMERICAN DOCUMENTATION INSTITUTE Vol. 12 at 223 (1977) (“Reuters provides the user with a 1.2 Kbps leased connection to the nearest network processor or multiplexor. The Monitor user configuration is a Digital Equipment Corporation PDP 8 with up to three display units.”); REUTERS BLENDS CATV & COMPUTER SKILLS IN NEWS RETRIEVAL SYSTEM, DATA PROCESSING DIGEST at 12 (1975) (“Reuters has introduced in New York a high-speed information retrieval system for the investment community. The system was developed by Information Dissemination and Retrieval, Inc. (IDR), a Reuters subsidiary, and uses the high-speed transmission capacity of coaxial cable with television and computer technology.”).

⁶ In addition to his work in private industry, Dr. Nagel served as a consultant to the Defense Advanced Research Projects Agency (“DARPA”), responsible for the development of emerging technologies used by the U.S. Department of Defense. Dr. Nagel was a designer of the Navy’s Tactical Air Navigation System (“TACAN”) and assisted in the development of the nuclear reactor that powers the Navy’s Seawolf class of nuclear submarines. Dr. Nagel was also the developer of the Hot Well Liquid Level Control system that is a part of the control system of the nuclear power plant aboard the Seawolf, Defender and other submarines.

described Dr. Nagel as a “noted computer scientist” for his groundbreaking work⁷—work that led to the inventions disclosed in the patents-in-suit.

The technology Nagel designed at InfoSafe Systems, Inc., won the Seybold Award for Excellence as the “most innovative product of the year.” His work in high technology received major press coverage in such publications as Fortune, Forbes, and Business Week. He testified before Congress on the capabilities of a system he designed for NASDAQ.

Aliye Pekin Celik, OUR COMMON HUMANITY IN THE INFORMATION AGE: PRINCIPLES AND VALUES FOR DEVELOPMENT at 191 (2007).

15. Following his development of groundbreaking electronic data distribution systems for Reuters, Dr. Nagel used his insights to develop the secure communications technologies that are used today by Verizon and many of the world’s largest corporations without attribution or compensation.

16. Dr. Nagel foresaw the need for enabling secure communications between two parties wherein an intermediary performs a requisite function with respect to the transaction without requiring the intermediary to be trusted with respect to the private information or cryptographic keys for communicated information.

17. Dr. Nagel’s interest in developing secure systems for the provision of highly secure data was driven in part by his experience being totally blind.⁸ Dr. Nagel recognized that the growing adoption of the Internet and increased computational power presented unique challenges to the security of medical records. Dr. Nagel also had the insight that the challenges presented in controlling access to secure medical records could be applied outside the context of

⁷ See Rick Tetzeli, et al., *Fortune Checks Out 25 Cool Companies For Products, Ideas, And Investments*, FORTUNE MAGAZINE (July 11, 1994).

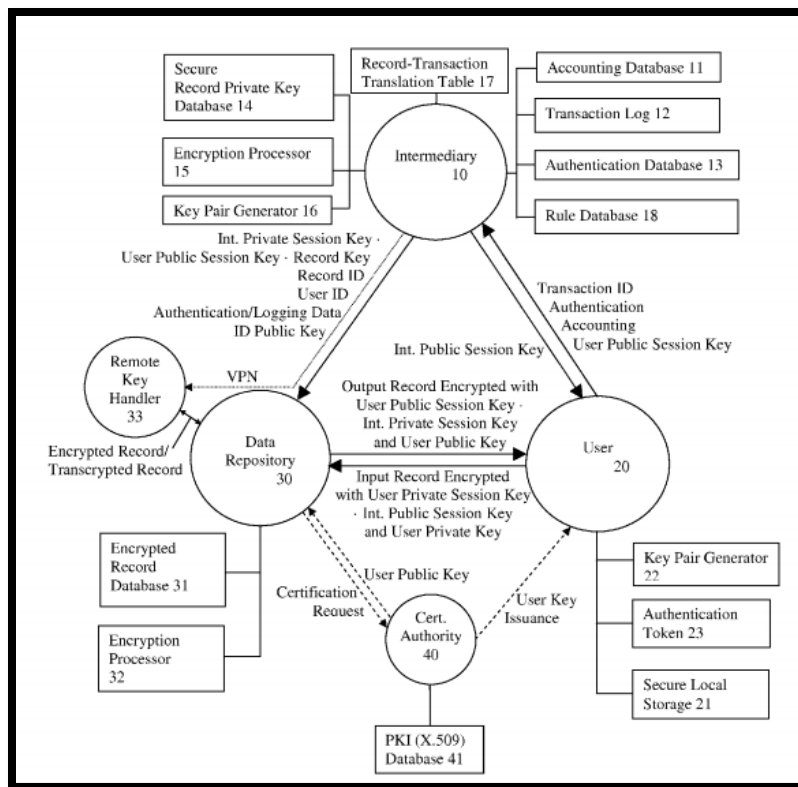
⁸ Dr. Nagel served as a representative to the United Nations Committee that authored the International Convention on the Protection of the Rights of Dignity of Persons with Disabilities. See Jan Jekielek, *Human Rights Panel Explores Implementation of Rights and Global Well-Being*, Epoch Times, December 3, 2010, <http://www.cccun.net/ccun-12-2-10-eventepochtim.pdf> (“Nagel, who is blind himself. He expounded on the remarkable accomplishment that is the Convention on the Rights of Persons with Disabilities, the 21st century’s first U.N. human rights convention.”).

medical records, with wide applicability to the security of data on networks where an intermediary could have access to secure information.

18. The rise of cloud computing (the delivery of on-demand computing resources over a distributed network), has made Dr. Nagel and his co-inventors' insights uniquely valuable. Medical records, financial information, email messages, and other forms of electronic data are now placed on remote servers and accessed via a network by a diverse variety of users, under a diverse variety of circumstances.

19. The inventions disclosed in the STPC patents address shortcomings in systems available at the time of the patents' conception—for example, the need for users in particular contexts, to access and/or modify data stored at or by an intermediary without allowing the intermediary to access an unencrypted version of the data.

20. Prior art systems such as the "Micali Fair Encryption scheme do[] not . . . allow communications of a secret in which only one party gains access to the content, and in which the third party or parties and one principal operate only on encrypted or secret information." '237 patent, col. 2:40-44.



‘237 Patent Fig. 1.

21. Dr. Nagel worked with Steven Hoffberg and David P. Felsher to develop the systems and methods disclosed in the STPC patents. The inventions taught in these patents relate to the secure transmission of data—for example, wherein an intermediary performs a requisite function with respect to a secure data transmission without requiring the intermediary to be trusted with the private, secure contents of the transmission and/or without requiring the intermediary to have access to the cryptographic keys required to access the protected information. The STPC patented systems and methods employ secure cryptographic schemes, which reduce the risks and liability of unauthorized disclosure of private information as it travels across a network.

22. Mr. Hoffberg holds a Master of Science degree from the Massachusetts Institute of Technology and an advanced degree in electrical engineering from Rensselaer Polytechnic Institute. Mr. Hoffberg is a named inventor on sixty-seven patents in the fields of telematics, wireless ad hoc networking, image and audio signal processing, and cryptography. Mr. Hoffberg

also spent three years in the University of Connecticut Medical School Medical Doctorate Program.

23. Mr. Felsher is an appellate attorney, health care activist, and inventor. After graduating from MIT with a Bachelor of Science Degree in Chemistry, Mr. Felsher went on to earn an MBA from the Wharton School of Business of the University of Pennsylvania and a J.D. from Fordham Law School.⁹ Mr. Felsher has served as counsel to the Association of American Physicians and Surgeons, Inc.

24. The STPC patents have been cited in over 550 United States patents and published patent applications as prior art before the United States Patent and Trademark Office.¹⁰

Companies whose patents cite the Secure Third-Party Communication Patents include:

- Microsoft Corporation
- Nokia Corporation
- Apple, Inc.
- International Business Machines Corporation
- Massachusetts Institute of Technology
- Ncr Corporation
- NetApp, Inc.
- Adobe Systems Incorporated
- American Express Travel Related Services Company, Inc.
- AT&T Intellectual Property LLP
- Canon Kabushiki Kaisha
- Hytrust, Inc.
- Cisco Technology, Inc.
- Intuit, Inc.
- Cloudera, Inc.
- Novell, Inc.
- Google, Inc.
- Teradata US, Inc.
- Mitsubishi Electric Corporation
- Texas Instruments, Inc.
- UnitedHealth Group Incorporated
- Fujitsu Limited
- Hewlett-Packard Development Company, L.P.
- **Verizon Patent and Licensing, Inc.**
- Visa U.S.A. Inc.
- Western Digital Technologies, Inc.

⁹ During his legal career, Mr. Felsher has been counsel of record on seventeen briefs to the United States Supreme Court.

¹⁰ The 550 forward citations to the Secure Third-Party Communication Patents do not include patent applications that were abandoned prior to publication in the face of the Secure Third-Party Communication Patents.

- Xerox Corporation
- Yahoo!, Inc.
- Koninklijke Philips Electronics, N.V.
- Zynga, Inc.
- Square, Inc.
- Sprint Communications Company L.P.
- Sony Corporation
- Siemens Aktiengesellschaft
- Sharp Laboratories of America, Inc.
- Sap AG
- EMC Corporation
- Samsung Electronics Co., Ltd.
- Ricoh Co., Ltd.
- Red Hat, Inc.
- Panasonic Corporation
- Broadcom Corporation
- Oracle International Corporation

25. The inventions taught in the STPC patents relate to the encryption of data passed through an intermediary and they form the backbone of Verizon products, including Verizon's Encrypted Mail: "Any business that needs to meet data privacy compliance regulations, can easily implement this simple and cost effective encryption solution." Verizon Encrypted Mail, *available at*: http://www22.business.verizon.net/SMBPortalWeb/appmanager/SMBPortal/download/Encrypted_Mail_product_data_sheet.pdf.

26. The IRI patents have been cited by over 970 United States patents and patent applications as prior art before the United States Patent and Trademark Office.¹¹ Companies whose patents cite the IRI patents include:

- Bank Of America Corporation
- Siemens Medical Solutions Health Services Corporation
- AthenaHealth, Inc.
- Robert Bosch GmbH
- Thompson Reuters (Healthcare), Inc.
- Northrop Grumman Information Technology, Inc.
- McKesson Corporation
- Lockheed Martin Corporation
- Sandisk Technologies Inc.
- Intel Corporation
- Greenway Medical Technologies, Inc.
- Medtronic, Inc.
- Sybase, Inc.
- General Electric Company

¹¹ The 970 forward citations to the IRI Patents and their related patent applications do not include patent applications that were abandoned prior to publication in the face of the IRI Patents.

- Epic Systems Corporation
- Allscripts Software, LLC
- Ebay, Inc.
- 3Com Corporation
- Oracle International Corporation
- Intuit, Inc.
- Gemalto N.V.
- Adobe Systems Incorporated
- Koninklijke Philips Electronics N.V.
- Electronic Data Systems Corporation
- American Express Travel Related Services Company, Inc.
- Google, Inc.
- Apple, Inc.
- McAfee, Inc.
- Hewlett-Packard Development Company L.P.
- EMC Corporation
- Blackboard, Inc.
- AT&T Intellectual Property LLP
- Cerner Innovation, Inc.
- Cisco Technology, Inc.
- Citrix System, Inc.
- International Business Machines Corporation

THE PARTIES

27. Tyler, Texas-based St. Luke is committed to advancing the current state of innovation in the field of data encryption technologies for secure communications over a distributed network. In addition to the ongoing efforts of Messrs. Felsher and Hoffberg, St. Luke employs a resident of Tyler, Texas as a Technology Analyst. St. Luke is a Texas limited liability company with its principal place of business at 719 West Front Street, Suite 247, Tyler, Texas 75710.



28. St. Luke is a small, Texas-based company. St. Luke depends on patent protection to effectively license its innovative technologies and build its business. Like Defendant Verizon,

St. Luke relies on its intellectual property. A Verizon Senior Vice President and Deputy General Counsel, John Thorne, explained the importance of patents to both businesses and the entire economy: “Patents encourage and protect innovations that benefit consumers, create jobs, and keep the economy growing.” Marguerite Reardon, *Vonage to Pay \$58 Million in Verizon Patent Case*, CNET.COM, March 9, 2007.

29. On information and belief, Defendant Verizon Communications, Inc. is a Delaware corporation with its principal office at 140 West Street, New York, NY 10013. Verizon Communications, Inc. can be served through its registered agent, The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, DE 19801.

30. On information and belief, Defendant Verizon Communications, Inc. “has over 500 affiliated entities”¹²

31. On information and belief, Defendant Verizon Services Corp. is a Delaware corporation with its principal office at 1717 Arch Street, 21st Floor, Philadelphia, PA 19103. Verizon Services Corp. can be served through its registered agent, CT Corporation System, 1999 Bryan St., Ste. 900, Dallas, TX 75201.

32. On information and belief, Defendant Verizon Online LLC is a Delaware limited liability company with its principal office at 22001 Loudoun County Parkway #C 1-3-507, Ashburn, VA 20147. Verizon Online LLC can be served through its registered agent, CT Corporation System, 1999 Bryan St., Ste. 900, Dallas, TX 75201.

33. On information and belief, Verizon maintains retail stores and offices throughout the State of Texas and the Eastern District of Texas. On information and belief, Verizon maintains a 400,000 square foot campus in Richardson, Texas, which includes employees and business units possessing information relevant to Verizon’s product development, engineering, and marketing of Verizon network security products and services.¹³

¹² *Verizon Servs. Corp. v. AIP Acquisition, LLC*, IPR2015-01104, Paper 1 at 9 (PTAB April 23, 2015).

¹³ *See, e.g.*, Steve Brown, *Verizon Campus in Richardson Changes Hands*, (July 26, 2015), available at: <http://www.dallasnews.com/business/commercial-real-estate/headlines/20150726->

34. According to Verizon's website, Verizon offers infringing products for sale throughout the United States and Canada, including in the Eastern District of Texas. Further, Verizon advertises its infringing products throughout the Eastern District of Texas and claims financial benefits through its conducting of business in Texas.

JURISDICTION AND VENUE

35. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has exclusive subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

36. Upon information and belief, this Court has personal jurisdiction over Verizon in this action because Verizon has committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Verizon would not offend traditional notions of fair play and substantial justice. Defendant Verizon, directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patents-in-suit. Moreover, Defendants Verizon Services Corp. and Verizon Online LLC are registered to do business in the State of Texas, and have appointed CT Corporation System, 1999 Bryan St., Ste. 900, Dallas, TX 75201, as its agent for service of process.

37. Venue is proper in this district under 28 U.S.C. §§ 1391(b)-(d) and 1400(b). Defendant Verizon is registered to do business in Texas, and upon information and belief, has transacted business in the Eastern District of Texas and has committed acts of direct and indirect infringement in the Eastern District of Texas. Additionally, Verizon has previously availed itself

verizon-campus-in-richardson-changes-hands.ece; *Verizon Job Listings for Richardson, Texas Facility*, VERIZON WEBSITE.COM (last visited October 2015); available at: http://www.verizon.com/about/work/jobs/search?location=Richardson%2C%20TX%2C%20United%20States&v_location=Richardson%2C%20TX%2C%20United%20States.

of this Court by filing permissive counterclaims of patent infringement in the Eastern District of Texas.¹⁴

TECHNOLOGY BACKGROUND

38. Advances in computational power and the explosive growth of the Internet have led to the development of secure encryption systems and information record management systems that enable secure communications between two or more computers on a network where the data that is sent and/or processed by an intermediary without access to the plaintext data.

- *The STPC patents* teach specific computer based encryption systems, including systems that use composite key asymmetric cryptographic algorithms to avoid substantially revealing plaintext data during intermediate processing.
- *The IRI patents* teach specific computer based systems and methods, including systems for electronically structuring and controlling access to protected data in a plurality of external databases.

A. Secure Third Party Communications Patents

39. Verizon prizes systems that provide secure third party communications through an intermediary.

Businesses need trusted communications. Email has become the most important and frequently used method of communicating highly sensitive information. Verizon Encrypted Mail gives businesses the ability to enable email encryption at the desktop. Any business that needs to meet data privacy compliance regulations, can easily implement this simple and cost effective encryption solution.

Verizon Encrypted Mail: End Point Email Encryption, VERIZON DATA SHEET at 1 (2009).

40. Verizon documentation has recognized that the advent of Cloud Computing has created new technologies that have required unique encryption solutions such as the inventions disclosed in the patents-in-suit.

¹⁴ See *TiVo Inc. v. Verizon Comm'ns, Inc.*, Case No. 2:09-CV-257, Dkt No. 109 (E.D. Tex., Sept. 17, 2010) (Order denying Verizon's transfer motion and noting Verizon's choice to file permissive patent infringement counterclaims in the Eastern District of Texas.).

And yet, opening up to a digital world also opens the door to *new risks for your business*. *New technologies and new ways of doing business* create opportunities for intruders to steal sensitive information and disrupt your day-to-day operations.

Confidently Pursue Opportunities While Guarding against Potential Threats, VERIZON SOLUTIONS BRIEF at 1 (2015) (emphasis added).

41. Verizon's competitors such as Microsoft and Oracle have confirmed the importance and value of encryption systems that protect data in the Cloud. Brendon Lynch, Chief Privacy Officer at Microsoft described the importance that Microsoft places on secure encryption in the cloud:

We share the same concerns as our customers do around government surveillance. We know that customers will not use technology that they do not trust that is what people should know about our [Microsoft's] approach to this . . . we're implementing strong encryption right throughout our services to ensure that governments can only access data by lawful means.

Brendon Lynch, *Microsoft Privacy and Compliance in the Cloud*, TRUSTWORTHY COMPUTING - VIDEO TRANSCRIPT (January 9, 2015), <https://www.youtube.com/watch?v=q5rwwQBTJx0>.

42. Vipin Samar, Vice President of database security product development at Oracle states in a 2014 press release that, "As regulations worldwide increasingly call for more data to be encrypted, organizations need a centralized solution to securely manage all the encryption keys and credential files in their data centers." The press release continued by pointing out the importance of secure encryption in the cloud.

and backup mechanisms. As organizations increasingly encrypt data at rest and on the network, securely managing all the encryption keys and credential files in the data center has become a major challenge.

At the same time, organizations also need to comply with stringent regulatory requirements for managing keys and certificates. Many global regulations and industry standards call for audits demonstrating that keys are routinely rotated, properly destroyed, and accessed solely by authorized entities.

Oracle Customers Secure Critical Encryption Keys with Oracle Key Vault, ORACLE PRESS RELEASE (August 7, 2014).

43. Although secure third party encryption systems that protect access to data at an intermediary are offered by major corporations today, at the time the inventions disclosed in the STPC patents were conceived, no such systems existed.

44. The claims in the STPC patents describe a solution that is unquestionably rooted in computer technology to overcome a problem specific to and characteristic of complex computer networks. Professor of Computer Science at Columbia University, Steven M. Bellovin¹⁵ described in a 1996 academic article, contemporaneous to the development of the patents-in-suit (and cited on the face of the STPC patents) that the development of modern cryptography was a reaction to the rise of the Internet as a mass medium and concerns unique to the exchange of information over the Internet.

In early 1994, CERT announced¹ that widespread password monitoring was occurring on the Internet. In 1995, Joncheray published a paper explaining how an eavesdropper could hijack a TCP connection [Jon95]. In mid-1998, there is still very little use of cryptography. Finally, though, there is some reason for optimism.

A number of factors have combined to change people's behavior. First, of course, there is the rise of the Internet as a mass medium, and along with it the rise of Internet commerce. Consider the following quote from a popular Web site:

Steven M. Bellovin, *Cryptography and the Internet*, AT&T LABS-RESEARCH PAPER (Aug. 1998).

45. Although encryption, in some form, has been an objective of individuals (and governments) for many years, the STPC patents are directed at solving problems that are unique to the realm of computers and specifically network cloud computing.

46. The specific technologies disclosed and claimed in the STPC patents are discussed in detail below. However, the history of cryptography provides context for the inventions disclosed in the STPC patents and confirms that the patented inventions are limited to specific computer systems and methods addressing issues specific to modern computer networks.

47. ***Pre-Mechanical Encryption.*** The origin of cryptography has been around since the reign of Pharaohs; however, the problems that “pre-silicon” societies faced were markedly different than those the patents-in-suit are directed at solving. The unique solutions taught by the patents-in-suit reflect that difference. In 1900 BC, Egyptian scribes developed a rudimentary

¹⁵ At the time, Professor Bellovin was a fellow at AT&T research laboratories.

form of cryptography that allowed the passing of messages written on papyrus. The key to unlocking the meaning of non-standard hieroglyphs (the encrypted message or cipher) was located in an inscription on the same document. Thus, a recipient of a message could decipher the meaning of the encoded message using the key transmitted with the message. This early form of encryption was susceptible to frequency analysis, a method utilizing the frequency that certain letters or symbols would be used.¹⁶



Alexander Stanoyevitch, INTRODUCTION TO CRYPTOGRAPHY WITH MATHEMATICAL FOUNDATIONS AND COMPUTER IMPLEMENTATIONS PRESS (2002).

48. Over the following four millennia, the advance of cryptography was limited. In the mid-1400s, Leon Battista Alberti invented an encryption system using a mechanical device with sliding disks that allowed for various methods of substitution.¹⁷ This is the base concept of a polyalphabetic cipher, which is an encryption method that switches through several substitution ciphers throughout encryption. Polyalphabetic substitution by rotating the discs to change the encryption logic limited the use of frequency analysis to crack the cipher. However,

¹⁶ NIGEL SMART, CRYPTOGRAPHY: AN INTRODUCTION 3RD EDITION 40 (2004) ([U]nderlying statistics of the language could be used to break the cipher. For example it was easy to determine which ciphertext letter corresponded to the plaintext letter *E*.”).

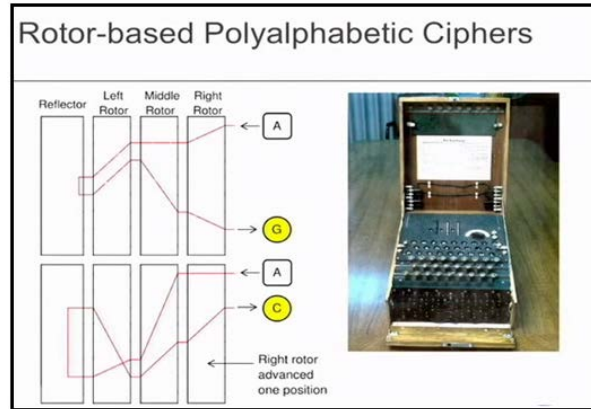
¹⁷ DAVID KAHN, THE CODE BREAKERS: THE STORY OF SECRET WRITING 125 (1967) (David Kahn calls Alberti "the father of western cryptography" based on his development of a device that had two copper disks that fit together. "Each one of them had the alphabet inscribed on it. After every few words, the disks were rotated to change the encryption logic, thereby limiting the use of frequency analysis to crack the cipher.”).

polyalphabetic substitution was susceptible to plain text attacks that would try various permutations of the code.

49. *Encryption in the Mechanical Age.* In the 1920s, electro-mechanical devices were developed that used electrical signals to perform rudimentary calculations that would encrypt messages. The Enigma machine developed by the German government at the end of World War I used mechanical devices to encrypt and decrypt messages. Germany's Enigma device used a set of codes that, when programed into a device, would generate an encrypted message. Ciphers generated by the Enigma could thus be decrypted if one had both possession of an Enigma device and the "crib" or the symmetric key that was used to program the device.¹⁸ Alan Turing (among others) wanted a technique to break Enigma that did not rely on the key, which could (and frequently did) change.¹⁹ Turing developed several ways of using Bayesian inference coupled with "the Bombe," an electromechanical device that could detect the setting for the Enigma.

¹⁸ DAVID KAHN, , SEIZING THE ENIGMA: THE RACE TO BREAK THE GERMAN U-BOAT CODES, 1939-1943 (1991) (In 1941 the British were able to decrypt ciphers generated by the enigma machine by discovering that portions of weather reports (Short Weather Codes) transmitted by German Warships were the symmetric key. However, in the fall of 1941 the German cryptographers stopped using short Weather Codes as symmetric keys. Subsequently, Germany out of abundance of caution changed the configuration of the enigma machines.).

¹⁹ DAVID LEAVITT, THE MAN WHO KNEW TOO MUCH: ALAN TURING AND THE INVENTION OF THE COMPUTER (2006) (Turing settled on a known plaintext attack, using what was known at the time as a "crib." A crib was a piece of plaintext that was suspected to lie in the given piece of cipher text. The methodology of this technique was to deduce a so-called "menu" from a given piece of cipher text and a suspected piece of corresponding plaintext. A menu is simply a graph, which represents the various relationships between cipher text and plaintext letters. Then the menu was used to program an electrical device called a Bombe.).



Steve Weis, THEORY AND PRACTICE OF CRYPTOGRAPHY 9:23 (November 2007) (image of the Enigma machine).

50. ***The Development of Public Key Encryption.*** Prior to 1976 (roughly three decades before the patents-in-suit issued), the only method of encryption was use of a symmetric key. Egyptian Ciphers, Polyalphabetic Encryption, and the Enigma Machine relied on a sender and receiver sharing the same key (a symmetric key). The advent of computer networks and the increasing computational power of computers spurred the invention of a cryptographic system specifically tailored toward encrypting and decrypting electronic messages communicated using a computer.

51. In a 1976 paper, cited on the face of the STPC patents, Whitfield Diffie and Martin Hellman proposed the notion of *public-key* (frequently, and more generally, called *asymmetric key*) cryptography in which two different but mathematically related keys are used—a *public* key and a *private* key. Systems that utilize *public key* encryption were developed specifically to address problems unique to computer networking. Public key encryption at the time of the invention of the STPC patent technologies was not a long-held view, nor a technology that simply amounted to taking something and “doing it on a computer.” The introduction to Diffie and Hellman’s paper makes clear that public key systems were specific to computer networking.

This paper deals with new problems which arise in the application of cryptography to computer communication systems with large numbers of users. Foremost among these is the key distribution problem. We

Diffie, et al., in *Multiuser Cryptographic Techniques*, AFIPS--CONFERENCE PROCEEDINGS, Vol. 45 at 109 (1976).

52. A public key system contains two keys (numbers) so that calculation of one key (the 'private key') is computationally infeasible from the other (the 'public key'), even though they are necessarily related. Instead, both keys are generated secretly, as an interrelated pair. Public key encryption offered a novel mechanism for allowing two parties to share data over a network.

53. The development of Diffie and Hellman's first public key system was directly motivated by the need to protect stored or transmitted data on a modern computer network.

In a computer network with a large number of users, cryptography is often essential for protecting stored or transmitted data. While this application closely resembles the age old use of cryptography to protect military and diplomatic communications, there are several important differences which require new protocols and new types of cryptosystems. This paper addresses the multiuser aspect of computer networks and presents ways to preserve privacy of communication despite the large number of user connections which are possible.

Id.

54. The Diffie-Hellman public key system illustrates the limitations present in systems for encrypting and decrypting information over a computer network contemporaneous to the STPC patents. The Diffie-Hellman system lacked the ability to enable the exchange of data between two parties through an intermediary where the intermediary would not have the ability to substantially decrypt the data. A 2005 paper (cited on the face of the STPC patents) described the limitations of the Diffie-Hellman system when conducting secure third party

communications. The paper also described a problem that the STPC patents solve as one that had only recently been addressed:

It was only recently that the problem has been formally addressed in the three-party model, where the server is considered to be a trusted third party (TTP). This is the same scenario used in the popular 3-party Kerberos authentication system. The main advantage of these systems is that users are only required to remember a single password, the one they share with a trusted server, while still being able to establish secure sessions with many users. ***The main drawback is the need of the trusted server during the establishment of these secure sessions.***

Michel Abdalla and David Pointcheval. *Interactive Diffie-Hellman Assumptions With Applications To Password-Based Authentication*. in PROCEEDINGS OF THE 9TH INTERNATIONAL CONFERENCE ON FINANCIAL CRYPTOGRAPHY AND DATA SECURITY (2005) (emphasis added).

55. Another early encryption system developed for communications over a computer network is a method of public-key encryption developed by Ron Rivest, Adi Shamir, and Leonard M. Adleman, now generally referred to as “RSA.” RSA is based on the use of two extremely large prime numbers which fulfill the criteria for a “trap-door, one-way permutation.” Such a permutation function enables the sender to encrypt the message using a non-secret encryption key, but does not permit an eavesdropper to decrypt the message through cryptanalytic techniques within an acceptable period of time. This is because, for a composite number composed of the product of two very large prime numbers, the computational time necessary to factor this composite number is unacceptably long. A brute force attack requires a sequence of putative keys to be tested to determine which, if any, is appropriate. A brute force attack requires a very large number of iterations. The number of iterations increases exponentially with the key bit size, while the normal decryption generally suffers only an arithmetic-type increase in computational complexity.

56. Like the Diffie-Hellman system, RSA was developed specifically to address problems with sending and receiving encrypted information over a computer network. The original RSA patent (cited on the face of the STPC and IRI patents) describes the use of public key encryption as directed toward a computer network.

With the development of computer technology, the transfer of information in digital form has rapidly increased. There are many applications, including electronic mail systems, bank systems and data processing systems, where the

transferred information must pass over communications channels which may be monitored by electronic eavesdroppers.

U.S. Patent No. 4,405,829, col. 1:14-20.

57. Academic articles from creators of the RSA system make clear that the use of public key encryption is specific to problems unique to computer networks.

[W]e present a sketch of how a computer system might be modified to solve the problem of performing operations on encrypted data securely. . . All sensitive data in main memory, in the data bank files, in the ordinary register set, and on the communications channel will be encrypted. During operation, a load/store instruction between main memory and the secure register set will automatically cause the appropriate decryption/encryption operations to be performed.

Ronald L. Rivest, Leonard Adleman, and Michael L. Dertouzos, *On Data Banks and Privacy Homomorphisms*, in ON DATA BANKS AND PRIVACY HOMOMORPHISMS 169 (1978).

58. The RSA system illustrates limitations in encryption technologies that preceded the STPC patents. RSA provided a mechanism for exchanging data between two parties but did not disclose the use of an untrusted intermediary when data was exchanged between two parties. A 1998 article contemporaneous to the development of the STPC patents (and cited on the face of the STPC patents) describes this as a limitation in the RSA system and other systems known at the time.

We point out that classic techniques of secret sharing [14] are inadequate in this scenario. Secret sharing requires one to reconstruct the secret at a single location before it can be used, hence introducing a single point of failure. The technique described above of sharing the secret key such that it can be used without reconstruction at a single location is known as *Threshold Cryptography*. See [9] for a succinct survey of these ideas and nontrivial problems associated with them.

An important question left out of the above discussion is key generation. Who generates the RSA modulus N and the shares d_1, d_2, d_3 ? Previously the answer

D. Boneh, J. Horwitz, *Generating A Product Of Three Primes With An Unknown Factorization*, in PROC. OF THE THIRD ALGORITHMIC NUMBER THEORY SYMPOSIUM 237 (1998).

59. Silvio Micali's patents (U.S. Pat. Nos. 6,026,163 and 5,315,658; cited on the face of the STPC patents) describe a split key, or so-called "fair" cryptosystem, designed to allow a secret key to be distributed to a plurality of trusted entities, such that the encrypted message is protected unless the key portions are divulged by all of the trusted entities. Thus, a secret key may be recovered through cooperation of a plurality of parties. The Micali system provides that

the decryption key is split between a number (n) of trusted entities, meeting the following functional criteria: (1) The private key can be reconstructed given knowledge of all n of the pieces held by the plurality of trusted entities; (2) The private key cannot be guessed at all if one only knows less than all ($<n-1$) of the special pieces; and (3) For $i-1, \dots, n$, the i^{th} special piece can be individually verified to be correct.

60. The Micali system does not allow communication of a secret in which only one party gains access to the content, and in which the third party or parties and one principal operate only on encrypted or secret information.

B. The Value Of The Inventions Disclosed In The STPC Patents

61. Executives at leading technology companies have described the value of specific encryption techniques as critical, lasting, and prominent. Chris Cicotte, a Cloud Architect at EMC, stated strong encryption technologies specific for networked computers “are a vital component of a strong security posture for any size organization, and it should be a standard offering within the cloud The threat landscape has already begun to evolve, and from an overall security perspective, we need to take a proactive approach by layering in technologies like encryption at every layer.”²⁰ The development of secure communications systems and methods, such as the inventions taught in the STPC patents, was motivated by the unique problems created by the internet where secured data is often transmitted through untrusted intermediaries.

Achieving secure communications in networks has been one of the most important problems in information technology. . . . If there is a private and authenticated channel between two parties, then secure communication between them is guaranteed. However, in most cases, many parties are only indirectly connected, as elements of an incomplete network of private and authenticated channels. *In other words they need to use intermediate or internal nodes.*

Yvo Desmedt and Yongee Wang, *Perfectly Secure Message Transmission Revisited* at 502, *Advances in Cryptology EUROCRYPT Vol. 2332* (2002) (emphasis added).

²⁰ Jude Chao, *Cloud Computing Demands Cloud Data Encryption*, ENTERPRISE NETWORKING PLANET WEBSITE, May 13, 2014, <http://www.enterprisenetworkingplanet.com/netsecur/cloud-computing-demands-cloud-data-encryption.html>.

62. Companies such as Oracle Corporation, International Business Machines Corporation, Hewlett-Packard Company, and Google, Inc., confirm the importance of providing strong encryption systems that address the unique threats posed by moving data to the cloud.

Once data is moved to the cloud, *it becomes vulnerable to a number of new threats* ranging from stolen administrator credentials to new hacking techniques. In addition, new legislation, such as the USA PATRIOT Act, is making it possible for competitors and governments to access data from cloud providers without the consent of the data owner. Many cloud providers thought they could achieve data sovereignty through locating cloud services in different jurisdictions, but this theory has been shaken by the subpoena classification ruling handed down recently in the U.S. federal court.

HP Atalla Cloud Encryption: Securing Data in the Cloud, HP TECHNICAL WHITE PAPER 2 (2014) (emphasis added).

The need to secure data is driven by an expanding privacy and regulatory environment coupled with an increasingly dangerous world of hackers, insider threats, organized crime, and other groups intent on stealing valuable data. *The security picture is complicated even more by the rapid expansion of access to sensitive data via the Internet*, an unprecedented understanding of technology, increasing economic competition, and the push to achieve greater efficiencies through consolidation and cloud computing.

Oracle Database 12C Security and Compliance, ORACLE WHITE PAPER 2 (February 2015) (emphasis added).

With rare exceptions, one of the most important assets for any company is its data. Your data may take the form of financial information, proprietary sales information, marketing information, healthcare information, intellectual property (IP), and more. Losing your data could negatively affect operations and potentially shut down your organization. . . . Cloud-aware applications create unique security challenges in that both Infrastructure as a Service (IaaS) providers and Platform as a Service (PaaS) providers make use of a shared-risk model.

Robi Sen, *Develop Secure Cloud-Aware Applications*, IBM DEVELOPER WORKS 2-3 (May 20, 2015).

Business requirements, industry regulations, and government mandates increasingly dictate that your organization must secure electronic communications. Whether it is financial data, medical records, or proprietary corporate information, you simply must secure the delivery of sensitive content to its destination.

Google Message Encryption, GOOGLE APPLICATION SECURITY PAPER 1 (2008).

63. Numerous academics have concluded the advent of cloud computing has created challenges that are unique to cloud computing and these challenges require specific encryption technologies that were previously unnecessary.

The growing demand for cloud computing stems from the need to securely store, manage, share and analyze immense amounts of complex data in many areas, including health care, national security and alternative energy. And although several companies have launched commercially available cloud systems, two areas still need significant improvements, [Dr. Bhavani] Thuraisingham said: the security mechanisms needed to protect sensitive data as well as the capability to process huge amounts of both geospatial data and what's known as semantic Web data.

Investment in Cloud Computing Research Pays Off, UT Dallas Computer Scientists Make Advances in Key Aspects of Growing Field, UNIVERSITY OF TEXAS AT DALLAS NEWS CENTER (April 19, 2011).²¹

Security is the most important challenge for cloud technology, as CSP's [Cloud Service Providers] have to protect the consumer's data from theft and ensure the consumer is not exploited. Consumers may be exploited from denial of service (DoS) attacks . . . ***They must also protect the data through the use of advanced encryption algorithms*** and ensure that their data centers are physically secure using advanced biometrics and many other authentication methods.

Sean Carlin & Kevin Curran, *Cloud Computing Technologies*, in INTERNATIONAL JOURNAL OF CLOUD COMPUTING AND SERVICES SCIENCE (IJ-CLOSER) Vol.1, No.2 at 59 (June 2012) (emphasis added).

The growth of computer networks and the opening that their interconnection brings, especially through Internet, mean that a great amount of information is traveling through network and ***crossing numerous intermediate systems. This results in the increase of the number of possible attacks and illegal operations.*** . . . They should guarantee the identity of the communicating parties . . . the protection against unauthorized writing and, in some cases, unauthorized reading of transferred data. These services of authentication, nonrepudiation, integrity and confidentiality, respectively, can be provided using cryptosystems.

Natasha Prohic, *Public Key Infrastructures - PGP vs. X.509* at 1, in INFOTECH SEMINAR ADVANCED COMMUNICATION SERVICES (ACS) (2005) (emphasis added).

64. On information and belief, contemporaneous to, and following conception of the inventions disclosed in the STPC patents, academics, and businesses headquartered in Texas

²¹ See also Kevin Hamlen et al., *Security Issues For Cloud Computing* at 39, INTERNATIONAL JOURNAL OF INFORMATION SECURITY AND PRIVACY Vol. 4(2) (April-June 2010) ("Because of the critical nature of the applications, it is important that clouds be secure. The major security challenge with clouds is that the owner of the data may not have control of where the data is placed."); Ryan Layfield, Murat Kantarcioglu, and Bhavani Thuraisingham, *Enforcing Honesty in Assured Information Sharing within a Distributed System*, IFIP WG 11.3 CONFERENCE ON DATABASE AND APPLICATIONS SECURITY (2007) ("The growing number of distributed information systems such as the internet has created a need for security in data sharing."); Safwan M. Khan and Kevin W. Hamlen, *AnonymousCloud: A Data Ownership Privacy Provider Framework in Cloud Computing* at 170, in PROCEEDINGS OF THE 11TH IEEE INTERNATIONAL CONFERENCE ON TRUST, SECURITY AND PRIVACY IN COMPUTING AND COMMUNICATIONS (June 2012) ("Revolutionary advances in hardware, middleware, and virtual machines over the past few years have elevated cloud computing to a thriving industry A significant barrier to the adoption of cloud services is customer fear of privacy loss in the cloud.").

actively entered the field of secure encrypted communications. Computer researchers at the University of Texas at Austin founded the Security Research Group. The University of Texas at Dallas founded the Data Security and Privacy Lab, a center for research on security issues raised by dissemination of data over computer networks.

65. Texas based companies incorporated secure communications technologies into numerous products and many of these same companies cite STPC patents in their own patents. Texas based businesses that developed products incorporating secure communications technologies included: HP Enterprise Services, LLC of Plano, Texas; Texas Instruments, Inc. of Dallas, Texas; Rocksteady Technologies, LLC of Austin, Texas; Dell, Inc. of Round Rock, Texas; AT&T Intellectual Property whose inventors were based in various locations in Texas; Gazzang, Inc. of Austin Texas; Net.Orange, Inc. of Dallas, Texas; and Futurewei Technologies, Inc. of Plano, Texas. The STPC patents are cited by at least 50 patents that were either initially assigned to or are currently assigned to entities headquartered in Texas.

1. U.S. Patent No. 8,316,237

66. U.S. Patent No. 8,316,237 (the “237 patent”) entitled, System and Method for Secure Three-Party Communications, was filed on January 10, 2011 and claims priority to March 23, 2001. St. Luke is the owner by assignment of the ‘237 patent. A true and correct copy of the ‘237 patent is attached hereto as Exhibit A. The ‘237 patent claims specific methods and systems for securely transcribing protected electronic information transmitted over at least one computer network from a first encrypted form to a second, different encrypted form substantially without intermediate decryption of the protected electronic information.

67. The ‘237 patent has been cited by over 100 issued United States patents as relevant prior art. Specifically, patents issued to the following companies have cited the ‘237 patent as relevant prior art.

- Electronics and Telecommunications Research Institute (ETRI)
- NEC Corporation
- Disney Enterprises, Inc.
- WMS Gaming, Inc.

- **Verizon Patent and Licensing, Inc.**²²
- Microsoft Corporation.
- Netapp. Inc.
- NCR Corporation
- EMC Corporation
- AT&T Intellectual Property, L.P.
- Sony Corporation
- SAP AG
- Blackberry Limited
- Adobe Systems Incorporated
- Nippon Telegraph and Telephone Corporation
- Novell, Inc.
- Spring Communications L.P.
- Hytrust, Inc.
- International Business Machines Corporation
- Google. Inc.
- Kabushiki Kaisha Toshiba
- Panasonic Intellectual Property Management Co., Ltd.
- Zvnga Inc.
- Certicom Corp.
- Wincor Nixdorf International GmbH
- Oracle International Corporation
- Futurewei Technologies, Inc.
- Dell Products, L.P.
- Intuit Inc.

68. The ‘237 patent claims a technical solution to a problem unique to computer networks – securely transmitting encrypted electronic information via an intermediary device, wherein the electronic information is cryptographically secure not only from outside attackers, but also from the intermediary.

69. At the time of the inventions claimed in the ‘237 patent, securely processing, transmitting, and accessing protected electronic data in a massively distributed computing environment presented new and unique issues over the state of the art. As explained in the ‘237 patent: “Often, the nature of these communications protocols places the third party (or group of third parties) in a position of trust, meaning that the third party or parties, without access to additional information, can gain access to private communications or otherwise undermine transactional security or privacy.” ‘237 patent, col. 2:13-17.

Generating and protecting encryption keys while maintaining data availability has traditionally been a major barrier to implementing encryption, especially on an

²² U.S. Patent No. 8,655,843 and U.S. Patent App. 2013/0132421 both assigned to Verizon Patent and Licensing, Inc. cite the ‘237 patent.

enterprise scale. Key management is complex and challenging, and often fails because issuance, storage, and renewing are difficult. ***Worse yet, lost keys can make important data permanently unrecoverable.***

Sustainable Compliance for the Payment Card Industry Data Security Standard, ORACLE WHITE PAPER 23 (July 2015) (emphasis added).

70. Although the systems and methods taught in the ‘237 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the ’237 patent claims were innovative and novel. “Typical public key encryption technologies, however, presume that a pair of communications partners seek to communicate directly between each other, without the optional or mandatory participation of a third party, and, in fact, are designed specifically to exclude third party monitoring.” ‘237 patent, col. 2:56-61. Indeed, companies such as Oracle have recognized that, until recently, security for distributed systems was not a primary concern.

- Security was not a major issue, even for Oracle
 - Standard passwords (scott/tiger, system/manager, ...)
 - Oracle standard users were installed and left open (though not at SAP!)
 - There are some recommendations, but not much more.
 - From Oracle9i, the issue of security was increasingly addressed by Oracle (DBCA: locking of default accounts, ..., 10.2: CONNECT roles)

Andreas Becker, *High Security for SAP Data with Oracle Database Vault and Transparent Data Encryption*, ORACLE PRESENTATION 6 (2010).

71. Further, the ’237 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary without the intermediary gaining substantial access to the unencrypted information. This improves the security of the computer system and allows it to be more efficient.²³ “Third parties,

²³ See Kevin Hamlen et al., *Security Issues For Cloud Computing* at 39, INTERNATIONAL JOURNAL OF INFORMATION SECURITY AND PRIVACY VOL. 4(2) (April-June 2010) (“The major security challenge with clouds is that the owner of the data may not have control of where the data is placed. . . . Therefore, we need to safeguard the data in the midst of untrusted processes.”); Elena Ferrari and Bhavani Thuraisingham, *Security and Privacy for Web Databases and Services* at 17, PROCEEDINGS OF THE EDBT CONFERENCE (March 2003) (“very little work has been devoted to security”); Elisa Bertino et al.; *Selective and Authentic Third-Party Distribution of XML Documents* at 1263, IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, Vol. 16 No. 10 (October 2004) (“The most intuitive solution is that of requiring Publishers to be trusted with regard to the considered security properties. However,

however, may offer valuable services to the participants in a communication, but existing protocols for involvement of more than two parties are either inefficient or insecure.” ‘237 patent, col. 2:61-64. Studies have confirmed that the inventions disclosed in the ‘237 patent improve the security of systems.

Key management is a big concern with encryption, because the effectiveness of the solution ultimately depends on protecting the key. If the key is exposed, the data being protected with the key is, essentially, exposed. Wherever the key is stored, it must be protected, and it should be changed on occasion. For example, if an administrator with access to a key leaves an organization, the key should be changed.

Tanya Baccam, *Transparent Data Encryption: New Technologies and Best Practices for Database Encryption*, SANS WHITE PAPER 3 (April 2010) (emphasis added).

72. The ‘237 patent claims are not directed to a “method of organizing human activity,” “fundamental economic practice long prevalent in our system of commerce,” or “a building block of the modern economy.” Instead, they are limited to a concretely circumscribed set of methods and systems for transcribing electronic information that is transmitted over a computer network via an intermediary.

73. The ‘237 patent claims are not directed at the broad concept/idea of “encrypting” or “decrypting” information. Instead, they are limited to a concretely circumscribed set of methods and systems for transcribing electronic information that is transmitted over a computer network via an intermediary. These methods and systems are technologies unique to the Internet age.

74. The inventive concepts claimed in the ‘237 patent are technological, not “entrepreneurial.” For example, transcribing protected electronic information between a first (e.g., server) encrypted form and a second (e.g., network) encrypted form without a substantial intermediate representation of the information in decrypted form is a specific, concrete solution to the technological problem of transferring encrypted information via an intermediary without providing the intermediary substantial access to the information.

this solution could not always be feasible in the Web environment since large Web-based systems cannot be easily verified to be secure.”).

75. Researchers have identified the problems the '237 patent is directed at solving arise from new security challenges relating to cloud computing.

Data Security: Data security was the most important concern that had hindered the acceptance of the cloud computing initially. Storing and processing the data, running software, using CPU and virtual Machines on others' infrastructure were some serious concerns for the users initially. Data breach, data integrity and data loss are major security issues that posed threats to organization's data and software. Moreover, the multi-tenancy model and pooled computing resources over cloud have introduced new security challenges requiring new techniques to tackle with [4] [5] [6].

Deepak Panth, Dhananjay Mehta and Rituparna Shelgaonkar, *A Survey on Security Mechanisms of Leading Cloud Service Providers*, in INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 98(1) at 34 (July 2014) (emphasis added).²⁴

76. The '237 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, claims of the '237 patent require transcribing protected electronic information using one or more intermediary computing devices specially configured to yield a desired result—a result that overrides the routine and conventional sequence of events in electronic communications, even encrypted electronic communications.

77. The '237 patent is directed to specific problems in the field of cryptography. In the “Background” section of the patent, the '237 patent explains that encryption systems use “keys,” similar to passwords, to control how plaintext is encrypted and decrypted. '237 patent, col. 2:65–3:13. An encryption system thereby encrypts and decrypts information differently depending upon the key input. *Id.* Two common cryptanalytic attacks, linear and differential cryptanalysis, analyze large amounts of cipher text (encrypted information) and different possible keys in order to eventually converge on the correct key and break the encryption. *Id.* at col. 3:1–3:13. Both attacks exploit the fact that some encryption systems use static keys to create

²⁴ See also Vaibhav Khadilkar, Murat Kantarcioglu, and Bhavani Thuraisingham, *Secure Data Processing in a Hybrid Cloud* at 1-2, Computing Research Repository (CoRR) abs/1105.1982 (2011) (“The emergence of cloud computing has created a paradigm shift by allowing parallel processing of massive amounts of data. . . . [H]ow do users protect themselves from cloud service providers who may be able to access their data? This issue is related to data security and is relevant for users since their data is placed at the provider’s site.”).

the cipher text. *Id.* In other words, using the same key repeatedly gives an attacker more information to work with. The inventions of the '237 patent introduce several novel techniques to overcome these weaknesses and allow encrypted information to be securely transferred through an intermediary.

78. The preemptive effect of the claims of the '237 patent are concretely circumscribed by specific limitations. For example, claim 1 of the '237 patent requires:

A transcription device, comprising:

an automated communication port configured to receive a first message representing an encrypted communication associated with a first set of asymmetric keys, to receive a transcription key, and to transmit a second message representing the encrypted communication associated with a second set of asymmetric keys, the first and second sets of encryption keys being distinct;

a memory; and

an automated processor, configured to communicate through the automated communication port and with the memory, to receive the first message, receive the transcription key, automatically transcribe the first message into the second message, and to transmit the second message, wherein the automated processor does not store as a part of the transcription any decrypted representation of the encrypted communication, and the transcription key is employed without revealing any secret cryptographic information usable for decrypting the first message or the second message.

79. The '237 patent does not attempt to preempt every application of the idea of encrypting electronic information transmitted over a computer network, or even the idea of encrypting electronic information transmitted over a computer network via an intermediary.

80. The '237 patent does not preempt the field of secure third-party communications systems, or prevent use of alternative secure third-party communications systems. For example, the '237 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and greatly limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

81. For example, the ‘237 patent describes numerous techniques for secure third-party communications that inform the invention’s development but do not, standing alone, fall within the scope of its claims:

- Key Escrow. U.S. Pat. No. 6,009,177 to Sudia, relates to a cryptographic system and method with a key escrow feature that uses a method for verifiably splitting users’ private encryption keys into components and for sending those components to trusted agents chosen by the particular users.
- Partitioning of Information Storage Systems. U.S. Patent No. 5,956,400 to Chaum, relates to partitioned information storage systems with controlled retrieval.
- Use of a Trusted Intermediary. U.S. Patent No. 6,161,181 to Haynes, describing secure electronic transactions using a trusted Intermediary; U.S. Patent No. 6,145,079 to Misty, describing secure electronic transactions using a trusted intermediary to perform electronic services.
- Split Key Storage. U.S. Patent No. 6,118,874 to Okamoto, teaching encrypted data using split storage key and system.
- Use of a Cryptographic File Labeling System. U.S. Pat. No. 5,953,419 to Lohstroh, disclosing cryptographic file labeling system for supporting secured access by multiple users.
- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, disclosing a personal storage device for receipt, storage, and transfer of digital information to other electronic devices; *see also* U.S. Pat. No. 5,991,519 to Benhammou; U.S. Pat. No. 5,999,629 to Heer; and U.S. Pat. No. 6,034,618 to Tatebayashi.
- Computer Network Firewalls and Agents. U.S. Pat. No. 6,061,798 to Coley, disclosed the use of an assigned proxy agent to verify the authority of an incoming request to access a network element indicated in the request. Once verified, the proxy agent completes the connection to the protected network element on behalf of the source of the incoming request; *see also* U.S. Pat. No. 6,023,762 to Dean, disclosing a data access and retrieval system which comprises a plurality of user data sources each storing electronic data signals describing data specific to a user, or enabling services selected by a user; an agent device which is configurable to select individual ones of the user data sources and present selections of user data and service data to a set of callers who may interrogate the agent device remotely over a communications network; and U.S. Pat. No. 6,029,150

to Kravitz, disclosing a system and method of payment in an electronic payment system wherein a plurality of customers have accounts with an agent. Further, the patent lists thirty-three other patented systems involving Computer Network Firewalls that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.

- Virtual Private Networks. As described in: U.S. Pat. No. 6,079,020 to Liu and U.S. Pat. No. 6,081,900 and twenty other patented systems involving virtual private networks that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.
- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos, disclosing the use of biometrics such as fingerprints to facilitate secure communications and identification of users. Further, the '237 lists 238 patented systems that use biometric authentication that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.

82. Although “[e]ncryption, in general, represents a basic building block of human ingenuity that has been used for hundreds, if not thousands, of years,”²⁵ the ‘237 patent does not claim, or attempt to preempt, “some process that involves the encryption of data for some purpose” (or similar abstraction).

83. The ‘237 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer.

84. The claimed subject matter of the ‘237 patent is not a pre-existing but undiscovered algorithm.

85. The ‘237 patent claims systems and methods that “could not conceivably be performed in the human mind or pencil and paper.”²⁶

86. The ‘237 patent claims require the use of a computer system.

²⁵ *Paone v. Broadcom Corp.*, Case No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015) (citing *Fid. Nat'l Info. Servs., Inc.*, Petitioner, CBM2014-00021, 2015 WL 1967328, at *8 (Apr. 29, 2015) (both upholding the patent eligibility of patents directed toward encryption).

²⁶ *TQP Dev., LLC v. Intuit Inc.*, Case No. 2:12-CV-180-WCB, 2014 WL 651935, at *4 (E.D. Tex. Feb. 19, 2014) (finding claims directed to encryption to be patent eligible); *Paone v. Broadcom Corp.*, Case No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015); see also *Prism Technologies, LLC v. T-Mobile USA, Inc.*, 12-cv-124, Dkt. No. 428 at 7 (D. Neb. Sept. 22, 2015) (Finding on cross motions for summary judgment that patents directed at delivering resources over an untrusted network were patent eligible. “The problems addressed by Prism’s claims are ones that ‘arose uniquely in the context of the Internet.’”).

87. The claims in the '237 patent require the modifying of data that has concrete and valuable effects in the field of secure third-party communications. By allowing an intermediary to receive secure information but not gain access to the unencrypted form of the information, the '237 patent improves the security of computer systems. Prior art systems that the '237 patent remedies enabled unauthorized "access to private communications or otherwise undermine[d] transactional security or privacy." Companies have described the use of encryption in the cloud as important to improve the security and functioning of systems.

For many organizations, keeping data private and secure has also become a compliance requirement. Standards including Health Insurance Portability and Accountability Act of 1996 (HIPAA), Sarbanes-Oxley (SOX), Payment Card Industry Data Security Standard (PCI DSS), the Gramm-Leach-Bliley Act, and EU Data Protection Directives all **require that organizations protect their data at rest and provide defenses against threats.**

HP Atalla Cloud Encryption: Securing Data in the Cloud, HP TECHNICAL WHITE PAPER 2 (2014) (emphasis added).

88. The '237 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.²⁷

89. The claimed invention in the '237 claims is rooted in computer technology and overcomes problems specifically arising in the realm of computer networks.

90. The systems and methods claimed in the '237 patent were not a longstanding or fundamental economic practice at the time of the patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general. As just one

²⁷ Limitations in the prior art that the '237 patent was directed to solving included: computer systems where a "third party plays a requisite role in the transaction but which need not be trusted with access to the information or the cryptographic key" (*Id.*, col. 2:5-7); "[p]asswords may be written near access terminals (*Id.* col. 1:50-51);" "[s]ecurity tokens can be stolen or misplaced" (*Id.*, col. 1:51-52); "users may share supposedly secret information" (*Id.*, col. 1:52); and "unauthorized uses of the system" (*Id.*, col. 11:28). The '237 patent "allows the entity that transmits the information to be assured that the transmission will be secure, even with respect to a trusted third party, while ensuring that the intended recipient must cooperate with the intended third party." '237 patent, col. 8:48-52.

example, at the time the inventions disclosed in the '237 patent were conceived, the use of asymmetric encryption keys was described by Oracle as "relatively new."²⁸

A Public Key Infrastructure (PKI) consists of protocols, services, and standards supporting applications of public key cryptography. ***Because the technology is still relatively new***, the term PKI is somewhat loosely defined.

Introduction to the SSL Technology, ORACLE DOCUMENTATION (February 1, 2001), http://docs.oracle.com/cd/E53645_01/tuxedo/docs12cr2/security/publickey.html (emphasis added).

91. The asserted claims do not involve a method of doing business that happens to be implemented on a computer; instead, the '237 patent teaches changing data in a way that will affect the communication system itself, by making it more secure. The security challenges that the '237 patent is directed at overcoming were new and unique to distributed networks, as confirmed in a recent paper from Accenture Services Pvt. Ltd.: "The unprecedented growth of cloud computing has created new security challenges. The problem is ever more complex as there is a transition from traditional computing to a service-based computing."²⁹

92. The '237 patent claims are not directed at a mathematical relationship or formula. The '237 patent claims concrete, specific computer systems and methods for cryptographically protecting and managing access to secure data in multi-party communications.

93. '237 patent claims transform data from one form into another that will be recognizable by the intended recipient but secure against decryption by unintended recipients.


94. IBM in its computer reference guides ("redbooks") refers to encryption as "transform[ing] data that is unprotected."

²⁸ See also *BackupEDGE Encryption Whitepaper*, MICROLITE CORPORATION at 2 (2003) (describing the technology of asymmetric keys as "new"); Roger Clarke, MESSAGE TRANSMISSION SECURITY (May 1998), <http://www.rogerclarke.com/II/CryptoSecy.html> ("Public key cryptography is relatively new and technically complex.").

²⁹ Deepak Panth, Dhananjay Mehta and Rituparna Shelgaonkar, *A Survey on Security Mechanisms of Leading Cloud Service Providers*, in INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 98(1) at 34 (July 2014).

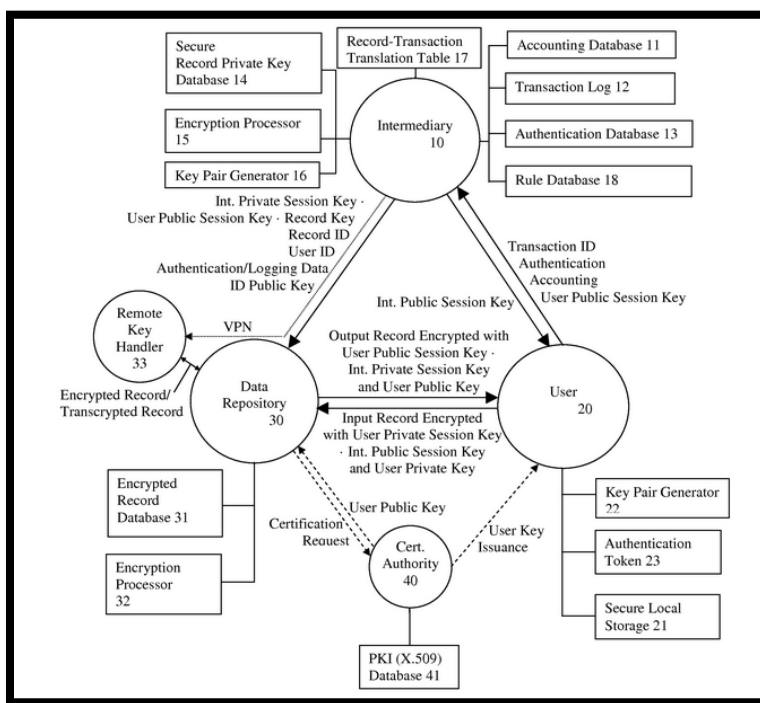
Encryption concepts and terminology

Encryption transforms data that is unprotected, or *plain text*, into encrypted data, or *ciphertext*, by using a *key*. Without knowledge of the encryption key, the ciphertext cannot be converted back to plain text.



Bertrand Dufrasne and Robert Tondini, IBM DS8870 DISK ENCRYPTION 6th Edition at 4 (2015) (from a reference guide published by IBM).

95. One or more claims of the '237 patent require a specific configuration of electronic devices, a network configuration, and the use of encryption systems to secure communications from access by an intermediary. These are meaningful limitations that tie the claimed methods and systems to specific machines. For example, the below diagram from the '237 patent illustrates a specific configuration of hardware disclosed in the patent.



'237 patent, Fig. 1.

2. U.S. Patent No. 7,181,017

96. U.S. Patent No. 7,181,017 (the "'017 patent") entitled, System and Method for Secure Three-Party Communications was filed on March 25, 2002, and claims priority to March 23, 2001. St. Luke is the owner by assignment of the '017 patent. A true and correct copy of the

'017 patent is attached hereto as Exhibit B. The '017 patent claims specific methods and systems for secure third-party communications—for example, a system and method for communicating information between a first party and a second party that includes identifying desired information; negotiating, through an intermediary, a cryptographic comprehension function for obscuring at least a portion of the information communicated between the first party and the second party; communicating the encrypted information to the second party, and decrypting the encrypted information using the negotiated cryptographic comprehension function. Moreover, in the patented systems and methods, the intermediary does not itself possess sufficient information to decrypt the encrypted information, thus allowing use of an “untrusted” intermediary.

97. The '017 patent has been cited by over 350 issued United States patents as relevant prior art. Specifically, patents issued to the following companies have cited the '017 patent.

- Electronics and Telecommunications Research Institute (ETRI)
- Sharp Laboratories of America, Inc.
- International Business Machines Corporation
- Microsoft Corporation
- Sony Corporation
- France Telecom
- Siemens Medical Solutions USA, Inc.
- Canon Kabushiki Kaisha
- Nikon Corporation
- Apple, Inc.
- Fujitsu Limited
- Hewlett-Packard Development Company, L.P.
- SAP AG
- Guardian Data Storage, LLC
- Teradata US, Inc.
- AT&T Intellectual Property I, L.P.
- Panasonic Corporation
- Sharp Laboratories of America, Inc.
- Ricoh Company, Ltd.
- Nokia Corporation
- Boss Logic, LLC
- Juniper Networks, Inc.
- American Express Travel Related Services Company, Inc.
- Kyocera Mita Corporation
- Oracle International Corporation
- Medox Exchange, Inc.
- Nortel Networks Limited

- Hitachi-Omron Terminal Solutions Corporation
- Medapps, Inc.
- Samsung Electronics Co., Ltd.
- NEC Corporation
- Visa International Service Corporation
- Cisco Technology, Inc.
- Yahoo!, Inc.
- Flexera Software, LLC
- CompuGroup Medical AG
- Datcard Systems, Inc.
- Futurewei Technologies, Inc.
- Telecom Italia S.P.A.
- General Electric Company
- Fuji Xerox Co., Ltd.
- Massachusetts Institute Of Technology
- Netapp, Inc.
- Koninklijke Philips N.V.
- Computer Associates Think, Inc.
- Huawei Technologies Co., Ltd.
- Texas Instruments, Inc.
- Nippon Telegraph and Telephone Corporation
- Research in Motion Limited.
- Net.Orange, Inc.
- Nokia Siemens Networks Oy
- Honeywell Int., Inc.

98. The claims in the '017 patent are directed at a technical solution to a problem unique to computer networks – securely transmitting encrypted electronic information via an intermediary device, wherein the electronic information is cryptographically secure not only from outside attackers, but also from the intermediary.

99. At the time of the inventions claimed in the '017 patent, securely processing, transmitting, and accessing protected electronic data in a massively distributed computing environment presented new and unique issues over the state of the art. As explained in the '017 patent: “Often, the nature of these communications protocols places the third party (or group of third parties) in a position of trust, meaning that the third party or parties, without access to additional information, can gain access to private communications or otherwise undermine transactional security or privacy.” '017 patent, col. 1:54-61.

Generating and protecting encryption keys while maintaining data availability has traditionally been a major barrier to implementing encryption, especially on an enterprise scale. Key management is complex and challenging, and often fails because issuance, storage, and renewing are difficult. ***Worse yet, lost keys can make important data permanently unrecoverable.***

Sustainable Compliance for the Payment Card Industry Data Security Standard, ORACLE WHITE PAPER 23 (July 2015) (emphasis added).

100. Although the systems and methods taught in the ‘017 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the ‘017 patent claims were innovative and novel. “Typical public key encryption technologies, however, presume that a pair of communications partners seek to communicate directly between each other, without the optional or mandatory participation of a third party, and, in fact, are designed specifically to exclude third party monitoring.” ‘017 patent, col. 4:40-45. As described in an article contemporaneous to the ‘017 patent, the rise of cloud computing and distributed networks gave rise to a need to use key encryption to resolve security issues.

stored or communicated. As information becomes increasingly mobile, moving rapidly from application to application and system to system, this feature becomes more and more desirable. Public-key schemes are scalable: their operation is well-suited to environments with lots of users. The advent of large-scale open networks like the Internet necessitates this property.

Simon Blake-Wilson, *Information Security, Mathematics and Public-Key Cryptography*, in *Designs, Codes and Cryptography* Vol. 19 at 81 (2000).

101. Further, the ‘017 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary without the intermediary gaining access to the unencrypted information. This improves the security of the computer system and allows it to be more efficient.³⁰ “Third parties, however,

³⁰ See Kevin Hamlen et al., *Security Issues For Cloud Computing* at 39, INTERNATIONAL JOURNAL OF INFORMATION SECURITY AND PRIVACY VOL. 4(2) (April-June 2010) (“The major security challenge with clouds is that the owner of the data may not have control of where the data is placed. . . . Therefore, we need to safeguard the data in the midst of untrusted processes.”); Elena Ferrari and Bhavani Thuraisingham, *Security and Privacy for Web Databases and Services* at 17, PROCEEDINGS OF THE EDBT CONFERENCE (March 2003) (“very little work has been devoted to security”); Elisa Bertino et al.; *Selective and Authentic Third-Party Distribution of XML Documents* at 1263, IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, Vol. 16 No. 10 (October 2004) (“The most intuitive solution is that of requiring Publishers to be trusted with regard to the considered security properties. However,

may offer valuable services to the participants in a communication, but existing protocols for involvement of more than two parties are either inefficient or insecure.” ‘017 patent, col. 4:45-48. Studies have confirmed that the inventions disclosed in the ‘017 patent improve the security of systems.

Key management is a big concern with encryption, because the effectiveness of the solution ultimately depends on protecting the key. If the key is exposed, the data being protected with the key is, essentially, exposed. Wherever the key is stored, it must be protected, and it should be changed on occasion. For example, if an administrator with access to a key leaves an organization, the key should be changed.

Tanya Baccam, *Transparent Data Encryption: New Technologies and Best Practices for Database Encryption*, SANS WHITE PAPER 3 (April 2010) (emphasis added).

102. The ‘017 patent claims are not directed to a “method of organizing human activity,” “fundamental economic practice long prevalent in our system of commerce,” or “a building block of the modern economy.” Instead, they are limited to a concretely circumscribed set of methods and systems for transcribing electronic information that is transmitted over a computer network via an intermediary.

103. The ‘017 patent claims are not directed at the broad concept/idea of “encrypting” or “decrypting” information. Instead, they are limited to a concretely circumscribed set of methods and systems for transcribing electronic information that is transmitted over a computer network via an intermediary. This type of method and system is unique to the Internet age.

104. The inventive concepts claimed in the ‘017 patent are technological, not “entrepreneurial.” For example, transcribing protected electronic information between a first (e.g., server) encrypted form and a second (e.g., network) encrypted form without a substantial intermediate representation of the information in decrypted form is a specific, concrete solution to the technological problem of transferring encrypted information via an intermediary without providing the intermediary substantial access to the information.

this solution could not always be feasible in the Web environment since large Web-based systems cannot be easily verified to be secure.”).

105. Companies such as Oracle have recognized that until recently security for distributed systems was not a primary concern.

- Security was not a major issue, even for Oracle
 - Standard passwords (scott/tiger, system/manager, ...)
 - Oracle standard users were installed and left open (though not at SAP!)
 - There are some recommendations, but not much more.
 - From Oracle9i, the issue of security was increasingly addressed by Oracle (DBCA: locking of default accounts, ..., 10.2: CONNECT roles)

Andreas Becker, *High Security for SAP Data with Oracle Database Vault and Transparent Data Encryption*, ORACLE PRESENTATION at 6 (2010).

106. Researchers have identified the problems the '017 patent is directed at solving arise from new security challenges relating to cloud computing.

Data Security: Data security was the most important concern that had hindered the acceptance of the cloud computing initially. Storing and processing the data, running software, using CPU and virtual Machines on others' infrastructure were some serious concerns for the users initially. Data breach, data integrity and data loss are major security issues that posed threats to organization's data and software. Moreover, the multi-tenancy model and pooled computing resources over cloud have introduced new security challenges requiring new techniques to tackle with [4] [5] [6].

Deepak Panth, Dhananjay Mehta and Rituparna Shelgaonkar, *A Survey on Security Mechanisms of Leading Cloud Service Providers*, in INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 98(1) at 34 (July 2014) (emphasis added).³¹

107. The '017 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, claims of the '017 patent require cryptographically manipulating protected electronic information using

³¹ See also Vaibhav Khadilkar, Murat Kantarcioglu, and Bhavani Thuraisingham. *Secure Data Processing in a Hybrid Cloud* at 1-2, Computing Research Repository (CoRR) abs/1105.1982 (2011) (“The emergence of cloud computing has created a paradigm shift by allowing parallel processing of massive amounts of data. . . . [H]ow do users protect themselves from cloud service providers who may be able to access their data? This issue is related to data security and is relevant for users since their data is placed at the provider’s site.”).

one or more intermediary computing devices specially configured to yield a desired result—a result that overrides the routine and conventional sequence of events in electronic communications, even encrypted electronic communications.

108. The '017 patent is directed to specific problems in the field of cryptography. In the “Background” section of the patent, the '017 patent explains that encryption systems use “keys,” similar to passwords, to control how plaintext is encrypted and decrypted. '017 patent, col. 4:39–4:64. An encryption system thereby encrypts and decrypts information differently depending upon the key input. *Id.* Two common cryptanalytic attacks, linear and differential cryptanalysis, analyze large amounts of cipher text (encrypted information) and different possible keys in order to eventually converge on the correct key and break the encryption. *Id.* Both attacks exploit the fact that some encryption systems use static keys to create the cipher text. *Id.* In other words, using the same key repeatedly gives an attacker more information to work with. The inventions of the '017 patent introduce several novel techniques to overcome these weaknesses, particularly where encrypted information is held by an intermediary.

109. The preemptive effect of the '017 patent is concretely circumscribed by specific limitations. For example, claim 1 of the '017 patent requires:

A method for processing information, comprising the steps of:

receiving information to be processed:

defining a cryptographic comprehension function for the information, adapted for making at least a portion of the information incomprehensible;

receiving asymmetric cryptographic key information, comprising at least asymmetric encryption key information and asymmetric decryption key information;

negotiating a new cryptographic comprehension function between two parties to a communication using an intermediary;

processing the information to invert the cryptographic comprehension function and impose the new cryptographic comprehension function in an integral process, in dependence on at least the asymmetric cryptographic key information, without providing the intermediary with sufficient asymmetric cryptographic key information to decrypt the processed information; and

outputting processed information,

wherein the ability of the asymmetric decryption key information to decrypt the processed information changes dynamically.

110. The '017 patent does not attempt to preempt every application of the idea of encrypting electronic information transmitted over a computer network, or even the idea of encrypting electronic information transmitted over a computer network via an intermediary.

111. The '017 patent does not preempt the field of secure third-party communications systems, or prevent use of alternative secure third-party communications systems. For example, the '017 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

112. For example, the '017 patent describes numerous techniques for secure third-party communications that inform the invention's development but do not, standing alone, fall within the scope of its claims:

- Key Escrow. U.S. Pat. No. 6,009,177 to Sudia, relates to a cryptographic system and method with a key escrow feature that uses a method for verifiably splitting users' private encryption keys into components and for sending those components to trusted agents chosen by the particular users.
- Partitioning of Information Storage Systems. U.S. Patent No. 5,956,400 to Chaum, relates to partitioned information storage systems with controlled retrieval.
- Use of a Trusted Intermediary. U.S. Patent No. 6,161,181 to Haynes, describing secure electronic transactions using a trusted Intermediary; U.S. Patent No. 6,145,079 to Misty, describing secure electronic transactions using a trusted intermediary to perform electronic services.
- Split Key Storage. U.S. Patent No. 6,118,874 to Okamoto, teaching encrypted data using split storage key and system.
- Use of a Cryptographic File Labeling System. U.S. Pat. No. 5,953,419 to Lohstroh, disclosing cryptographic file labeling system for supporting secured access by multiple users.

- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, disclosing a personal storage device for receipt, storage, and transfer of digital information to other electronic devices; *see also* U.S. Pat. No. 5,991,519 to Benhammou; U.S. Pat. No. 5,999,629 to Heer; and U.S. Pat. No. 6,034,618 to Tatebayashi.
- Computer Network Firewalls and Agents. U.S. Pat. No. 6,061,798 to Coley, disclosed the use of an assigned proxy agent to verify the authority of an incoming request to access a network element indicated in the request. Once verified, the proxy agent completes the connection to the protected network element on behalf of the source of the incoming request; *see also* U.S. Pat. No. 6,023,762 to Dean, disclosing a data access and retrieval system which comprises a plurality of user data sources each storing electronic data signals describing data specific to a user, or enabling services selected by a user; an agent device which is configurable to select individual ones of the user data sources and present selections of user data and service data to a set of callers who may interrogate the agent device remotely over a communications network; and U.S. Pat. No. 6,029,150 to Kravitz, disclosing a system and method of payment in an electronic payment system wherein a plurality of customers have accounts with an agent. Further, the patent lists thirty-three other patented systems involving Computer Network Firewalls that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.
- Virtual Private Networks. As described in: U.S. Pat. No. 6,079,020 to Liu and U.S. Pat. No. 6,081,900 and twenty other patented systems involving virtual private networks that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.
- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos, disclosing the use of biometrics such as fingerprints to facilitate secure communications and identification of users. Further, the '017 lists numerous patented systems that use biometric authentication that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.

113. Although “[e]ncryption, in general, represents a basic building block of human ingenuity that has been used for hundreds, if not thousands, of years,”³² the claims in the ‘017 patent do not claim, or attempt to preempt, “some process that involves the encryption of data for some purpose” (or similar abstraction).

³² *Paone v. Broadcom Corp.*, Case No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015) (*citing Fid. Nat'l Info. Servs., Inc.*, Petitioner, CBM2014-00021, 2015 WL 1967328, at *8 (Apr. 29, 2015) (both upholding the patent eligibility of patents directed toward encryption).

114. The '017 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer

115. The claimed subject matter of the '017 patent is not a pre-existing but undiscovered algorithm.

116. The '017 patent claims systems and methods that “could not conceivably be performed in the human mind or pencil and paper.”³³

117. The claims in the '017 patent require the modifying of data that has concrete and valuable effects in the field of secure third-party communications. By allowing an intermediary to receive secure information but not gain access to the unencrypted form of the information, the '017 patent improves the security of computer systems. Prior art systems that the '017 patent remedies enabled unauthorized “access to private communications or otherwise undermine[d] transactional security or privacy.” Companies have described the use of encryption in the cloud as important to improve the security and functioning of systems.

For many organizations, keeping data private and secure has also become a compliance requirement. Standards including Health Insurance Portability and Accountability Act of 1996 (HIPAA), Sarbanes-Oxley (SOX), Payment Card Industry Data Security Standard (PCI DSS), the Gramm-Leach-Bliley Act, and EU Data Protection Directives all **require that organizations protect their data at rest and provide defenses against threats.**

HP Atalla Cloud Encryption: Securing Data in The Cloud, HP TECHNICAL WHITE PAPER 2 (2014) (emphasis added).

118. The '017 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.

119. The claimed invention in the '017 claims is rooted in computer technology and overcame problems specifically arising in the realm of computer networks.

³³ *TQP Dev., LLC v. Intuit Inc.*, Case No. 2:12-CV-180-WCB, 2014 WL 651935, at *4 (E.D. Tex. Feb. 19, 2014) ((finding claims directed to encryption to be patent eligible); *see also Paone v. Broadcom Corp.*, Case No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015); *see also Prism Technologies, LLC v. T-Mobile USA, Inc.*, 12-cv-124, Dkt. No. 428 at 7 (D. Neb. Sept. 22, 2015) (Finding on cross motions for summary judgment that patents directed at delivering resources over an untrusted network were patent eligible. “The problems addressed by Prism’s claims are ones that ‘arose uniquely in the context of the Internet.’”).

120. The systems and methods claimed in the '017 patent were not a longstanding or fundamental economic practice at the time of the patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general. As just one example, at the time the inventions disclosed in the '017 patent were conceived, the use of asymmetric encryption keys was described by Oracle as “relatively new.”³⁴

A Public Key Infrastructure (PKI) consists of protocols, services, and standards supporting applications of public key cryptography. ***Because the technology is still relatively new***, the term PKI is somewhat loosely defined.

Introduction to the SSL Technology, ORACLE DOCUMENTATION (February 1, 2001), http://docs.oracle.com/cd/E53645_01/tuxedo/docs12cr2/security/publickey.html (emphasis added).

121. The asserted claims do not involve a method of doing business implemented on a computer; instead, it involves a method for changing data in a way that will affect the communication system itself, by making it more secure. The security challenges that the '017 patent is directed at were new and unique to distributed networks as confirmed in a recent paper from Accenture Services Pvt. Ltd. “The unprecedented growth of cloud computing has created new security challenges. The problem is ever more complex as there is a transition from traditional computing to a service-based computing.”³⁵

122. The '017 patent claims are not directed to a mathematical relationship or formula. The '017 patent claims concrete, specific computer systems and methods for cryptographically protecting and managing access to secure data in multi-party communications.

123. The '017 patent claims cover a systems and methods that transform data from one form into another that will be recognizable by the intended recipient but secure against

³⁴ See also *BackupEDGE Encryption Whitepaper*, MICROLITE CORPORATION at 2 (2003) (describing the technology of asymmetric keys as “new”); Roger Clarke, MESSAGE TRANSMISSION SECURITY (May 1998), <http://www.rogerclarke.com/II/CryptoSecy.html> (“Public key cryptography is relatively new and technically complex.”).

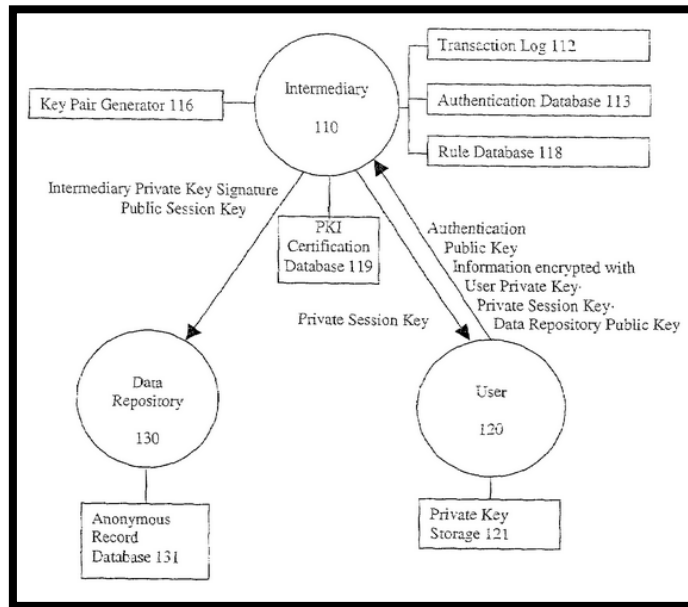
³⁵ Deepak Panth, Dhananjay Mehta and Rituparna Shelgaonkar, *A Survey on Security Mechanisms of Leading Cloud Service Providers*, in INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 98(1) at 34 (July 2014).

decryption by unintended recipients. IBM, in its reference guides (“redbooks”), refers to encryption as “transform[ing] data that is unprotected.”

Data Security: Data security was the most important concern that had hindered the acceptance of the cloud computing initially. Storing and processing the data, running software, using CPU and virtual Machines on others’ infrastructure were some serious concerns for the users initially. Data breach, data integrity and data loss are major security issues that posed threats to organization's data and software. Moreover, the multi-tenancy model and pooled computing resources over cloud have introduced new security challenges requiring new techniques to tackle with [4] [5] [6].

Bertrand Dufrasne and Robert Tondini, IBM DS8870 DISK ENCRYPTION 6th Edition at 4 (2015) (from a reference guide published by IBM).

124. One or more claims of the ‘017 patent require a specific configuration of electronic devices, a network configuration, and the use of encryption systems to secure communications from access by an intermediary. These are meaningful limitations that tie the claimed methods and systems to specific machines. For example, the below diagram from the ‘017 patent illustrates a specific configuration of hardware disclosed in the patent.



‘017 patent, Fig. 2.

3. U.S. Patent No. 7,869,591

125. U.S. Patent No. 7,869,591 (the “’591 patent”) entitled, System and Method for Secure Three-Party Communications, was filed on February 16, 2007, and claims priority to March 23, 2001. St. Luke is the owner by assignment of the ‘591 patent. A true and correct copy of the ‘591 patent is attached hereto as Exhibit C.

126. The ‘591 patent has been cited by over twenty issued United States patents as relevant prior art. Specifically, patents issued to the following companies have cited the ‘591 patent.

- Square, Inc.
- Konnlike Philips Electronics, N.V.
- Red Hat, Inc.
- Microsoft Corporation
- Industrial Technology Research Institute (“ITRI”)
- Electronics and Telecommunications Research Institute (ETRI)
- Saas Document Solutions Limited
- Good Technology Corporation
- Avanade, Inc.
- Medical Management International, Inc.

127. The ‘591 patent claims specific methods and systems for secure third-party communications—for example, a system and method for communicating information between a first party and a second party that includes identifying desired information; negotiating, through an intermediary, a cryptographic comprehension function for obscuring at least a portion of the information communicated between the first party and the second party; communicating the encrypted information to the second party; and decrypting the encrypted information using the negotiated cryptographic comprehension function. Moreover, in the patented systems and methods, the intermediary does not itself possess sufficient information to decrypt the encrypted information, thus allowing use of an “untrusted” intermediary.

128. The claims in the ‘591 patent are directed at a technical solution to a problem unique to computer networks – securely transmitting encrypted electronic information via an intermediary device, wherein the electronic information is cryptographically secure not only from outside attackers, but also from the intermediary.

129. At the time of the inventions claimed in the ‘591 patent, securely processing, transmitting, and accessing protected electronic data in a massively distributed computing environment presented new and unique issues over the state of the art. As explained in the ‘591 patent: “Often, the nature of these communications protocols places the third party (or group of third parties) in a position of trust, meaning that the third party or parties, without access to additional information, can gain access to private communications or otherwise undermine transactional security or privacy.” ‘591 patent, col. 2:10-15.

Generating and protecting encryption keys while maintaining data availability has traditionally been a major barrier to implementing encryption, especially on an enterprise scale. Key management is complex and challenging, and often fails because issuance, storage, and renewing are difficult. ***Worse yet, lost keys can make important data permanently unrecoverable.***

Sustainable Compliance for the Payment Card Industry Data Security Standard, ORACLE WHITE PAPER 23 (July 2015) (emphasis added).

130. Although the systems and methods taught in the ‘591 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the ‘591 patent claims were innovative and novel. “Typical public key encryption technologies, however, presume that a pair of communications partners seek to communicate directly between each other, without the optional or mandatory participation of a third party, and, in fact, are designed specifically to exclude third party monitoring.” ‘591 patent, col. 2:54-69. As described in an article contemporaneous to the ‘591 patent, the rise of cloud computing and distributed networks gave rise to a need to use key encryption to resolve security issues.

stored or communicated. As information becomes increasingly mobile, moving rapidly from application to application and system to system, this feature becomes more and more desirable. Public-key schemes are scalable: their operation is well-suited to environments with lots of users. The advent of large-scale open networks like the Internet necessitates this property.

Simon Blake-Wilson, *Information Security, Mathematics and Public-Key Cryptography*, in *Designs, Codes and Cryptography* Vol. 19 at 81 (2000).

131. Further, the ‘591 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary

without the intermediary gaining access to the unencrypted information. This improves the security of the computer system and allows it to be more efficient.³⁶ “Third parties, however, may offer valuable services to the participants in a communication, but existing protocols for involvement of more than two parties are either inefficient or insecure.” ‘591 patent, col. 2:59-62. Studies have confirmed that the inventions disclosed in the ‘591 patent improve the security of systems.

Key management is a big concern with encryption, because the effectiveness of the solution ultimately depends on protecting the key. If the key is exposed, the data being protected with the key is, essentially, exposed. Wherever the key is stored, it must be protected, and it should be changed on occasion. For example, if an administrator with access to a key leaves an organization, the key should be changed.

Tanya Baccam, *Transparent Data Encryption: New Technologies and Best Practices for Database Encryption*, SANS WHITE PAPER 3 (April 2010) (emphasis added).

132. The ‘591 patent claims are not directed to a “method of organizing human activity,” “fundamental economic practice long prevalent in our system of commerce,” or “a building block of the modern economy.” Instead, they are limited to a concretely circumscribed set of methods and systems for transcribing electronic information that is transmitted over a computer network via an intermediary.

133. The ‘591 patent claims are not directed at the broad concept/idea of “encrypting” or “decrypting” information. Instead, they are limited to a concretely circumscribed set of methods and systems for transcribing electronic information that is transmitted over a computer network via an intermediary. This type of method and system is unique to the Internet age.

³⁶ See Kevin Hamlen et al., *Security Issues For Cloud Computing* at 39, INTERNATIONAL JOURNAL OF INFORMATION SECURITY AND PRIVACY VOL. 4(2) (April-June 2010) (“The major security challenge with clouds is that the owner of the data may not have control of where the data is placed. . . . Therefore, we need to safeguard the data in the midst of untrusted processes.”); Elena Ferrari and Bhavani Thuraisingham, *Security and Privacy for Web Databases and Services* at 17, PROCEEDINGS OF THE EDBT CONFERENCE (March 2003) (“very little work has been devoted to security”); Elisa Bertino et al., *Selective and Authentic Third-Party Distribution of XML Documents* at 1263, IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, Vol. 16 No. 10 (October 2004) (“The most intuitive solution is that of requiring Publishers to be trusted with regard to the considered security properties. However, this solution could not always be feasible in the Web environment since large Web-based systems cannot be easily verified to be secure.”).

134. The inventive concepts claimed in the '591 patent are technological, not “entrepreneurial.” For example, transcribing protected electronic information between a first (e.g., server) encrypted form and a second (e.g., network) encrypted form without a substantial intermediate representation of the information in decrypted form is a specific, concrete solution to the technological problem of transferring encrypted information via an intermediary without providing the intermediary substantial access to the information.

135. Companies such as Oracle have recognized that until recently security for distributed systems was not a primary concern.

- Security was not a major issue, even for Oracle
 - Standard passwords (scott/tiger, system/manager, ...)
 - Oracle standard users were installed and left open (though not at SAP!)
 - There are some recommendations, but not much more.
 - From Oracle9i, the issue of security was increasingly addressed by Oracle (DBCA: locking of default accounts, ..., 10.2: CONNECT roles)

Andreas Becker, *High Security for SAP Data with Oracle Database Vault and Transparent Data Encryption*, ORACLE PRESENTATION 6 (2010).

136. Researchers have identified the problems the '591 patent is directed at solving arise from new security challenges relating to cloud computing.

Data Security: Data security was the most important concern that had hindered the acceptance of the cloud computing initially. Storing and processing the data, running software, using CPU and virtual Machines on others' infrastructure were some serious concerns for the users initially. Data breach, data integrity and data loss are major security issues that posed threats to organization's data and software. Moreover, the multi-tenancy model and pooled computing resources over cloud have introduced new security challenges requiring new techniques to tackle with [4] [5] [6].

Deepak Panth, Dhananjay Mehta and Rituparna Shelgaonkar, *A Survey on Security Mechanisms of Leading Cloud Service Providers*, in INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 98(1) at 34 (July 2014) (emphasis added).³⁷

³⁷ See also Vaibhav Khadilkar, Murat Kantarcioglu, and Bhavani Thuraisingham. *Secure Data Processing in a Hybrid Cloud* at 1-2, Computing Research Repository (CoRR) abs/1105.1982 (2011) (“The emergence of cloud computing has created a paradigm shift by allowing parallel processing of massive amounts of data. . . . [H]ow do users protect themselves from cloud

137. The '591 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, the claims of the '591 patent require cryptographically manipulating protected electronic information using one or more intermediary computing devices specially configured to yield a desired result—a result that overrides the routine and conventional sequence of events in electronic communications, even encrypted electronic communications.

138. The '591 patent is directed to specific problems in the field of cryptography. In the “Background” section of the patent, the '591 patent explains that encryption systems use “keys,” similar to passwords, to control how plaintext is encrypted and decrypted. '591 patent, col. 2:16-37. An encryption system thereby encrypts and decrypts information differently depending upon the key input. *Id.* Two common cryptanalytic attacks, linear and differential cryptanalysis, analyze large amounts of cipher text (encrypted information) and different possible keys in order to eventually converge on the correct key and break the encryption. *Id.* Both attacks exploit the fact that some encryption systems use static keys to create the cipher text. *Id.* In other words, using the same key repeatedly gives an attacker more information to work with. The inventions of the '591 patent introduce several novel techniques to overcome these weaknesses particularly where encrypted information is held by an intermediary.

139. The preemptive effect of the '591 patent is concretely circumscribed by specific limitations. For example, claim 13 of the '591 patent requires:

A method for transcribing information, comprising:

- (a) receiving and storing in a first memory information encrypted based on a first set of cryptographic keys, a first portion of the first set of cryptographic keys having been employed to produce the encrypted information and a second portion of the first set of cryptographic keys being required to decrypt the information

service providers who may be able to access their data? This issue is related to data security and is relevant for users since their data is placed at the provider's site.”).

encrypted with the first portion of the first set of cryptographic information;

(b) receiving and storing in a second memory a first portion of a second set of cryptographic keys, having a corresponding second portion of the second set of cryptographic keys being required for decryption of a message encrypted using the first portion of the second set of cryptographic keys;

(c) negotiating a set of session keys through a communication port,

(d) generating a transcription key for transforming the received encrypted information to transcribed information, in dependence on at least:

(i) information representing the second portion of the first set of cryptographic keys,

(ii) information representing the first portion of the second set of cryptographic keys; and

(iii) a first portion of the set of session keys, and

(e) transcribing the stored encrypted information into transcribed information using the transcription key, wherein the generating a transcription key step and the transcribing the encrypted information step are performed without either requiring or employing sufficient information either to decrypt the encrypted information or to comprehend the transcribed information.

140. The '591 patent does not attempt to preempt every application of the idea of encrypting electronic information transmitted over a computer network, or even the idea of encrypting electronic information transmitted over a computer network via an intermediary.

141. The '591 patent does not preempt the field of secure third-party communications systems, or prevent use of alternative secure third-party communications systems. For example, the '591 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

142. For example, the '591 patent describes numerous techniques for secure third-party communications that inform the invention's development but do not, standing alone, fall within the scope of its claims:

- Key Escrow. U.S. Pat. No. 6,009,177 to Sudia, relates to a cryptographic system and method with a key escrow feature that uses a method for verifiably splitting users' private encryption keys into components and for sending those components to trusted agents chosen by the particular users.
- Partitioning of Information Storage Systems. U.S. Patent No. 5,956,400 to Chaum, relates to partitioned information storage systems with controlled retrieval.
- Use of a Trusted Intermediary. U.S. Patent No. 6,161,181 to Haynes, describing secure electronic transactions using a trusted Intermediary; U.S. Patent No. 6,145,079 to Misty, describing secure electronic transactions using a trusted intermediary to perform electronic services.
- Split Key Storage. U.S. Patent No. 6,118,874 to Okamoto, teaching encrypted data using split storage key and system.
- Use of a Cryptographic File Labeling System. U.S. Pat. No. 5,953,419 to Lohstroh, disclosing cryptographic file labeling system for supporting secured access by multiple users.
- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, disclosing a personal storage device for receipt, storage, and transfer of digital information to other electronic devices; *see also* U.S. Pat. No. 5,991,519 to Benhammou; U.S. Pat. No. 5,999,629 to Heer; and U.S. Pat. No. 6,034,618 to Tatebayashi.
- Computer Network Firewalls and Agents. U.S. Pat. No. 6,061,798 to Coley, disclosed the use of an assigned proxy agent to verify the authority of an incoming request to access a network element indicated in the request. Once verified, the proxy agent completes the connection to the protected network element on behalf of the source of the incoming request; *see also* U.S. Pat. No. 6,023,762 to Dean, disclosing a data access and retrieval system which comprises a plurality of user data sources each storing electronic data signals describing data specific to a user, or enabling services selected by a user; an agent device which is configurable to select individual ones of the user data sources and present selections of user data and service data to a set of callers who may interrogate the agent device remotely over a communications network; and U.S. Pat. No. 6,029,150 to Kravitz, disclosing a system and method of payment in an electronic payment system wherein a plurality of customers have accounts with an agent. Further, the patent lists thirty-three other patented systems involving Computer Network Firewalls that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.

- Virtual Private Networks. As described in: U.S. Pat. No. 6,079,020 to Liu and U.S. Pat. No. 6,081,900 and twenty other patented systems involving virtual private networks that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.
- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos, disclosing the use of biometrics such as fingerprints to facilitate secure communications and identification of users. Further, the '591 lists numerous patented systems that use biometric authentication that are not, standing alone, preempted by the inventions claimed in the patents-in-suit.

143. Although “[e]ncryption, in general, represents a basic building block of human ingenuity that has been used for hundreds, if not thousands, of years,”³⁸ the claims in the '591 patent do not claim, or attempt to preempt, “some process that involves the encryption of data for some purpose” (or similar abstraction).

144. The '591 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer

145. The claimed subject matter of the '591 patent is not a pre-existing but undiscovered algorithm.

146. The '591 patent claims systems and methods that “could not conceivably be performed in the human mind or pencil and paper.”³⁹

147. The claims in the '591 patent require the modifying of data that has concrete and valuable effects in the field of secure third-party communications. By allowing an intermediary to receive secure information but not gain access to the unencrypted form of the information, the '591 patent improves the security of computer systems. Prior art systems that the '591 patent

³⁸ *Paone v. Broadcom Corp.*, Case No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015) (citing *Fid. Nat'l Info. Servs., Inc.*, Petitioner, CBM2014-00021, 2015 WL 1967328, at *8 (Apr. 29, 2015) (both upholding the patent eligibility of patents directed toward encryption).

³⁹ *TQP Dev., LLC v. Intuit Inc.*, Case No. 2:12-CV-180-WCB, 2014 WL 651935, at *4 (E.D. Tex. Feb. 19, 2014) ((finding claims directed to encryption to be patent eligible); see also *Paone v. Broadcom Corp.*, Case No. 15 Civ. 0596-BMC-GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015); see also *Prism Technologies, LLC v. T-Mobile USA, Inc.*, 12-cv-124, Dkt. No. 428 at 7 (D. Neb. Sept. 22, 2015) (Finding on cross motions for summary judgment that patents directed at delivering resources over an untrusted network were patent eligible. “The problems addressed by Prism’s claims are ones that ‘arose uniquely in the context of the Internet.’”).

remedies enabled unauthorized “access to private communications or otherwise undermine[d] transactional security or privacy.” Companies have described the use of encryption in the cloud as important to improve the security and functioning of systems.

For many organizations, keeping data private and secure has also become a compliance requirement. Standards including Health Insurance Portability and Accountability Act of 1996 (HIPAA), Sarbanes-Oxley (SOX), Payment Card Industry Data Security Standard (PCI DSS), the Gramm-Leach-Bliley Act, and EU Data Protection Directives all *require that organizations protect their data at rest and provide defenses against threats*.

HP Atalla Cloud Encryption: Securing Data in The Cloud, HP TECHNICAL WHITE PAPER 2 (2014) (emphasis added).

148. The ‘591 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.

149. The claimed invention in the ‘591 claims is rooted in computer technology and overcame problems specifically arising in the realm of computer networks.

150. The systems and methods claimed in the ‘591 patent were not a longstanding or fundamental economic practice at the time of the patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general. As just one example, at the time the inventions disclosed in the ‘591 patent were conceived, the use of asymmetric encryption keys was described by Oracle as “relatively new.”⁴⁰

A Public Key Infrastructure (PKI) consists of protocols, services, and standards supporting applications of public key cryptography. *Because the technology is still relatively new*, the term PKI is somewhat loosely defined.

Introduction to the SSL Technology, ORACLE DOCUMENTATION (February 1, 2001), <http://docs.oracle.com/cd/E5364501/tuxedo/docs12cr2/security/publickey.html> (emphasis added).

151. The asserted claims do not involve a method of doing business that happens to be implemented on a computer; instead, they involve a method for changing data in a way that will affect the communication system itself, by making it more secure. The security challenges that

⁴⁰ See also *BackupEDGE Encryption Whitepaper*, Microlite CORPORATION at 2 (2003) (describing the technology of asymmetric keys as “new”); Roger Clarke, MESSAGE TRANSMISSION SECURITY (May 1998), <http://www.rogerclarke.com/II/CryptoSecy.html> (“Public key cryptography is relatively new and technically complex.”).

the '591 patent is directed at were new and unique to distributed networks as confirmed in a recent paper from Accenture Services Pvt. Ltd. "The unprecedented growth of cloud computing has created new security challenges. The problem is ever more complex as there is a transition from traditional computing to a service-based computing."⁴¹

152. The '591 patent claims are not directed at a mathematical relationship or formula. The '591 patent claims concrete, specific computer systems and methods for cryptographically protecting and managing access to secure data in multi-party communications.

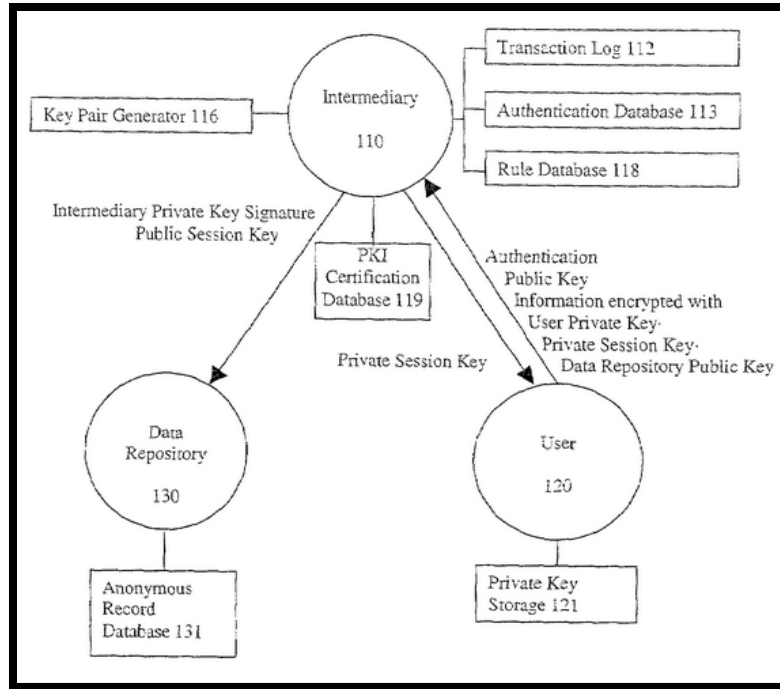
153. '591 patent claims transform data from one form into another that will be recognizable by the intended recipient but secure against decryption by unintended recipients. IBM, in its reference guides ("redbooks"), refers to encryption as "transform[ing] data that is unprotected.

Data Security: Data security was the most important concern that had hindered the acceptance of the cloud computing initially. Storing and processing the data, running software, using CPU and virtual Machines on others' infrastructure were some serious concerns for the users initially. Data breach, data integrity and data loss are major security issues that posed threats to organization's data and software. Moreover, the multi-tenancy model and pooled computing resources over cloud have introduced new security challenges requiring new techniques to tackle with [4] [5] [6].

Bertrand Dufresne and Robert Tondini, IBM DS8870 DISK ENCRYPTION 6th Edition at 4 (2015) (from a reference guide published by IBM).

154. One or more claims of the '591 patent require a specific configuration of electronic devices, a network configuration, and the use of encryption systems to secure communications from access by an intermediary. These are meaningful limitations that tie the claimed methods and systems to specific machines. For example, the below diagram from the '591 patent illustrates a specific configuration of hardware disclosed in the patent.

⁴¹ Deepak Panth, Dhananjay Mehta and Rituparna Shelgaonkar, *A Survey on Security Mechanisms of Leading Cloud Service Providers*, in INTERNATIONAL JOURNAL OF COMPUTER APPLICATIONS 98(1) at 34 (July 2014).



‘591 patent, Fig. 2.

C. Information Record Infrastructure Patents

155. The IRI patents disclose specific computer based systems and methods for electronically structuring and controlling access to protected data in a plurality of external databases.

156. Over fifteen years ago, Mr. Felsher conceived of the inventions disclosed in the IRI patents, based on his experiences with the limitations in existing systems for controlling access to electronic medical records and protected electronic data.

157. During Mr. Felsher’s work in the field of electronic medical records, he witnessed first-hand the drawbacks to existing computer systems and methods for controlling access to protected data. Existing systems failed to efficiently transmit unstructured protected information. ‘368 patent, col. 3:5-10. Other problems included the inability to secure the protection of data, integrate content management functions, and create a trust infrastructure wherein an independent third party represents and serves as an agent for the content owner. *Id.* at col. 3:4-54:16. The result was an inability to effectively manage access to protective data.

The IRI patents disclosed systems and methods that overcome these drawbacks. The inventions disclosed in the IRI patents improved upon the then-available technology, enabled efficient access control of unstructured data, reduced costs, and ultimately resulted in a more secure system.

158. Verizon's competitors, such as Microsoft Corporation and Hewlett Packard Company, have confirmed the importance and value of systems and methods that manage access to protected data.

Today, the need for data protection and security goes well beyond the realm of access privileges and firewalls. Organizations of all sizes, in public and private sectors, must not only protect information from unauthorized access and intrusion but also manage how documents, presentations, spreadsheets, and e-mails are handled in the normal course of daily business

HP Information Rights Management Solutions Ensuring Life Cycle Protection Of Digital Information in Microsoft Environments, HP WHITE PAPER (2005).

Such cloud adoption within the healthcare industry is gaining momentum because the economic, clinician productivity and care team collaboration advantages of the cloud are undeniable. However, as was the case for UCHHealth, there's ***one fundamental concern that continues to weigh heavily on the minds of providers: Is patient data safe, secure and private in the cloud.***

University of Colorado Health Adopts Microsoft Office 365 for its data privacy and security commitment, MICROSOFT ON THE ISSUES BLOG (December 18, 2013), <http://blogs.microsoft.com/on-the-issues/2013/12/18/university-of-colorado-health-adopts-microsoft-office-365-for-its-data-privacy-and-security-commitment/> (emphasis added).

159. Academics have confirmed the value of secure information access management systems such as the inventions disclosed in the IRI patents.

With the proliferation of the Internet, the speed and ease of digital data exchange has increased, together with the number of potential parties that can exchange data. This has also meant that digital data security is no longer confined to the computer that holds the original data, or even behind corporate firewalls. Furthermore, data security no longer applies only to the access to data, but also to what the user can do with the data

Alapan Arnab and Andrew Hutchinson, *Digital Rights Management - An Overview of Current Challenges and Solutions*, in PROCEEDINGS OF INFORMATION SECURITY SOUTH AFRICA CONFERENCE (2004) (emphasis added).

160. Although major corporations offer systems for providing secure access to protected data today, at the time the inventions disclosed in the IRI patents were conceived,

systems had significant limitations that were addressed by the inventions disclosed in the IRI patents.

While “awareness of risks and of possible technical solutions is increasing,” the authors would appear to be describing a rather precarious environment, at least in the short run. The picture does not improve when one focuses on the details of some of the technical fixes. Barrows and Clayton deem “tight” prospective access restrictions—a “need to know.” mandatory access control model—as largely incompatible with the dynamic health care environment.

Reid Cushman, *Serious Technology Assessment for Health Care Information Technology*, JOURNAL OF THE AMERICAN MEDICAL INFORMATICS ASSOCIATION 4(4) (1997).⁴²

161. The claims in the IRI patents describe solutions that are rooted in computer technology to overcome problems specific to and characteristic of complex computer networks where protected data is stored. For example, academics identified distributed information systems as leading to new problems regarding information rights management that the IRI patents solve.

The development and wider use of wireless networks and mobile devices has led to novel pervasive computing environments *which pose new problems for software rights management* and enforcement on resource-constrained and occasionally connected devices. . . . The latter opens new channels for super-distribution and sharing of software applications that do not impose a cost on the user.

Ivana Dusparic, Dominik Dahlem, and Jim Dowling, *Flexible Application Rights Management in a Pervasive Environment*, in IEEE INTERNATIONAL CONFERENCE ON E-TECHNOLOGY, E-COMMERCE AND E-SERVICE, pages 680–685 (2005) (emphasis added).⁴³

⁴² This reference is cited on the face of the IRI patents as an exemplar illustrating limitations in systems existing at the time the inventions disclosed in the IRI patents were conceived; *see also* Alapan Arnab and Andrew Hutchinson, *Digital Rights Management - An Overview of Current Challenges and Solutions*, in PROCEEDINGS OF INFORMATION SECURITY SOUTH AFRICA CONFERENCE (2004) (emphasis added) (“none of these products provide for all the needs of an enterprise, and furthermore these products do not offer all the benefits that DRM potentially offers to an enterprise”).

⁴³ *See also* Aaron Franks, Stephen LaRoy, Miek Wood, and Mike Worth. *Idrm: An Analysis Of Digital Rights Management For The Itunes Music Store*, TECHNICAL REPORT, UNIVERSITY OF BRITISH COLUMBIA (2005) (“The need for secure digital rights management (DRM) is more urgent today than ever before. With the rapid increase in broadband availability, Internet file sharing has become a threat to content providers’ bottom line.”); Mike Godwin, *What Every Citizen Should Know About DRM, A.K.A. ‘Digital Rights Management,’* PUBLIC KNOWLEDGE (2004) (“As circumvention tools evolve, and as new technologies pose new infringement problems, the locking of industrial sectors into a particular “standard” scheme, mediated and supervised by government, actually slows the ability of the content sector to respond to new problems.”); HP DIGITAL RIGHTS MANAGEMENT (DRM) FOR NETWORK AND SERVICE PROVIDERS

Then there is the cloud. Cloud, cloud, cloud, it's on every webcast, in every article. The cloud has many advantages. Why wouldn't you want to outsource all your costs of network management, storage, system administration? The cloud makes perfect sense but has one massive concern... security.

Simon Thorpe, *Security in the Enterprise 2.0 World: Conflicts of Collaboration*, ORACLE OFFICIAL BLOG, September 27, 2010, <https://blogs.oracle.com/irm/>.

162. Although secure and effective information rights management, in some form, has been an objective of corporations and researchers for many years ('368 patent, col. 6:61-7:3), the IRI patents are directed at solving problems that are unique to the realm of computers and specifically network cloud computing.

163. The systems and methods disclosed in the IRI patents have particular application to two primary fields: electronic medical records and electronic rights management. Shortcomings in available technology at the time the inventions disclosed in the IRI patents were conceived, lead to the development of the IRI patents.

164. A brief overview of the state of the prior art in these two areas provides context to understanding the truly inventive nature of the IRI patents. The specific systems and methods disclosed and claimed in the IRI patents are discussed in detail later in this Complaint.

165. Background on the state of the art at the time of the inventions disclosed in the IRI patents confirms that the patented inventions are limited to specific computer systems and methods address issues specific to accessing protected data using modern computer networks.

166. ***Information Rights Management.*** The inventions disclosed in the IRI patents have particular application to the management of rights in digital works, to allow a content owner to exploit the value of the works while assuring control over the use and dissemination. The IRI patents address problems specific to and arising from distribution and protected works on the internet.

167. At the time the inventions disclosed in the IRI patents were conceived, the growth of the internet created unique problems relating to managing rights to protected works.

(NSPs), HP SOLUTION BRIEF (2003) (“DRM [Digital Rights Management] is an emerging technology with fragmented addressable markets, solution capabilities and standards.”).

There's too much data being collected in so many ways, and a lot of it in ways that you don't feel you had a role in the specific transaction," he [Craig Mundie] said. "Now that you're just being observed, whether it's for commercial purposes or other activities, *we have to move to a new model.*" . . . Under the model imagined by Mundie [a] central authority would distribute encryption keys to applications, allowing them to access protected data in the ways approved by the data's owners.

Tom Simonite, *Microsoft Thinks DRM Can Solve the Privacy Problem*, MIT TECHNOLOGY REVIEW, October 10, 2013 (emphasis added) (Craig Mundie is Senior Advisor to the CEO at Microsoft and its former Chief Research and Strategy Officer).⁴⁴

168. In the late 1990s and early 2000s, information rights management systems had significant limitations. Prior art systems did not create a trust infrastructure wherein an independent third party represents and serves as agent for the content owner, implementing a set of restrictive rules for use of the content, and interacting and servicing customers.

169. Rudimentary information rights management systems such as Microsoft's PlayForSure and RealNetwork's Rhapsody were still years from being released. Even when these systems were released in 2004 they had significant limitations. Both systems lacked the ability of a third party to act as an intermediary between a content creator and a user. The state of the art at the time the inventions disclosed in the IRI patents were conceived underscores the inventive nature of the IRI patents.

170. *Electronic Medical Records*. The IRI patents disclose systems and methods for controlling access to protected health information where the information is stored in one or more external databases. Systems for controlling access to medical records, contemporaneous to the IRI patents had significant limitations that the IRI patents address.⁴⁵ These systems included: (1)

Anonymizing Records. A method used in contemporaneous systems to the IRI patents is the

⁴⁴ See also Martin Abrahams, *Document Theft - IRM as a Last Line of Defense*, ORACLE IRM, THE OFFICIAL BLOG, August 1, 2011, <https://blogs.oracle.com/irm/> ("The relevance of IRM is clear. . . . In a cloudy world, where perimeters are of diminishing relevance, you need to apply controls to the assets themselves.").

⁴⁵ See Reid Cushman, *Serious Technology Assessment for Health Care Information Technology*, J. AM. MED. INFORM. ASSOC. 4: 259-265 (1997) (This article is cited on the face of the IRI patents and finds "Data protection practices in the typical late twentieth-century organization are not very good, even in putatively "secure" institutions. . . . The forthcoming study of health care security by the National Academy of Sciences, to be released in February 1997, is expected to reach a similar conclusion. The widespread deficits in security are hardly a secret; they are common fodder among information systems professionals.").

maintenance of anonymous medical records. However, such techniques did not provide patients and medical professionals the ability to access patient specific records. (2) Indexing. Systems contemporaneous to the IRI patents indexed medical records with anonymous identification codes. While these systems preserved privacy, these systems made locating a database record other than by patient identifier, or its accession identifier, difficult. (3) Proxy Systems. Other contemporaneous systems used a proxy server to protect user privacy. However, systems using an Internet proxy resulted in a loss of rights and did not act in a representative capacity for the content owner, and did not integrate content management functions.

171. In addition, access to these early medical records systems was limited to authorized individuals who were on-site, as these systems provided little-to-no connectivity to anyone outside of the organization or to the Internet generally. Because access was restricted to on-site users on a local network using stationary terminals in designated areas, there was very little emphasis placed on data security.

172. In sharp contrast – to the flexible, modular, and tightly integrated multi-layer security and access control framework disclosed and claimed in the IRI patents, systems such as Epic System Corporation’s CareWeb⁴⁶ had significant limitations including: inability to effectively control access on a record-by-record basis within respective external databases, as claimed in several IRI patents; inability to distinguish between records within an external or backend database, the databases accessed through CareWeb were basically opaque to the “CareWeb” system; CareWeb’s implementation because of its fixed structure was expressly limited to a particular, monolithic front-end architecture for secure implementation.

173. At the time the inventions disclosed in the IRI patents were conceived, the medical community showed little sign of implementing a system for controlling access to

⁴⁶ John D. Halamka, Peter Szolovits, David Rind, and Charles Safran, *A WWW Implementation of National Recommendations for Protecting Electronic Health Information*, J. AM. MED. INFORM. ASSOC. 4: 458-464 (1997) (The limitations of the CareWeb system are discussed in depth in the specification of the IRI patents.).

medical records that were stored in external databases. However, computer networks presented new challenges and unique problems that the IRI patents addressed.

As health care moves from paper to electronic data collection, providing easier access and dissemination of health information, the development of guiding privacy, confidentiality, and security principles is necessary to help balance the protection of patients' privacy interests against appropriate information access. . . . It is imperative that all participants in our health care system work actively toward a viable resolution of this information privacy debate.

Suzu Buckovich, Helga Rippen, and Michael Rozen, *Driving Toward Guiding Principles: A Goal for Privacy, Confidentiality, and Security of Health Information*, J. AM. MED. INFORM. ASSOC. 6 (1999).

174. The need for a secure system for providing access to medical records was specifically required to address cloud computing where medical records were stored in one or more external databases.

The healthcare industry is in a major period of transformation and IT modernization. More than ever, healthcare providers and professionals are faced with the need to be more efficient, reduce costs and collaborate seamlessly as virtual teams to deliver higher quality care for more people at a lower cost point. Healthcare organizations are increasingly looking to cloud technologies to help them meet these goals. However, a natural concern with using cloud technology is keeping sensitive health information private and secure.

Hemant Pathak, DATA PRIVACY AND COMPLIANCE IN THE CLOUD IS ESSENTIAL FOR THE HEALTHCARE INDUSTRY (December 2013), <http://www.microsoft.com/en-us/health/blogs/data-privacy-and-compliance-in-the-cloud-is-essential-for-the-healthcare-industry/default.aspx>.

1. U.S. Patent No. 7,587,368

175. U.S. Patent No. 7,587,368 (the "'368 patent'") entitled, Information Record Infrastructure, System and Method was filed on July 5, 2001, and claims priority to July 6, 2000. St. Luke is the owner by assignment of the '368 patent. A true and correct copy of the '368 patent is attached hereto as Exhibit D. The '368 patent claims specific methods and systems for securely controlling access to a plurality of digital records by a remote computer.

176. The '368 patent has been cited by over 100 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '368 patent as relevant prior art.

- Microsoft Corporation
- LG Electronics, Inc.
- Canon Kabushiki Kaisha

- Hewlett-Packard Development Company, L.P.
- Voltage Security, Inc.
- Northrop Grumman Systems Corporation
- International Business Machines Corporation
- McAfee, Inc.
- J.D. Power And Associates
- NEC Corporation
- Electronics And Telecommunications Research Institute (ETRI)
- Koninklijke Philips Electronics N.V.
- Huawei Technologies Co., Ltd.
- Ricoh Co., Ltd.
- Massachusetts Institute Of Technology

177. The '368 patent claims a technical solution to a problem unique to computer networks – securely transmitting encrypted digital records and controlling access to digital records requested by a remote computer.

178. At the time of the inventions claimed in the '368 patent, electronically structuring and controlling access to protected data in a plurality of external databases presented new and unique issues over the state of the art. As explained in the '368 patent: “The present invention therefore seeks to provide a comprehensive set of technologies to address the full scope of issues presented in implementing a secure and versatile information content infrastructure that respects the rights of content owners and users to privileges, such as confidentiality.” '368 patent, col. 54:27-33.

179. Although the systems and methods taught in the '368 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the '368 patent claims were innovative and novel. “Existing systems do not create a trust infrastructure, wherein an independent third party represents and serves as an agent for the content owner, implementing a set of restrictive rules for use of content . . . Thus, existing intermediaries do not act in a representative capacity for the content owner, and do not integrate content management functions.” '368 patent, col. 5:4-16.

180. Further, the '368 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary. This improves the security of the computer system and allows it to be more efficient. “[B]y consolidating a plurality of institutions [referring to digital records stored in external databases],

uniformity, interoperability, cost reductions, and improved security result.” ‘368 patent, col. 67:65-67.

181. The ‘368 patent claims are not directed to a “method of organizing human activity,” “fundamental economic practice long prevalent in our system of commerce,” or “a building block of the modern economy.” Instead, they are limited to a concretely circumscribed set of methods and systems that provide a conduit for the authorized transmission of digital records, while maintaining the security of the records against unauthorized access.

182. The ‘368 patent claims are not directed at the broad concept/idea of “managing digital records.” Instead, the ‘368 patent claims are limited to a concretely circumscribed set of methods and systems for authorizing and transmitting secure digital records. These methods and systems are technologies unique to the Internet age.

183. The ‘368 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, one or more claims of the ‘368 patent require encrypting and sending, by the server system, the requested digital record which has been validated, using the public key and the session key to encrypt the digital record - a procedure that overrides the routine and conventional sequence of events in electronic communications, even encrypted electronic communications.

184. The ‘368 patent is directed to specific problems in the field of digital record access and transmission.

185. The preemptive effect of the claims of the ‘368 patent are concretely circumscribed by specific limitations. For example, claim 1 of the ‘368 patent requires:

A method, comprising the steps of:

storing a plurality of digital records and respective access rules for each digital record in a computer memory associated with a server system;

receiving a request for access, from a remote computer, to access a digital record stored in the computer memory;

validating, by the server system, the received request to access the digital record by applying a respective set of access rules for the digital record stored in the computer memory;

retrieving, by the server system, a public key having an associated private key, and associating a logging wrapper having a respective session key with the digital record, after validating the received request, wherein the session key is distinct from the public key and the private key;

encrypting and sending, by the server system, the requested digital record which has been validated, using the public key and the session key to encrypt the digital record;

receiving and decrypting the encrypted digital record, by the remote computer, using the private key, and the session key in conjunction with the logging wrapper;

generating by the logging wrapper, at the remote computer, a logging event; and

recording the logging event in an access log.

186. The '368 patent does not attempt to preempt every application of the idea of controlling access to an encrypted digital record over a computer network.

187. The '368 patent does not preempt the field of electronically structuring and controlling access to protected data in a plurality of external databases. For example, the '368 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and greatly limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

188. For example, the '368 patent describes numerous techniques for electronically structuring and controlling access to protected data in a plurality of external databases. The techniques inform the invention's development but do not, standing alone, fall within the scope of its claims:

- Rights-Based Access to Database Records. U.S. Pat. No. 5,325,294 to Keene, relates to a system that receives and stores the individual's medical information, after the individual is tested to establish this information and the date on which such information was most recently obtained
- Role-Based Access. U.S. Pat. No. 6,023,765 to Kuhn, relates to a role-based access control in multi-level secure systems.

- Secure Networks. U.S. Pat. No. 5,579,393 to Conner, relates to a system and method for secure digital records, comprising a provider system and a payer system.
- Cryptographic Technology. U.S. Pat. No. 5,956,408 to Arnold, relates to an apparatus and method for secure distribution of data. Data, including program and software updates, is encrypted by a public key encryption system using the private key of the data sender.
- Watermarking. U.S. Pat. No. 5,699,427 to Chow, relates to a method to deter document and intellectual property piracy through individualization, and a system for identifying the authorized receiver of any particular copy of a document.
- Computer System Security. U.S. Pat. No. 5,881,225 to Worth, relates to a security monitor for controlling functional access to a computer system. A security monitor controls security functions for a computer system. A user desiring access to the system inputs a user identification and password combination, and a role the user to assume is selected from among one or more roles defined in the system.
- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, relates to a personal storage device for receipt, storage, and transfer of digital information to other electronic devices has a pocket sized crush resistant casing with a volume of less than about ten cubic centimeters.
- Computer Network Firewall. U.S. Pat. No. 5,944,823 to Jade, relates to a system and method for providing outside access to computer resources through a firewall. A firewall isolates computer and network resources inside the firewall from networks, computers and computer applications outside the firewall.
- Virtual Private Network. U.S. Pat. No. 6,079,020 to Liu, relates to a method and an apparatus for managing a virtual private network operating over a public data network. This public data network has been augmented to include a plurality of virtual private network gateways so that communications across the virtual private network are channeled through the virtual private network gateways.
- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos relates to a patient and healthcare provider identification system which includes a database of patient and healthcare provider information including the identity of each patient and provider and some identification criteria (such as fingerprint data).

189. Although “[e]ncryption, in general, represents a basic building block of human ingenuity that has been used for hundreds, if not thousands, of years,”⁴⁷ the ‘368 patent does not claim, or attempt to preempt, “some process that involves the encryption of data for some purpose” (or similar abstraction).

190. The ‘368 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer.

191. The claimed subject matter of the ‘368 patent is not a pre-existing but undiscovered algorithm.

192. The ‘368 patent claims systems and methods that “could not conceivably be performed in the human mind or pencil and paper.”⁴⁸

193. The ‘368 patent claims require the use of a computer system.

194. The ‘368 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.

195. The claimed invention in the ‘368 claims is rooted in computer technology and overcomes problems specifically arising in the realm of computer networks.

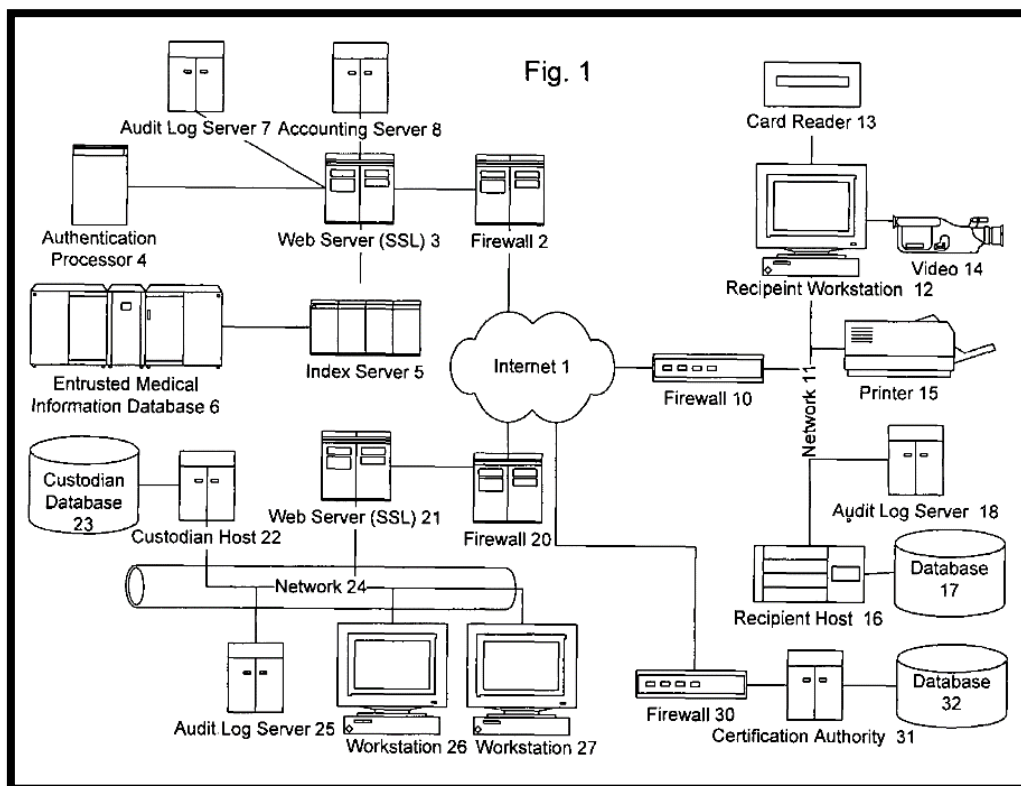
196. The systems and methods claimed in the ‘368 patent were not a longstanding or fundamental economic practice at the time of patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general.

197. The asserted claims do not involve a method of doing business that happens to be implemented on a computer; instead, it involves a method for changing digital records in a way that will affect the communication system itself, by making it more secure.

⁴⁷ *Paone v. Broadcom Corp.*, Case No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015) (citing *Fid. Nat'l Info. Servs., Inc.*, Petitioner, CBM2014-00021, 2015 WL 1967328, at *8 (Apr. 29, 2015) (both upholding the patent eligibility of patents directed toward encryption).

⁴⁸ *TQP Dev., LLC v. Intuit Inc.*, Case No. 2:12-CV-180-WCB, 2014 WL 651935, at *4 (E.D. Tex. Feb. 19, 2014) (finding claims directed to encryption to be patent eligible). *See also Paone v. Broadcom Corp.*, No. 15 CIV. 0596 BMC GRB, 2015 WL 4988279, at *7 (E.D.N.Y. Aug. 19, 2015).

198. One or more claims of the '368 patent require a specific configuration of electronic devices, a network configuration, and the use of encryption systems to secure communications and manage access to secure digital records. These are meaningful limitations that tie the claimed methods and systems to specific machines. For example, the below diagram from the '368 patent illustrates a specific configuration of hardware disclosed in the patent.



'368 patent, Fig. 1.

2. U.S. Patent No. 8,498,941

199. U.S. Patent No. 8,498,941 (the "'941 patent") entitled, Information Record Infrastructure, System and Method, was filed on July 22, 2009, and claims priority to July 6, 2000. St. Luke is the owner by assignment of the '941 patent. A true and correct copy of the '941 patent is attached hereto as Exhibit E. The '941 patent claims specific methods and systems for securely controlling access to a plurality of digital records by a remote computer where each record has associated access rules.

200. The '941 patent has been cited by 10 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '941 patent as relevant prior art.

- Red Hat, Inc.
- Intuit, Inc.
- Microsoft Corporation
- Silver Spring Networks, Inc.
- Royal Canadian Mint
- Extendabrain Corporation

201. The '941 patent claims a technical solution to a problem unique to computer networks – controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules.

202. At the time of the inventions claimed in the '941 patent, electronically structuring and controlling access to protected data in a plurality of external databases presented new and unique issues over the state of the art. As explained in the '941 patent: “The present invention therefore seeks to provide a comprehensive set of technologies to address the full scope of issues presented in implementing a secure and versatile information content infrastructure that respects the rights of content owners and users to privileges, such as confidentiality.” '941 patent, col. 53:35-39.

203. Although the systems and methods taught in the '941 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the '941 patent claims were innovative and novel. “Existing systems do not create a trust infrastructure, wherein an independent third party represents and serves as an agent for the content owner, implementing a set of restrictive rules for use of content . . . Thus, existing intermediaries do not act in a representative capacity for the content owner, and do not integrate content management functions.” '941 patent, col. 5:17-20.

204. Further, the '941 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary. This improves the security of the computer system and allows it to be more efficient. “[B]y

consolidating a plurality of institutions [referring to digital records stored in external databases], uniformity, interoperability, cost reductions, and improved security result.” ‘941 patent, col. 66:21-23.

205. The ‘941 patent claims are not directed to a “method of organizing human activity,” “fundamental economic practice long prevalent in our system of commerce,” or “a building block of the modern economy.” Instead, they are limited to a concretely circumscribed set of methods and systems that provide a conduit for the authorized transmission of digital records, while maintaining the security of the records against unauthorized access.

206. The ‘941 patent claims are not directed at the broad concept/idea of “managing digital records.” Instead, the ‘941 patent claims are limited to a concretely circumscribed set of methods and systems for authorizing and transmitting secure digital records. These methods and systems are technologies unique to the Internet age.

207. The ‘941 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, one or more claims of the ‘941 patent require the generation of an information polymer - a procedure that overrides the routine and conventional sequence of events in electronic communications, even encrypted electronic communications.

208. The ‘941 patent is directed to specific problems in the field of digital record access and transmission.

209. The preemptive effect of the claims of the ‘941 patent are concretely circumscribed by specific limitations. For example, claim 1 of the ‘941 patent requires:

A method for controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules, comprising:

receiving a request from a requestor, the requestor having at least one attribute;

searching the plurality of automated electronic databases to find records in dependence on the request and on connections between respective records;

applying a set of access rules associated with each found record by at least one automated processor, to produce a set of accessible records;

linking the set of accessible records into an information polymer using a server device;

applying at least one compensation rule by at least one automated processor, dependent on the at least one attribute of the requestor;

logging at least the request for access by at least one automated processor; and

communicating the information polymer to the requestor.

210. The '941 patent does not attempt to preempt every application of the idea of controlling access to a digital record over a computer network where the digital records are within a plurality of automated electronic databases.

211. The '941 patent does not preempt the field of electronically structuring and controlling access to protected data in a plurality of external databases. For example, the '941 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and greatly limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

212. For example, the '941 patent describes numerous techniques for electronically structuring and controlling access to protected data in a plurality of external databases. The techniques inform the invention's development but do not, standing alone, fall within the scope of its claims:

- Rights-Based Access to Database Records. U.S. Pat. No. 5,325,294 to Keene, relates to a system that receives and stores the individual's medical information, after the individual is tested to establish this information and the date on which such information was most recently obtained
- Role-Based Access. U.S. Pat. No. 6,023,765 to Kuhn, relates to a role-based access control in multi-level secure systems.

- Security Tokens. U.S. Patent No. 5,978,918 to Scholnick, discloses a back-end process returns a time sensitive token that the “sender” sends to the “receiver.” The “receiver” takes the time sensitive token and uses it to retrieve the private data.⁴⁹
- Secure Networks. U.S. Pat. No. 5,579,393 to Conner, relates to a system and method for secure digital records, comprising a provider system and a payer system.
- Cryptographic Technology. U.S. Pat. No. 5,956,408 to Arnold, relates to an apparatus and method for secure distribution of data. Data, including program and software updates, is encrypted by a public key encryption system using the private key of the data sender.
- Watermarking. U.S. Pat. No. 5,699,427 to Chow, relates to a method to deter document and intellectual property piracy through individualization, and a system for identifying the authorized receiver of any particular copy of a document.
- Computer System Security. U.S. Pat. No. 5,881,225 to Worth, relates to a security monitor for controlling functional access to a computer system. A security monitor controls security functions for a computer system. A user desiring access to the system inputs a user identification and password combination, and a role the user to assume is selected from among one or more roles defined in the system.
- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, relates to a personal storage device for receipt, storage, and transfer of digital information to other electronic devices has a pocket sized crush resistant casing with a volume of less than about ten cubic centimeters.
- Computer Network Firewall. U.S. Pat. No. 5,944,823 to Jade, relates to a system and method for providing outside access to computer resources through a firewall. A firewall isolates computer and network resources inside the firewall from networks, computers and computer applications outside the firewall.
- Virtual Private Network. U.S. Pat. No. 6,079,020 to Liu, relates to a method and an apparatus for managing a virtual private network operating over a public data network. This public data network has been augmented to include a plurality of virtual private

⁴⁹ See also Arindam Khaled et. al, *A Token-based Access Control System for RDF Data in the Clouds* at 104, in PROCEEDINGS OF THE 2ND IEEE INTERNATIONAL CONFERENCE ON CLOUD COMPUTING TECHNOLOGY AND SCIENCE (2010) (discussing the use of a “token-based access control system . . . implemented in Hadoop (an open source cloud computing framework)”).

network gateways so that communications across the virtual private network are channeled through the virtual private network gateways.

- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos relates to a patient and healthcare provider identification system which includes a database of patient and healthcare provider information including the identity of each patient and provider and some identification criteria (such as fingerprint data).⁵⁰

213. The '941 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer.

214. The claimed subject matter of the '941 patent is not a pre-existing but undiscovered algorithm.

215. The '941 patent claims require the use of a computer system.

216. The '941 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.

217. The claimed invention in the '941 claims is rooted in computer technology and overcomes problems specifically arising in the realm of computer networks.

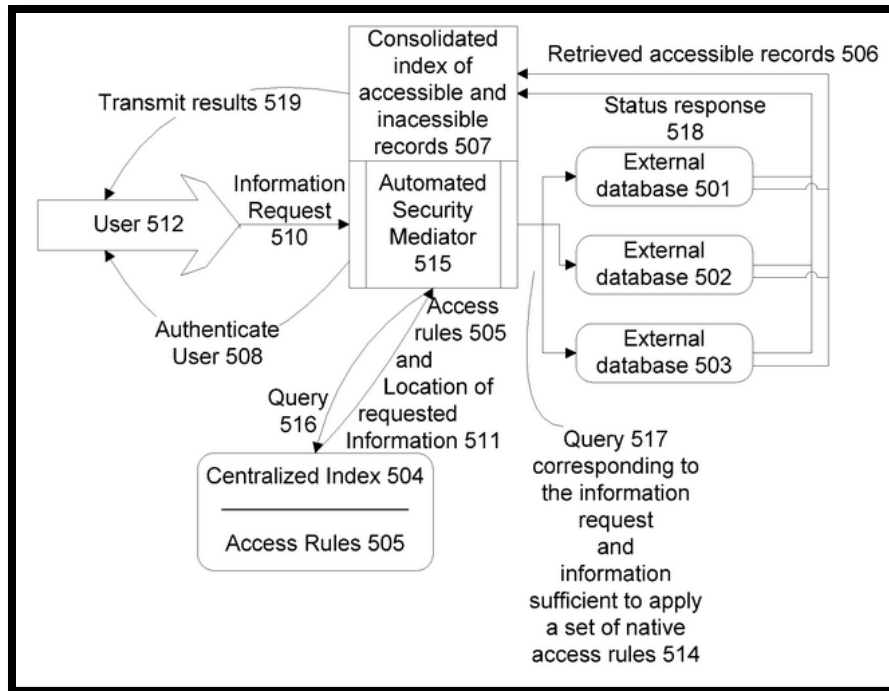
218. The systems and methods claimed in the '941 patent were not a longstanding or fundamental economic practice at the time of patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general.

219. The asserted claims do not involve a method of doing business that happens to be implemented on a computer; instead, they involve a method for changing digital records in a way that will affect the communication system itself, by making it more secure.

220. One or more claims of the '941 patent require a specific configuration of electronic devices, a network configuration, and the use of encryption systems to secure communications and manage access to secure digital records. These are meaningful limitations

⁵⁰ Nary Subramanian, *Biometric Authentication*, in ENCYCLOPEDIA OF CRYPTOGRAPHY AND SECURITY (S. Jajodia and H.C.A. van Tilborg 2nd ed. 2011) (“Biometric authentication is a technique for identifying the person accessing a secured asset . . . by comparing their unique biological features . . . [an] issue with biometric authentication is privacy of personal data.”).

that tie the claimed methods and systems to specific machines. For example, the below diagram from the '941 patent illustrates a specific configuration of hardware disclosed in the patent.



'941 patent, Fig. 6.

3. U.S. Patent No. 8,380,630

221. U.S. Patent No. 8,380,630 (the "'630 patent'") entitled, Information Record Infrastructure, System and Method, was filed on May 29, 2010, and claims priority to July 6, 2000. St. Luke is the owner by assignment of the '630 patent. A true and correct copy of the '630 patent is attached hereto as Exhibit F. The '630 patent claims specific methods and systems for securely controlling access to a plurality of digital records by a remote computer, using a security mediator, where each record has associated access rules.

222. The '630 patent has been cited by ten United States patents and published patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '630 patent as relevant prior art.

- Informatica Corporation
- Electronics and Telecommunications Research Institute ("ETRI")
- J.D. Power and Associates
- CA, Inc.

- Microsoft Corporation

223. The '630 patent claims a technical solution to a problem unique to computer networks – controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules.

224. At the time of the inventions claimed in the '630 patent, electronically structuring and controlling access to protected data in a plurality of external databases presented new and unique issues over the state of the art. As explained in the '630 patent: “The present invention therefore seeks to provide a comprehensive set of technologies to address the full scope of issues presented in implementing a secure and versatile information content infrastructure that respects the rights of content owners and users to privileges, such as confidentiality.” '630 patent, col. 53:45-49.

225. Although the systems and methods taught in the '630 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the '630 patent claims were innovative and novel. “Existing systems do not create a trust infrastructure, wherein an independent third party represents and serves as an agent for the content owner, implementing a set of restrictive rules for use of content . . . Thus, existing intermediaries do not act in a representative capacity for the content owner, and do not integrate content management functions.” '630 patent, col. 5:11-23.

226. Further, the '630 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary. This improves the security of the computer system and allows it to be more efficient. “[B]y consolidating a plurality of institutions [referring to digital records stored in external databases], uniformity, interoperability, cost reductions, and improved security result.” '630 patent, col. 66:33-35.

227. The '630 patent claims require an automated security mediator (“ASM”).

228. The '630 patent claims require the ASM query the automated centralized index (“ACI”) to locate the record information within a plurality of external databases.

229. The '630 patent claims require that the ASM generate an index of accessible location record information that is available in a plurality of externally databases.

230. The '630 patent claims are not directed to a “method of organizing human activity,” “fundamental economic practice long prevalent in our system of commerce,” or “a building block of the modern economy.” Instead, they are limited to a concretely circumscribed set of methods and systems that provide a conduit for the authorized transmission of digital records, while maintaining the security of the records against unauthorized access.

231. The '630 patent claims are not directed at the broad concept/idea of “managing digital records.” Instead, the '630 patent claims are limited to a concretely circumscribed set of methods and systems for authorizing and transmitting secure digital records. These methods and systems are technologies unique to the Internet age.

232. The '630 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, one or more claims of the '630 patent require an ASM, require the generation of an Automated Centralized Index (“ACI”), require applying the access rules associated with the located requested information (“LRI”), require the ASM query the ACI to locate the record information within the plurality of external databases, and require that the ASM generate an index of LRI accessible in a plurality of external databases - a procedure that overrides the routine and conventional sequence of events in electronic communications.

233. The '630 patent is directed to specific problems in the field of digital record access and transmission.

234. The preemptive effect of the claims of the '630 patent are concretely circumscribed by specific limitations. For example, claim 1 of the '630 patent requires:

A method for security mediation, comprising:

receiving an information request for information stored within a plurality of external databases (“POEDs”) from a user, wherein the information

request is received by an automated security mediator (“ASM”) which is neither an owner nor custodian of the requested information;

authenticating the user;

querying an automated centralized index (“ACI”), maintained by the ASM to locate the requested information within the POEDs, wherein the ACI includes a location and a set of access rules for each entry;

applying the access rules associated with the located requested information (“LRI”);

automatically communicating from the ASM to each of the POEDs storing the LRI: a query corresponding to the information request, and information sufficient to apply a set of native access rules of the respective POEDs storing the LRI to further control access to the LRI;

receiving at least a status response from at least one of the POEDs storing the LRI indicating whether the LRI is accessible or inaccessible;

automatically indexing the accessible and inaccessible LRI; and

at least one of:

- retrieving, by the ASM, the accessible LRI from the POEDs storing the LRI and communicating, from the ASM to the user a consolidation of the retrieved accessible LRI; and
- communicating, from the ASM to the user a consolidated index of the accessible LRI.

235. The ‘630 patent does not attempt to preempt every application of the idea of controlling access to a digital record over a computer network where the digital records are within a plurality of automated electronic databases.

236. The ‘630 patent does not preempt the field of electronically structuring and controlling access to protected data in a plurality of external databases. For example, the ‘630 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and greatly limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

237. For example, the '630 patent describes numerous techniques for electronically structuring and controlling access to protected data in a plurality of external databases. The techniques inform the invention's development but do not, standing alone, fall within the scope of its claims:

- Rights-Based Access to Database Records. U.S. Pat. No. 5,325,294 to Keene, relates to a system that receives and stores the individual's medical information, after the individual is tested to establish this information and the date on which such information was most recently obtained
- Role-Based Access. U.S. Pat. No. 6,023,765 to Kuhn, relates to a role-based access control in multi-level secure systems.
- Secure Networks. U.S. Pat. No. 5,579,393 to Conner, relates to a system and method for secure digital records, comprising a provider system and a payer system.
- Cryptographic Technology. U.S. Pat. No. 5,956,408 to Arnold, relates to an apparatus and method for secure distribution of data. Data, including program and software updates, is encrypted by a public key encryption system using the private key of the data sender.
- Watermarking. U.S. Pat. No. 5,699,427 to Chow, relates to a method to deter document and intellectual property piracy through individualization, and a system for identifying the authorized receiver of any particular copy of a document.
- Computer System Security. U.S. Pat. No. 5,881,225 to Worth, relates to a security monitor for controlling functional access to a computer system. A security monitor controls security functions for a computer system. A user desiring access to the system inputs a user identification and password combination, and a role the user to assume is selected from among one or more roles defined in the system.
- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, relates to a personal storage device for receipt, storage, and transfer of digital information to other electronic devices has a pocket sized crush resistant casing with a volume of less than about ten cubic centimeters.
- Computer Network Firewall. U.S. Pat. No. 5,944,823 to Jade, relates to a system and method for providing outside access to computer resources through a firewall. A firewall isolates computer and network resources inside the firewall from networks, computers and computer applications outside the firewall.

- Virtual Private Network. U.S. Pat. No. 6,079,020 to Liu, relates to a method and an apparatus for managing a virtual private network operating over a public data network. This public data network has been augmented to include a plurality of virtual private network gateways so that communications across the virtual private network are channeled through the virtual private network gateways.
- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos relates to a patient and healthcare provider identification system which includes a database of patient and healthcare provider information including the identity of each patient and provider and some identification criteria (such as fingerprint data).

238. The '630 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer.

239. The claimed subject matter of the '630 patent is not a pre-existing but undiscovered algorithm.

240. The '630 patent claims require the use of a computer system.

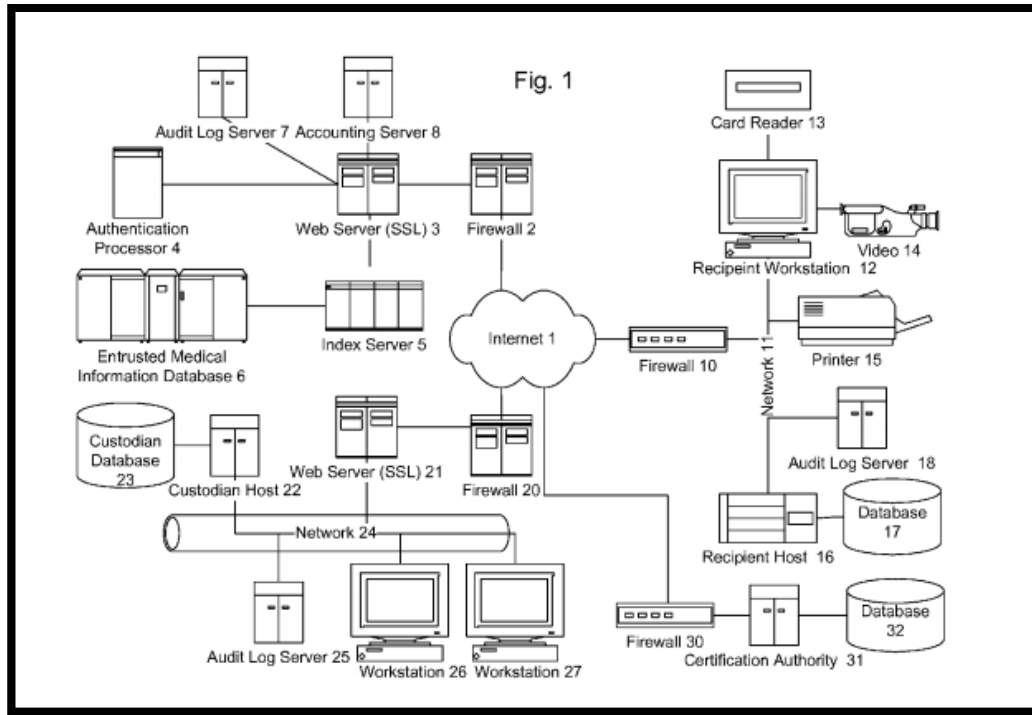
241. The '630 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.

242. The claimed invention in the '630 claims is rooted in computer technology and overcomes problems specifically arising in the realm of computer networks.

243. The systems and methods claimed in the '630 patent were not a longstanding or fundamental economic practice at the time of patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general.

244. The asserted claims do not involve a method of doing business that happens to be implemented on a computer; instead, they involve a method for changing digital records in a way that will affect the communication system itself, by making it more secure.

245. One or more claims of the '630 patent require a specific configuration of electronic devices, a network configuration, and the use of encryption systems to secure communications and manage access to secure digital records. These are meaningful limitations that tie the claimed methods and systems to specific machines. For example, the below diagram from the '630 patent illustrates a specific configuration of hardware disclosed in the patent.



'630 patent, Fig. 1.

4. U.S. Patent No. 8,600,895

246. U.S. Patent No. 8,600,895 (the "'895 patent") entitled, Information Record Infrastructure, System and Method, was filed on February 19, 2013, and claims priority to July 6, 2000. St. Luke is the owner by assignment of the '895 patent. A true and correct copy of the '895 patent is attached hereto as Exhibit G. The '895 patent claims specific methods and systems for securely controlling access to a plurality of digital records by a remote computer, using a security mediator, where each record has associated access rules.

247. The '895 patent has been cited by four United States patents and patent applications as relevant prior art.⁵¹ Specifically, patents issued to the following companies have cited the '895 patent as relevant prior art.

- J.D. Power and Associates

⁵¹ Although the '895 patent has only been cited 4 times, the patent applications to which the '895 patent claims priority have been cited by hundreds of companies. U.S. Patent Application 12/790,818 was cited in 45 issued patents and published patent applications, U.S. Patent Application was cited in 27 patents and published patent applications, and U.S. Patent Application 09/899,787 was cited in 751 patents and published patent applications.

- Fujitsu Limited
- Extendabrain Corporation

248. The '895 patent claims a technical solution to a problem unique to computer networks – controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules.

249. At the time of the inventions claimed in the '895 patent, electronically structuring and controlling access to protected data in a plurality of external databases presented new and unique issues over the state of the art. As explained in the '895 patent: “The present invention therefore seeks to provide a comprehensive set of technologies to address the full scope of issues presented in implementing a secure and versatile information content infrastructure that respects the rights of content owners and users to privileges, such as confidentiality.” '895 patent, col. 53:53-57.

250. Although the systems and methods taught in the '895 patent have been adopted by leading businesses today, at the time of invention, the technologies taught in the '895 patent claims were innovative and novel. “Existing systems do not create a trust infrastructure, wherein an independent third party represents and serves as an agent for the content owner, implementing a set of restrictive rules for use of content . . . Thus, existing intermediaries do not act in a representative capacity for the content owner, and do not integrate content management functions.” '895 patent, col. 5:18-30.

251. Further, the '895 patent claims improve upon the functioning of a computer system by allowing encrypted electronic data to be securely transmitted through an intermediary. This improves the security of the computer system and allows it to be more efficient. “[B]y consolidating a plurality of institutions [referring to digital records stored in external databases], uniformity, interoperability, cost reductions, and improved security result.” '895 patent, col. 66:41-44.

252. The '895 patent claims require controlling access to a plurality of records stored within a plurality of automated external databases.

253. The '895 patent claims require an automated centralized index ("ACI") that includes, for each record, a (1) location identifier (LI), (2) content identifier (CI), and (3) associated set of access rules (ASAR).

254. The '895 patent claims require logically associating the releasable accessible record ("AR") into a linked set of releasable ARs (LAS) and communicating the LAS to the requestor.

255. The '895 patent claims are not directed to a "method of organizing human activity," "fundamental economic practice long prevalent in our system of commerce," or "a building block of the modern economy." Instead, they are limited to a concretely circumscribed set of methods and systems that provide a conduit for the authorized transmission of digital records, while maintaining the security of the records against unauthorized access.

256. The '895 patent claims are not directed at the broad concept/idea of "managing digital records." Instead, the '895 patent claims are limited to a concretely circumscribed set of methods and systems for authorizing and transmitting secure digital records. These methods and systems are technologies unique to the Internet age.

257. The '895 patent claims are directed toward a solution rooted in computer technology and use technology unique to computers and computer networking to overcome a problem specifically arising in the realm of secure distributed computing. For example, one or more claims of the '895 patent require an ACI, require a content identifier ("CI"), require querying ACI to find entries containing CI, require for each accessible record (AR) communicate to the plurality of external databases information sufficient for the external databases to apply native access rules to determine whether the AR is releasable.

258. The '895 patent is directed to specific problems in the field of digital record access and transmission.

259. The preemptive effect of the claims of the '895 patent are concretely circumscribed by specific limitations. For example, claim 16 of the '895 patent requires:

An apparatus for controlling access to a plurality of records stored within a plurality of automated external databases (“AXES”), comprising:

- an automated centralized index (“ACI”), stored in a memory, configured to store an entry for each record consisting of a location identifier (“LI”), an associated set of access rules (“ASAR”), and a content identifier (“CI”);

- an input port configured to receive a request from a requestor for access to one or more records stored in the plurality of AXES, wherein the request specifies a CI with which to query the ACI;

- at least one processor configured to:

 - generate a query based on the specified CI (“SCI”);

 - find entries in the ACI containing the SCI;

 - for each found entry, apply the ASAR corresponding to the LI to determine if the record stored in a respective one of the AXES corresponding to the LI is accessible;

 - generate a communication, for communication to the respective one of the AXES storing an accessible record (“AR”), wherein the communication contains information sufficient for the respective one of the AXES storing the AR to apply a set of native access rules (“NAR”) it maintains to determine if the AR is releasable;

 - form a linked set of releasable ARs by logically associating the releasable ARs; and

 - generate a communication containing the linked set of releasable ARs; and

- at least one communications port configured to communicate:

 - the generated communication to the respective one of the AXES storing the ARs; and

 - the linked set of releasable ARs.

260. The ‘895 patent does not attempt to preempt every application of the idea of controlling access to a digital record over a computer network where the digital records are within a plurality of automated electronic databases.

261. The ‘895 patent does not preempt the field of electronically structuring and controlling access to protected data in a plurality of external databases. For example, the ‘895 patent includes inventive elements—embodied in specific claim limitations—that concretely circumscribe the patented invention and greatly limit its breadth. These inventive elements are not necessary or obvious tools for achieving secure third-party communications, and they ensure that the claims do not preempt other techniques for secure communications.

262. For example, the '895 patent describes numerous techniques for electronically structuring and controlling access to protected data in a plurality of external databases. The techniques inform the invention's development but do not, standing alone, fall within the scope of its claims:

- Rights-Based Access to Database Records. U.S. Pat. No. 5,325,294 to Keene, relates to a system that receives and stores the individual's medical information, after the individual is tested to establish this information and the date on which such information was most recently obtained
- Role-Based Access. U.S. Pat. No. 6,023,765 to Kuhn, relates to a role-based access control in multi-level secure systems.
- Secure Networks. U.S. Pat. No. 5,579,393 to Conner, relates to a system and method for secure digital records, comprising a provider system and a payer system.
- Cryptographic Technology. U.S. Pat. No. 5,956,408 to Arnold, relates to an apparatus and method for secure distribution of data. Data, including program and software updates, is encrypted by a public key encryption system using the private key of the data sender.
- Watermarking. U.S. Pat. No. 5,699,427 to Chow, relates to a method to deter document and intellectual property piracy through individualization, and a system for identifying the authorized receiver of any particular copy of a document.
- Computer System Security. U.S. Pat. No. 5,881,225 to Worth, relates to a security monitor for controlling functional access to a computer system. A security monitor controls security functions for a computer system. A user desiring access to the system inputs a user identification and password combination, and a role the user to assume is selected from among one or more roles defined in the system.
- Computer Security Devices. U.S. Pat. No. 5,982,520 to Weiser, relates to a personal storage device for receipt, storage, and transfer of digital information to other electronic devices has a pocket sized crush resistant casing with a volume of less than about ten cubic centimeters.
- Computer Network Firewall. U.S. Pat. No. 5,944,823 to Jade, relates to a system and method for providing outside access to computer resources through a firewall. A firewall isolates computer and network resources inside the firewall from networks, computers and computer applications outside the firewall.

- Virtual Private Network. U.S. Pat. No. 6,079,020 to Liu, relates to a method and an apparatus for managing a virtual private network operating over a public data network. This public data network has been augmented to include a plurality of virtual private network gateways so that communications across the virtual private network are channeled through the virtual private network gateways.
- Biometric Authentication. U.S. Pat. No. 5,193,855 to Shamos relates to a patient and healthcare provider identification system which includes a database of patient and healthcare provider information including the identity of each patient and provider and some identification criteria (such as fingerprint data).

263. The '895 patent does not claim, or attempt to preempt, the performance of an abstract business practice on the Internet or using a conventional computer.

264. The claimed subject matter of the '895 patent is not a pre-existing but undiscovered algorithm.

265. The '895 patent claims require the use of a computer system.

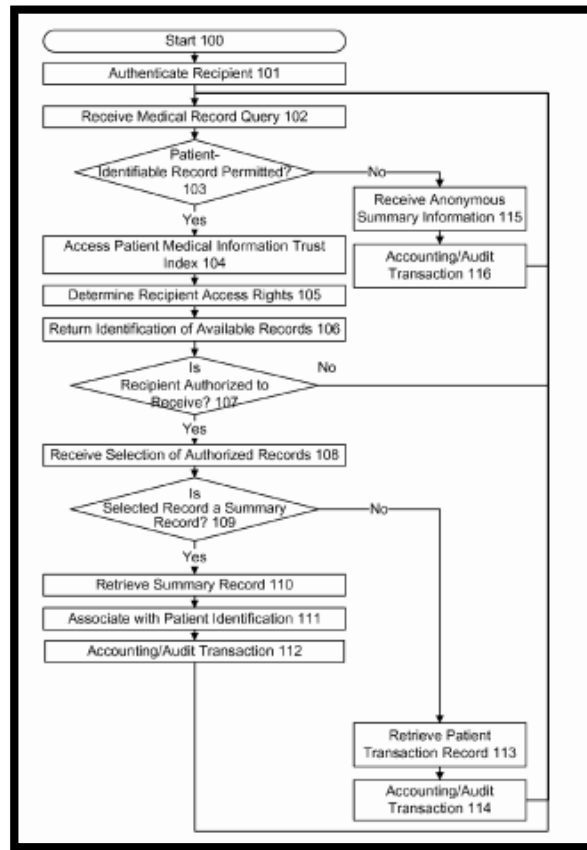
266. The '895 patent claims systems and methods not merely for transferring secure information over a computer network, but for making the computer network itself more secure.

267. The claimed invention in the '895 claims is rooted in computer technology and overcomes problems specifically arising in the realm of computer networks.

268. The systems and methods claimed in the '895 patent were not a longstanding or fundamental economic practice at the time of patented inventions. Nor were they fundamental principles in ubiquitous use on the Internet or computers in general.

269. The asserted claims do not involve a method of doing business that happens to be implemented on a computer; instead, they involve a method for changing digital records in a way that will affect the communication system itself, by making it more secure.

270. One or more claims of the '895 patent require a specific configuration of electronic devices, a network configuration, and the use of access rules to secure communications and manage access to secure digital records. These are meaningful limitations that tie the claimed methods and systems to specific machines. For example, the below diagram from the '895 patent illustrates a specific configuration of hardware disclosed in the patent.



'895 patent, Fig. 4.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 8,316,237

271. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

272. Verizon makes, uses, sells, and/or offers for sale in the United States products and/or services for secure three-party communications.

273. Verizon makes, sells, offers to sell, imports, and/or uses the Verizon Voice Cypher (“Voice Cypher” or “Verizon ‘237 Product”).

274. On information and belief, Voice Cypher includes encryption technology.

275. On information and belief, Voice Cypher enables sending encrypted information through an intermediary where the intermediary is not able to access the unencrypted information.

276. On information and belief, Voice Cypher is available to businesses and individuals throughout the United States.

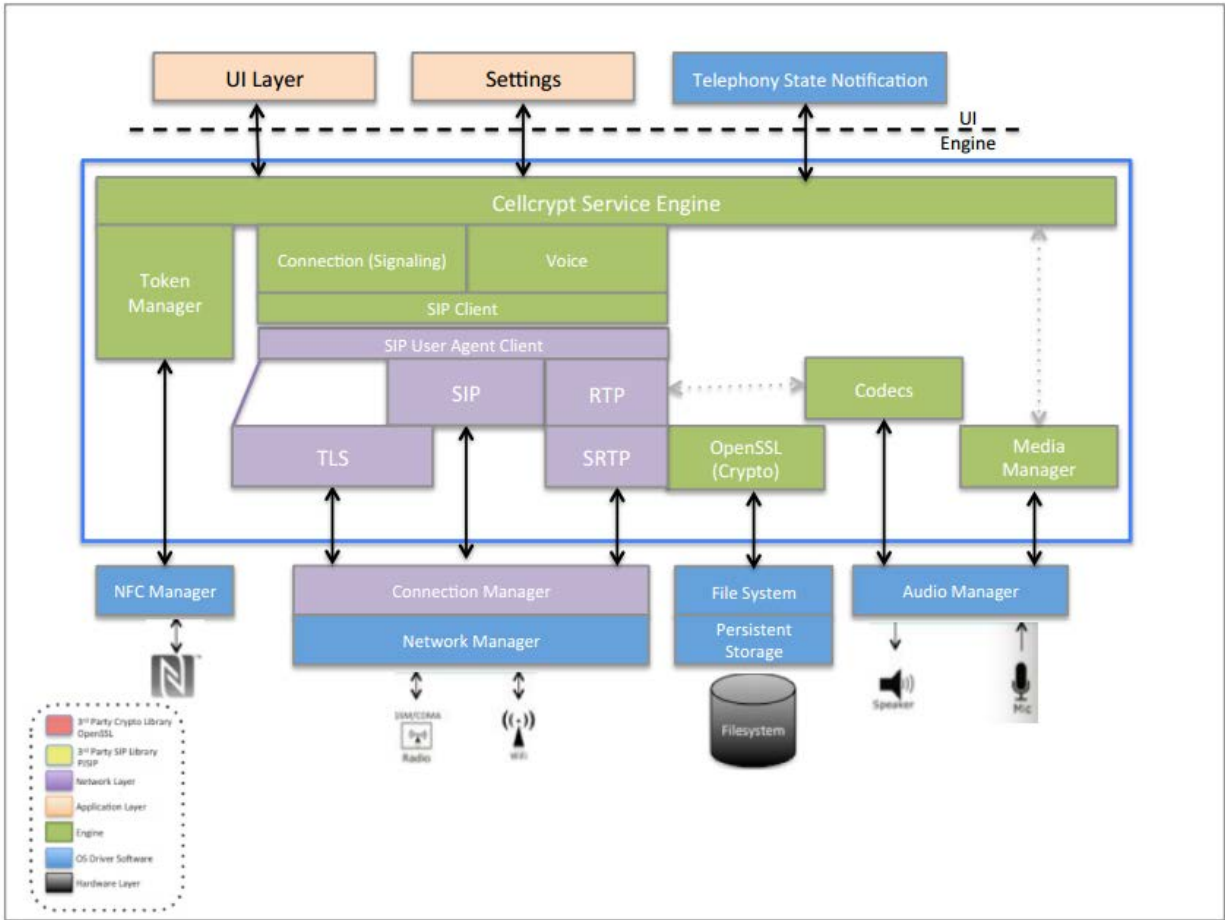
277. On information and belief, Voice Cypher is provided to businesses and individuals located in the Eastern District of Texas.

278. On information and belief, Voice Cypher uses RSA-2048 and Elliptical Curve Digital Signature Algorithm encryption.

279. On information and belief, Voice Cypher generates a session key that is unique and valid for one phone call or one message. The session key generated by Voice Cypher is destroyed by Voice Cypher after its use.

280. On information and belief, Voice Cypher includes an automated communication port configured to receive a first message representing an encrypted communication associated with a first set of asymmetric keys (*e.g.*, an RSA-2048 asymmetric key), to receive a transcription key (*e.g.*, a session-specific RSA and/or ECDSA transcription key), and to transmit a second message representing the encrypted communication associated with a second set of asymmetric keys (*e.g.*, a second set of RSA-2048 asymmetric keys).

281. On information and belief, the below diagram shows an example of architecture of the Verizon '237 Product loaded on a mobile device.



CellCrypt Mobile for Security Client Version 1.0, CELLCRYPT SECURITY TARGET IA DOCUMENTATION at 8 (April 14, 2014).

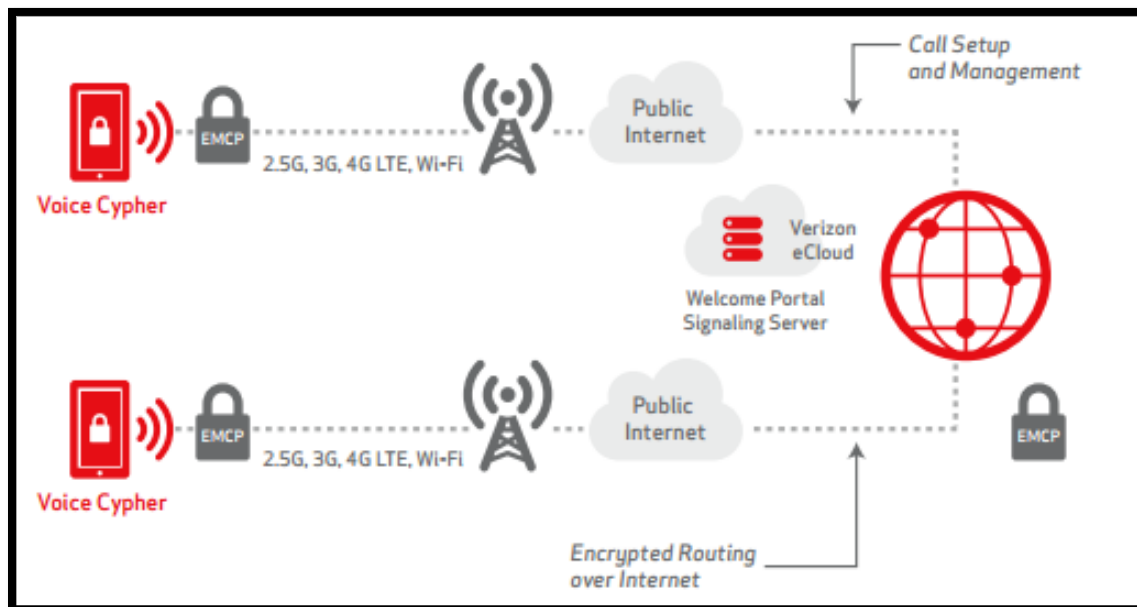
282. On information and belief, the Verizon ‘237 Product is described by Verizon and/or its partner, CellCrypt, as a “Secure Voice over Internet Protocol (SVoIP) application for smartphones, which enables users to have secure voice calls on an end-to-end encryption session.”

283. On information and belief, Defendant states that the Verizon ‘237 Product “uses trusted and well-proven, strong encryption technologies that keep your voice calls private wherever you may be in the world. End-to-end encryption ensures that your calls are kept secure at all points between the two smart phones, even within untrusted or insecure networks.”⁵²

⁵² *User Guide: Verizon Voice Cypher for Android, VERIZON USER GUIDE at 3 (August 31, 2015).*

284. On information and belief, the Verizon '237 Product uses the TLS protocols (RFC 5246 and RFC 6460) using mutual authentication with certificates and the ciphersuites: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (using the 256-bit prime modulus elliptic curve specified in FIPS-186-2) and TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 (using the 384-bit prime modulus elliptic curve specified in FIPS-186-2).

285. On information and belief, the below documentation from Verizon shows the architecture of the Verizon '237 Product.



User Guide: Verizon Voice Cypher for Android, VERIZON USER GUIDE at 3 (August 31, 2015).

286. On information and belief, the Verizon '237 Product is enabled to utilize the following encryption functionality: ECDSA SGK, AES EDK (both the AES encryption and decryption key), HMAC Key, and CTR_DRBG CSP (including both the V and Key AES).

287. On information and belief, the Verizon '237 Product stores the Symmetric Key for HMAC authentication of an SRTP stream in random access memory.

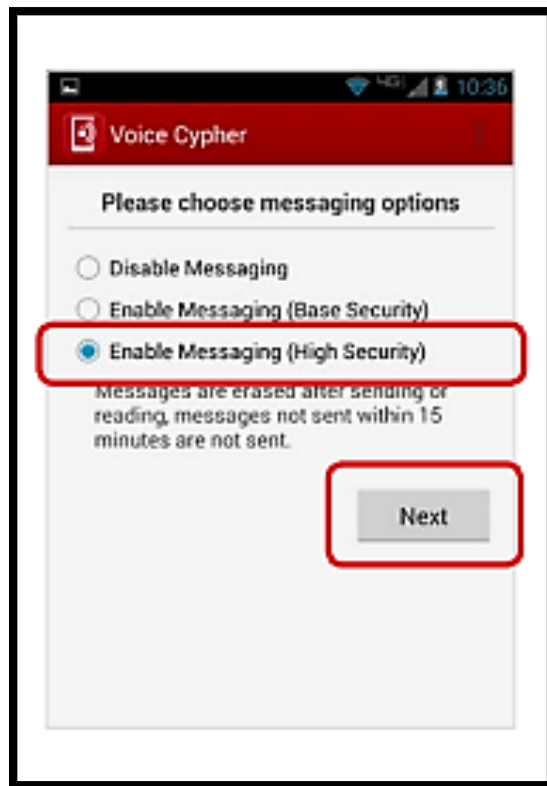
288. On information and belief, the Verizon '237 Product stores the Symmetric Key for AS encryption and decryption of the SRTP stream in random access memory.

289. On information and belief, the Verizon '237 Product stores the symmetric key for encryption and decryption of the TLS data stream to an SIP Server in random access memory.

290. On information and belief, the Verizon '237 Product stores the private key for a transport layer security connection to a session initiated protocol server in random access memory and encrypted flash on the filesystem.

291. On information and belief, the Verizon '237 Product uses timing synchronization function[ality] X.509v2 certificates to authenticate the user to the session initiated server via a mutually authenticated transport layer security connection.

292. On information and belief, the below documentation from Verizon shows an implantation of the Verizon '237 Product on a client device and the screen allowing the client device to enable secure messaging.



User Guide: Verizon Voice Cypher for Android, VERIZON USER GUIDE at 11 (August 31, 2015).

293. On information and belief, the Verizon '237 Product is enabled to use public key cryptography to authenticate a communication of data between two client devices, and for secure key exchange to establish a session key. The voice data is enabled to be encrypted using symmetric algorithms, using a different session key for each call.

294. On information and belief, the Verizon '237 Product enables use of an AES 256 bit key and/or RC4 256 bit key. Both the AES 256 bit key and RCA 256 bit key can be used by the Verizon '237 Product at the same time. The Verizon '237 Product enable data packets to be first encrypted with an RC4 key and then encrypt the data again with an AES key. Both algorithms (RSA and AES) are initialized with different session keys derived from the exchanged secrets.

295. On information and belief, the Verizon '237 Product utilizes AES (Advanced Encryption Standard) for symmetric encryption.

296. On information and belief, the Verizon '237 Product utilizes ECDSA (Elliptic Curve Digital Signature Algorithm) for digital signatures.

297. On information and belief, the Verizon '237 Product utilizes ECDH (Elliptic Curve Diffie-Hellman) for key agreement.

298. On information and belief, the Verizon '237 Product utilizes SHA (Secure Hash Algorithm) for message digest.

299. On information and belief, the Verizon '237 Product utilizes key pairs that are generated on the phone during the installation and are unique to each phone. Ephemeral session keys are generated per call to ensure forward secrecy.

300. On information and belief, the Verizon '237 Product utilizes a session key that is only valid for one phone call and securely destroyed after use.

301. On information and belief, the Verizon '237 Product utilizes protected data that is encrypted in a 256-bit AES key that is then wrapped in a 256-bit RC4 encryption key.

302. Verizon documentation of the Verizon '237 Product describes the encryption scheme used by Verizon as including the following:

Public Cryptography
(RSA & DH, all 2048 bits)

RSA is used for authentication. The key pairs are generated on the phone during the installation and are unique to each phone. A private key is never shared. The Diffie-Hellman (DH) and RSA algorithms are used for key exchange. The session key is only valid for one phone call and securely destroyed after use.

Symmetric Cryptography
(AES & RC4 both 256 bits)

Both encryption algorithms are used at the same time. The data packet is first encrypted with AES and the crypto-data is then encrypted again with RC4, using the exchanged session key and are used in Counter Mode (CTR).

Hashing Algorithms
(SHA512, MD5)

Two industry standard hashing algorithms are used for increased integrity assurance.

Using CellCrypt Over BGAN, BLACKBERRY AND NOKIA VOICE ENCRYPTION VERSION 1.0 at 3
(August, 20, 2009).

303. On information and belief, the Verizon '237 Product comprises an automated processor, configured to communicate through the automated communication port of and with the memory, to receive the first message, receive the transcription key, automatically transcribe the first message into the second message, and to transmit the second message.

304. On information and belief, the Verizon '237 Product verifies user identities through identity certificates and establishing a shared secret.

305. On information and belief, the Verizon '237 Product server includes memory.

306. On information and belief, the Verizon '237 Product enables asymmetric encryption.

307. On information and belief, Verizon has directly infringed and continues to directly infringe the '237 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for secure three-party communications, including but not limited to, the Verizon '237 Product, which includes infringing encryption technologies. Such products and/or services include, by way of example and without limitation, Verizon Voice Cypher.

308. By making, using, testing, offering for sale, and/or selling encryption products and services, including but not limited to the Verizon '237 Product, Verizon has injured St. Luke

and is liable to St. Luke for directly infringing one or more claims of the '237 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

309. On information and belief, Verizon indirectly infringes the '237 patent by actively inducing infringement under 35 U.S.C. § 271(b).

310. On information and belief, Verizon had knowledge of the '237 patent since at least February 2014. Verizon cited the '237 patent in U.S. Patent No. 8,655,843 and U.S. Patent App. 2013/0132421 both assigned to Verizon Patent and Licensing, Inc. U.S. Patent No. 8,655,843 was filed on November 22, 2011 and issued on February 18, 2014.

311. Alternatively, on information and belief, Verizon has had knowledge of the '237 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the '237 patent and knew of its infringement, including by way of this lawsuit.

312. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon '237 Product and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

313. Verizon specifically intended and was aware that the normal and customary use of the accused products would infringe the '237 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '237 patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '237 Product that has the capability of operating in a manner that infringe one or more of the claims of the '237 patent, including at least claim 1, and Verizon further provides documentation and training materials that cause customers and end users of the Verizon '237 Product to utilize the product(s) in a manner that directly infringe one or more claims of the '237 patent. By providing instruction and training to customers and end-users on how to use the Verizon '237 Product in a manner that directly infringes one or more claims of the '237 patent, including at least claim 1, Verizon specifically intended to induce infringement of the '237 patent. On information and belief, Verizon engaged in such inducement

to promote the sales of the Verizon '237 Product, *e.g.*, through Verizon's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '237 patent.⁵³ Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '237 patent, knowing that such use constitutes infringement of the '237 patent.

314. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '237 patent.

315. As a result of Verizon's infringement of the '237 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 7,181,017

316. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

317. Verizon makes, uses, sells, and/or offers for sale in the United States products and/or services for secure three-party communications.

318. Verizon makes, sells, offers to sell, imports, and/or uses Verizon Voice Cypher ("Voice Cypher" or "Verizon '017 Product").

319. On information and belief, Voice Cypher includes a server that receives information to be processed from a sending mobile device.

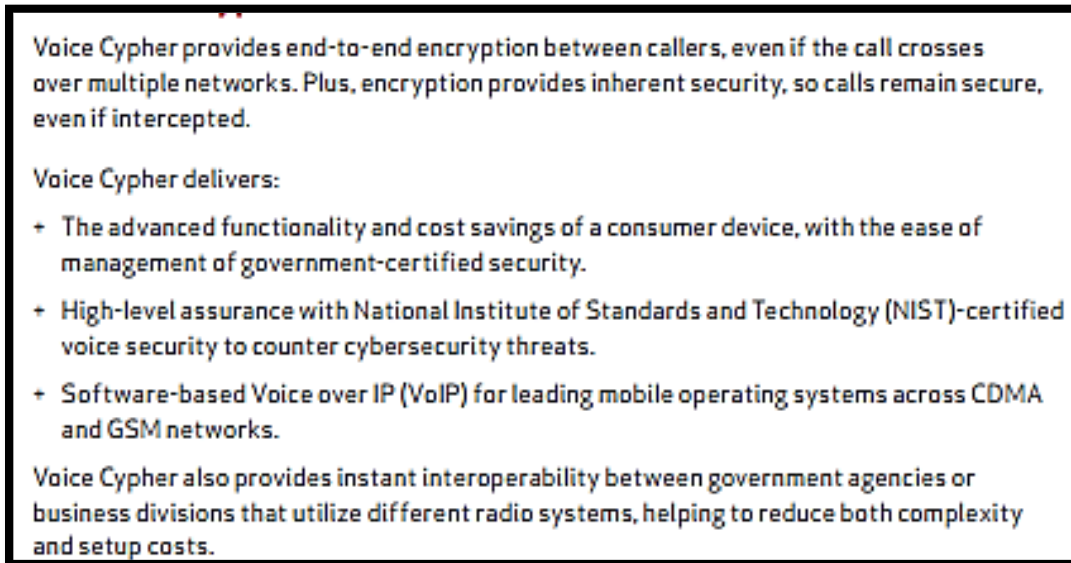
⁵³ See *e.g.*, *User Guide: Verizon Voice Cypher for Android*, VERIZON USER GUIDE (August 31, 2015); *User Guide: Verizon Voice Cypher for BlackBerry OS10*, VERIZON USER GUIDE (2014); *Verizon Voice Cypher Enterprise Management Portal User Guide*, VERIZON DOCUMENTATION V2.0.1 (March 30, 2015); *Verizon Voice Cypher User Guide for iOS*, VERIZON DOCUMENTATION V3.0.12 (July 21, 2015); *Verizon Voice Cypher User Guide for Windows Phone*, VERIZON DOCUMENTATION V3.0.9 (July 21, 2015).

320. On information and belief, the Voice Cypher client application on a mobile device (e.g., smartphone) enables receiving information to be processed (e.g., a call or message).

321. On information and belief, Voice Cypher security is based on public-private key pairs.

322. On information and belief, Voice Cypher provides an end-to-end encryption infrastructure that uses CellCrypt's security technologies.

323. Verizon documentation represents Voice Cypher as enabling the synchronization of private data without exposing it to Verizon.



Verizon Voice Cypher: End-To-End Encryption for Commercial Smartphones, VERIZON DATA SHEET at 1 (2014).

324. On information and belief, Verizon servers receive information (e.g., a voice message) to be processed from a sending mobile device (e.g., smartphone on the Verizon network).

325. On information and belief, the Verizon '017 Product breaks each file into chunks and the file is encrypted using AES-128 and a key derived from each chunk's contents that utilizes RSA-256.

326. On information and belief, the Verizon '017 Product defines a cryptographic comprehension function (e.g., session-specific cryptographic key, cipher suite, cryptographic

mode of operation, initial conditions, and/or other cryptographic comprehension information) for the protected data, adapted for making at least a portion of the information incomprehensible.

327. On information and belief, the Verizon '017 Product generates two key pairs for transmitting protected data.

328. On information and belief, the Verizon '017 Product defines a cryptographic comprehension function (e.g., session-specific cryptographic key, cipher suite, cryptographic mode of operation, initial conditions, and/or other cryptographic comprehension information) for the information (e.g., voice or message data), adapted for making at least a portion of the information incomprehensible.

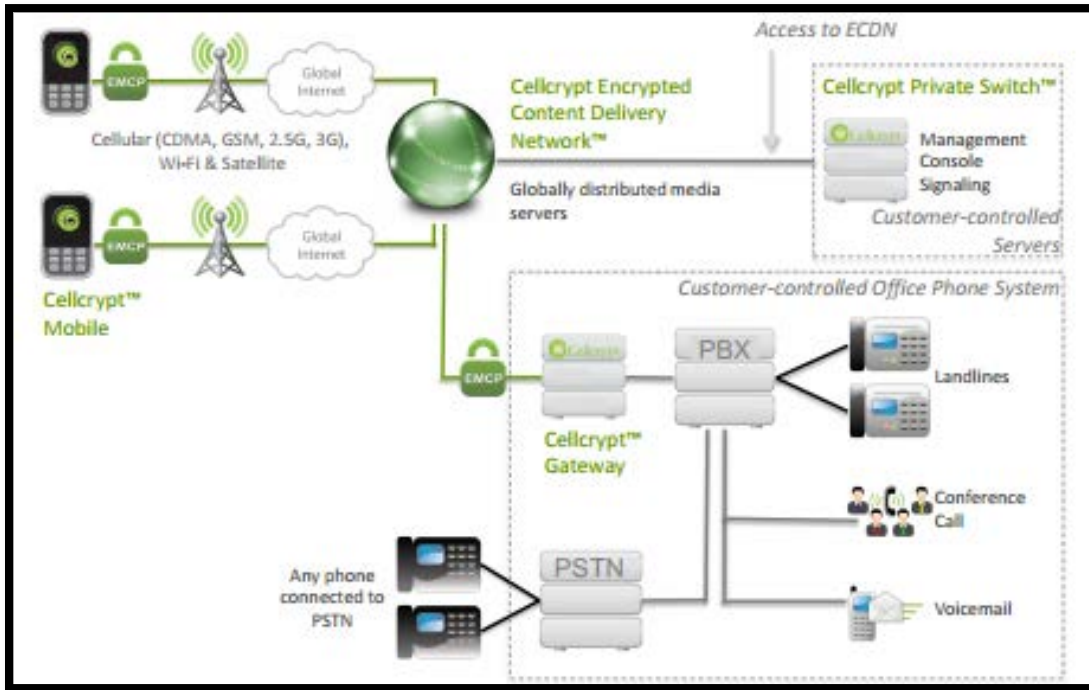
329. On information and belief, the Verizon '017 Product is described by Verizon and/or its partner CellCrypt as a "Secure Voice over Internet Protocol (SVoIP) application for smartphones, which enables users to have secure voice calls on an end-to-end encryption session."

330. On information and belief, Defendant states that the Verizon '017 Product "uses trusted and well-proven, strong encryption technologies that keep your voice calls private wherever you may be in the world. End-to-end encryption ensures that your calls are kept secure at all points between the two smart phones, even within untrusted or insecure networks."⁵⁴

331. On information and belief, the Verizon '017 Product uses the TLS protocols (RFC 5246 and RFC 6460) using mutual authentication with certificates and the ciphersuites: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (using the 256-bit prime modulus elliptic curve specified in FIPS-186-2) and TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 (using the 384-bit prime modulus elliptic curve specified in FIPS-186-2).

332. On information and belief, the below documentation from Verizon's partner, CellCrypt, shows one implementation of architecture of the Verizon '017 Product.

⁵⁴ *User Guide: Verizon Voice Cypher for Android*, VERIZON USER GUIDE at 3 (August 31, 2015).



David Coley, *Mobile Voice and Text Encryption: Loose Lips Might Sink Ships*, CELLCRYPT PRESENTATION at 6 (May 2012).

333. On information and belief, the Verizon '017 Product is enabled to utilize the following encryption functionality: ECDSA SGK, AES EDK (both the AES encryption and decryption key), HMAC Key, and CTR_DRBG CSP (including both the V and Key AES).

334. On information and belief, the Verizon '017 Product stores the Symmetric Key for HMAC authentication of an SRTP stream in random access memory.

335. On information and belief, the Verizon '017 Product stores the Symmetric Key for AS encryption and decryption of the SRTP stream in random access memory.

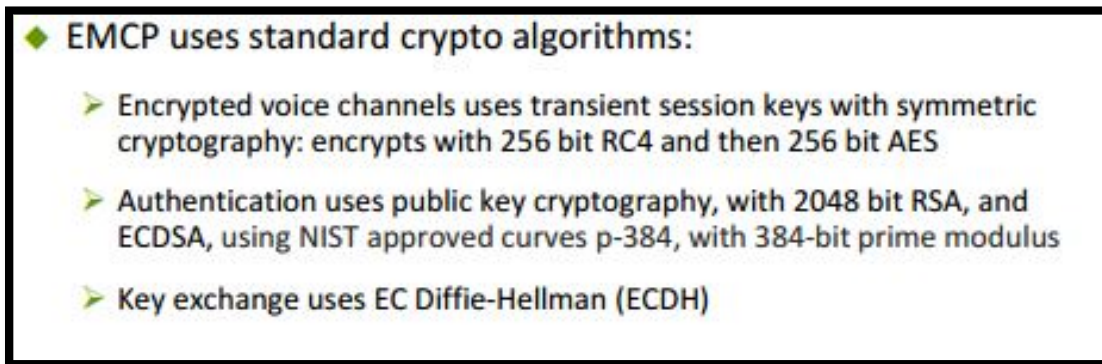
336. On information and belief, the Verizon '017 Product stores the symmetric key for encryption and decryption of the TLS data stream to an SIP Server in random access memory.

337. On information and belief, the Verizon '017 Product stores the private key for a transport layer security connection to a session initiated protocol server in random access memory and encrypted flash on the filesystem.

338. On information and belief, the Verizon '017 Product uses "end-to-end" encryption.

339. On information and belief, Verizon '017 Product server receives asymmetric key information (e.g., RSA-2048 asymmetric key information), comprising at least asymmetric encryption key information and asymmetric decryption key information.

340. On information and belief, Verizon's partner, CellCrypt, states in its documentation that the Verizon '017 Product uses "encrypted voice channels us[ing] transient session keys with symmetric cryptography: encrypts with 256 bit RC4 and then 256 bit AES, authentication uses public key cryptography, with 2048 bit RSA, and ECDSA, using NIST approved curves p-384, with 384-bit prime modulus."



David Coley, *Mobile Voice and Text Encryption: Loose Lips Might Sink Ships*, CELLCRYPT PRESENTATION at 7 (May 2012).

341. On information and belief, the Verizon '017 Product server receives asymmetric key information (e.g., device-and/or user-specific RSA with 2048 bit key and/or ECDSA using NIST approved curves p-384, with 384-bit prime modulus), comprising at least asymmetric encryption key information, and asymmetric decryption key information.

342. On information and belief, the Voice Cypher negotiates a new cryptographic comprehension function (e.g., new session-specific cryptographic key) between two or more parties to a communication (e.g., sending a voice or data message to a mobile device) using a Voice Cypher server intermediary.

343. On information and belief, Voice Cypher processes the information to invert the cryptographic comprehension function (e.g., the initial session-specific cryptographic key) and

impose the new cryptographic comprehension function (e.g., the new session-specific cryptographic key) in an integral process, in dependence on at least the asymmetric cryptographic key information (e.g., the device-specific asymmetric key information), without providing the intermediary (e.g., the Voice Cypher server intermediary) with sufficient asymmetric key information to decrypt the processed information.

344. On information and belief, Voice Cypher outputs processed information (e.g., messaging or voice data) for receipt by one or more mobile devices.

345. On information and belief, Voice Cypher is available to businesses and individuals throughout the United States.

346. On information and belief, Voice Cypher is provided to businesses and individuals located in the Eastern District of Texas.

347. On information and belief, Voice Cypher uses RSA-2048 and Elliptical Curve Digital Signature Algorithm encryption.

348. On information and belief, Voice Cypher generates a session key that is unique and valid for one phone call or one message. The session key generated by Voice Cypher is destroyed by Voice Cypher after its use.

349. On information and belief, Voice Cypher includes an automated communication port configured to receive a first message representing an encrypted communication associated with a first set of asymmetric keys (e.g., an RSA-2048 asymmetric key), to receive a transcription key (e.g., a session-specific RSA and/or ECDSA transcription key), and to transmit a second message representing the encrypted communication associated with a second set of asymmetric keys (e.g., a second set of RSA-2048 asymmetric keys).

350. On information and belief, the Verizon '017 Product uses timing synchronization function[ality] X.509v2 certificates to authenticate the user to the session initiated server via a mutually authenticated transport layer security connection.

351. On information and belief, the Verizon '017 Product is enabled to use public key cryptography to authenticate a communication of data between two client devices, and for secure

key exchange to establish a session key. The voice data is enabled to be encrypted using symmetric algorithms, using a different session key for each call.

352. On information and belief, Verizon has directly infringed and continues to directly infringe the '017 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for secure three-party communications, including but not limited to, the Verizon '017 Product, which includes infringing encryption technologies. Such products and/or services include, by way of example and without limitation, Verizon Voice Cypher.

353. By making, using, testing, offering for sale, and/or selling encryption products and services, including but not limited to the Verizon '017 Product, Verizon has injured St. Luke and is liable to St. Luke for directly infringing one or more claims of the '017 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

354. On information and belief, Verizon also infringes indirectly the '017 patent by active inducement under 35 U.S.C. § 271(b).

355. Verizon has had knowledge of the '017 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the '017 patent and knew of its infringement, including by way of this lawsuit.

356. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon '017 Product and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

357. Verizon specifically intended and was aware that the normal and customary use of the accused product would infringe the '017 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '017 patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '017 Product that has the capability of operating in a manner that infringe one or more of the claims of the '017 patent, including at least claim 1, and Verizon further provides documentation and training materials that cause customers and end

users of the Verizon '017 Product to utilize the product(s) in a manner that directly infringe one or more claims of the '017 patent. By providing instruction and training to customers and end-users on how to use the Verizon '017 Product in a manner that directly infringes one or more claims of the '017 patent, including at least claim 1, Verizon specifically intended to induce infringement of the '017 patent. On information and belief, Verizon engaged in such inducement to promote the sales of the Verizon '017 Product, *e.g.*, through Verizon's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused product to infringe the '017 patent.⁵⁵ Accordingly, Verizon has induced and continues to induce users of the accused product to use the accused product in their ordinary and customary way to infringe the '017 patent, knowing that such use constitutes infringement of the '017 patent.

358. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '017 patent.

359. As a result of Verizon's infringement of the '017 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 7,869,591

360. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

361. Verizon makes, uses, sells, and/or offers for sale in the United States products and/or services for secure three-party communications.

⁵⁵ See *e.g.*, *User Guide: Verizon Voice Cypher for Android*, VERIZON USER GUIDE (August 31, 2015); *User Guide: Verizon Voice Cypher for BlackBerry OS10*, VERIZON USER GUIDE (2014); *Verizon Voice Cypher Enterprise Management Portal User Guide*, VERIZON DOCUMENTATION V2.0.1 (March 30, 2015); *Verizon Voice Cypher User Guide for iOS*, VERIZON DOCUMENTATION V3.0.12 (July 21, 2015); *Verizon Voice Cypher User Guide for Windows Phone*, VERIZON DOCUMENTATION V3.0.9 (July 21, 2015).

362. Verizon makes, sells, offers to sell, imports, and/or uses Verizon Voice Cypher (“Voice Cypher” or “Verizon ‘591 Product’”).

363. On information and belief, Verizon Voice Cypher includes encryption technology.

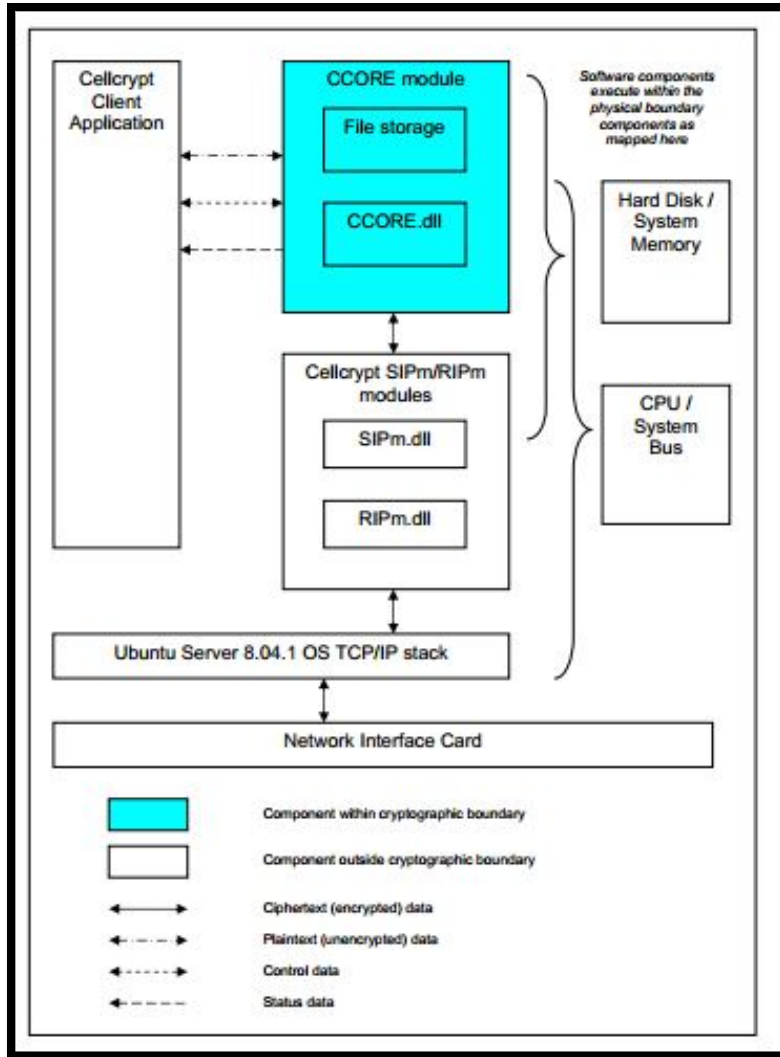
364. On information and belief, the Verizon ‘591 Product enables sending encrypted information through an intermediary where the intermediary is not able to view the unencrypted message.

365. On information and belief, the Verizon ‘591 Product is available to businesses and individuals throughout the United States.

366. On information and belief, the Verizon ‘591 Product is provided to businesses and individuals located in the Eastern District of Texas.

367. On information and belief, the Verizon ‘591 Product comprises a server that receives and stores in a first memory information encrypted based on a first set of cryptographic keys (e.g., a first set of asymmetric keys), a first portion (e.g., a private key portion) of the first set of cryptographic keys having been employed to produce the encrypted information and a second portion (e.g., a public key portion) of the first set of cryptographic keys being required to decrypt the information encrypted with the first portion of the first set of cryptographic information (e.g., the first set of asymmetric keys).

368. The below schematic from Voice Cypher documentation shows the exchange of encrypted data between the memory on a client device and a network.



CellCrypt CCore Module FIPS 140-2 Level 1 Security Policy, CELLCRYPT SECURITY DOCUMENTS V4.1 at 3 (April 13, 2010).

369. On information and belief, a Verizon server receives and stores in a second memory (e.g., privileged memory dedicated to cryptographic key storage and/or manipulation) a first portion (e.g., a public key portion) of a second set of cryptographic keys (e.g., a second set of asymmetric keys), having a corresponding second portion (e.g., a private key portion) being required for decryption of a message encrypted using the first portion of the second set of cryptographic keys (e.g., the public key portion of the second set of asymmetric keys).

370. On information belief, Verizon’s ‘591 Product server negotiates a set of session keys (e.g., RSA and/or AES session keys) through a communications port.

371. On information and belief, a Verizon '591 Product server without requiring or employing sufficient information either to decrypt the encrypted information or to comprehend the transcribed information generates a transcription key for transforming the received encrypted information to transcribed information.

372. On information and belief, a Verizon '591 Product server without requiring or employing sufficient information either to decrypt the encrypted information or to comprehend the transcribed information, transcribes the stored encrypted information into transcribed information using the transcription key.

373. On information and belief, the Verizon '591 Server generates a transcription key for transforming the received encrypted information to transcribed information, in dependence on at least information representing the second portion of the first set of cryptographic keys (e.g., information representing the public key portion of the first set of RSA and/or ECDSA asymmetric cryptographic keys), information representing the first portion of the second set of cryptographic keys (e.g., information representing the public key portion of the second set of RSA and/or ECDSA asymmetric cryptographic keys), and a first portion of the set of session keys (e.g., a first portion of the set of RSA, ECDSA, and/or AES session keys).

374. On information and belief, the Verizon '591 Product transcribes information wherein at least one of the first set of cryptographic keys, the second set of cryptographic keys, and the set of session keys, are key pairs related through at least one cryptographic algorithm selected from the group consisting of one or more of an elliptic curve cryptographic algorithm, a Rivest-Shamir-Adleman cryptographic algorithm, an El Gamal cryptographic algorithm,⁵⁶ and a Diffie-Hellman cryptographic algorithm.

375. On information and belief, the Verizon '591 Product transcribes information wherein at least one of the first set of cryptographic keys, the second set of cryptographic keys,

⁵⁶ See Yvo Desmedt, *ElGamal Public Key Encryption*, ENCYCLOPEDIA OF CRYPTOGRAPHY AND SECURITY at 396 (2011) ("[t]he ElGamal public key encryption scheme is characterized by having as ciphertext, $(c_1, c_2) := (g^k, m \cdot y_A^k)$ ").

and the set of session keys, are key pairs related through at least one of an elliptic curve cryptographic algorithm, an RSA cryptographic algorithm, ECDSA cryptographic algorithm, and/or a Diffie-Hellman cryptographic algorithm.

376. On information and belief, the Verizon '591 Product transmits information by authenticating a remote system and communicating the transcription key to the authenticated remote system.

377. On information and belief, the Verizon '591 Product transmits information by authenticating a remote system and communicating the transcription key to the authenticated remote system at least where the transcription key is generated on a Verizon server remote from the server where the transcription key is to be deployed.

378. On information and belief, Voice Cypher transmits information wherein the first set of cryptographic keys is associated with a first party, the second set of cryptographic keys is associated with a second party, and the method is conducted without exchanging cryptographic information between the first party and second party sufficient for decrypting the encrypted information or comprehending the transcribed information.

379. On information and belief, Voice Cypher transmits information wherein the first set of cryptographic keys (e.g., the first set of RSA asymmetric keys) is associated with a first party (e.g., Verizon client device sending the protected data), the second set of cryptographic keys (e.g., the second set of RSA asymmetric keys) is associated with a second party (e.g., an Verizon client device receiving the protect data), and Verizon's Voice Cypher service does not exchange cryptographic information between the first party and second party sufficient for decrypting the encrypted information or comprehending the transcribed information.

380. On information and belief, the Verizon '591 Product transmits information where the set of session keys is dynamically generated for use in conjunction with a communication session, and the transcription key and the second set of cryptographic keys together provide insufficient information to determine key components of the first set of cryptographic keys.

381. On information and belief, the Verizon '591 Product transcribes information wherein the set of session keys is dynamically generated for use in conjunction with a communication session, and the transcription key and the second set of cryptographic keys together provide insufficient information to determine key components of the first set of cryptographic keys.

382. On information and belief, the Verizon '591 Product transcribes information wherein the session keys are negotiated through the communication port with an intended recipient of the transcribed information.

383. On information and belief, Voice Cypher session keys are negotiated through a communication port with an intended recipient of the transcribed information.

384. On information and belief, Verizon has directly infringed and continues to directly infringe the '591 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for secure three-party communications, including but not limited to, the Verizon '591 Product, which includes infringing encryption technologies. Such products and/or services include, by way of example and without limitation Verizon Voice Cypher.

385. By making, using, testing, offering for sale, and/or selling encryption products and services, including but not limited to the Verizon '591 Product, Verizon has injured St. Luke and is liable to St. Luke for directly infringing one or more claims of the '591 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

386. On information and belief, Verizon also infringes indirectly the '591 patent by active inducement under 35 U.S.C. § 271(b).

387. Verizon has had knowledge of the '591 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the '591 patent and knew of its infringement, including by way of this lawsuit.

388. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon '591 Product and had knowledge

that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

389. Verizon specifically intended and was aware that the normal and customary use of the accused products would infringe the '591 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '591 patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '591 Product that has the capability of operating in a manner that infringe one or more of the claims of the '591 patent, including at least claim 1, and Verizon further provides documentation and training materials that cause customers and end users of the Verizon '591 Product to utilize the product in a manner that directly infringes one or more claims of the '591 patent. By providing instruction and training to customers and end-users on how to use the Verizon '591 Product in a manner that directly infringes one or more claims of the '591 patent, including at least claim 1, Verizon specifically intended to induce infringement of the '591 patent. On information and belief, Verizon engaged in such inducement to promote the sales of the Verizon '591 Product, *e.g.*, through Verizon's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '591 patent.⁵⁷ Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '591 patent, knowing that such use constitutes infringement of the '591 patent.

390. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '591 patent.

⁵⁷ See, *e.g.*, *Verizon Cloud Documentation*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ObjectOperations.htm>; *Tips For Understanding Verizon Cloud*, VERIZON SUPPORT (2015), available at: <http://www.verizonwireless.com/support/how-to-use-verizon-cloud/>; *Verizon Cloud Control User Guide*, VERIZON DOCUMENTATION (2015), available at: <https://cloud.verizon.com/documentation/CloudConsoleUserGuide.htm>; *Verizon Cloud Storage API Reference*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/StorageAPIReference.htm>; *Verizon Cloud Desktop Application Help Guide*, VERIZON HELP GUIDE (2014).

391. As a result of Verizon's infringement of the '591 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 7,587,368

392. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

393. Verizon designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for managing access to protected data.

394. Verizon designs, makes, uses, sells and/or offers for sale in the United States products and/or services including Verizon Cloud Identity and Access Management; Verizon Secure Cloud Interconnect; Verizon Universal Identity Management; Verizon M2M Identity Management; and Verizon Managed Certificate Services (collectively, the "Verizon '368 Products").

395. On information and belief, the Verizon '368 Products are Information Rights Management products for information stored in the cloud.

396. On information and belief, the Verizon '368 Products comprise a database system with a plurality of digital records, each having an associated set of access rules, stored in a computer memory associated with a server system.

397. On information and belief, the Verizon '368 Products comprise at least one interface computer (e.g., an identity and access management server associated with a cloud storage server system) in communication with at least one remote computer (e.g., a remote computer requesting to access files in the cloud storage server system) receiving a request to access a digital record stored in the cloud storage server system.

398. On information and belief, the Verizon '368 Products include an automated processor, associated with the server system.

399. On information and belief, the Verizon ‘368 Products comprise a plurality of digital records, each digital record having an associated set of access rules, stored in a computer memory associated with a server system. For example, the Verizon ‘368 Products include a plurality of digital records (e.g., Verizon Cloud Storage (“VCS”) objects; Verizon Cloud Key Management Service (“VCKMS”) key blobs, each digital record (e.g., VCS object; VCKMS key blob) having an associated set of access rules (e.g., an associated set of resource-specific VCIAM access rules), stored in a computer memory associated with a server system (e.g., a physical and/or virtual storage resource associated with a Verizon Cloud server system).

400. On information and belief, the Verizon ‘368 Products are available to businesses and individuals throughout the United States.

401. On information and belief, the Verizon ‘368 Products are provided to businesses and individuals located in the Eastern District of Texas.

402. The below documentation from Verizon shows the access control functionality that is enabled by the Verizon ‘368 Products.

Access Control

Access Control Policy begins the definition of access controls. Policy statements limit access by users to resources. You must understand the range of access required by each role your users embody and build policies that restrict access to resources appropriate for each role. Policies either grant or deny access to specified actions taken on specified resources. You can also restrict the resource by conditions on the resource.

Note: Policies can be extremely granular; a policy can be constructed that limits access to a specific action on a specific resource.

Once policies are established, combine policies as required to build the roles your users perform. Users may have more than one role. A single role need not encompass every job function performed by any given user. You can combine many granular roles to enable all the functions of a user.

You can assign individual users to a role, users with unique access requirements can be assigned roles directly. Or you can combine many users with similar job functions into a group and assign the group the necessary roles. Individual users inherit the roles of the group or groups to which they are assigned. Users can be assigned to multiple groups and inherit the roles of all groups to which they are assigned.

For example, define a policy that grants access to all actions for virtual machines with the tag `activeDirectory`, which you apply to every Active Directory server. Create a role, `ADAdmin`, with that policy. Create a group, `ADAdministrator`, with that role. When new Active Directory security administrators are hired, you assign their user to the `ADAdministrator` group and they can perform their job.

When a user takes an action, all the policies associated with a user from all the roles in all the groups are evaluated. Only after evaluating every policy is the user granted or denied access to that action.

For example, you can define a blanket policy denying access to a resource and a special policy granting access to that resource. Assign the first policy to all but one role. Assign the second policy to that final role. Therefore, a user with both roles will be able to access the resource through the specific grant.

Access Control in Public Cloud, VERIZON CLOUD DOCUMENTATION (2015), available at: <https://cloud.verizon.com/documentation/PolicyBasedAccessControl.htm>.

403. On information and belief, the Verizon ‘368 Products comprise an interface computer in communication with a remote computer, receiving a request for access from the remote computer to access a digital record stored in the computer memory. For example, the Verizon ‘368 Products comprise at least one VCIAM application program interface (“API”) interface server computer, in communication with a remote computer (e.g., a VCIAM-credentialed mobile device, computer, or IoT device), receiving a request for access from the remote computer to access a digital record stored in the computer memory (e.g., a REST API request from the VCIAM-credentialed mobile device, computer, or IoT device to access a VCS object or VCKMS key blob stored in the Verizon Cloud server computer memory).

404. On information and belief, the Verizon ‘368 Products comprise an automated processor, associated with the server system.

405. On information and belief, the Verizon ‘368 Products comprise at least one VCIAM physical and/or virtual processor automated to validate the received request to access the digital record (e.g., the received REST API request from the VCIAM-credentialed mobile device, computer, or IoT device to access a VCS object or VCKMS key blob stored in the Verizon Cloud server computer memory) by applying a respective set of access rules for the digital record stored in the computer memory (e.g., by applying, based on the authenticated context of the request (e.g., user, role, time, client platform, etc.), a respective set of VCIAM access rules for the requested VCS object or VCKMS key blob stored in the Verizon Cloud server computer memory).

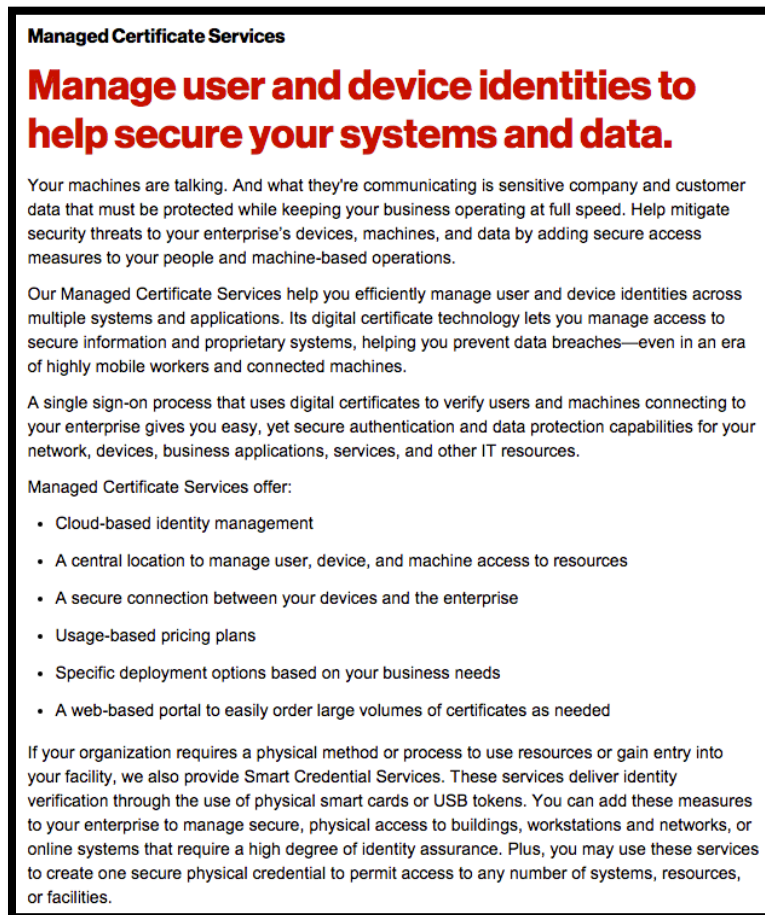
406. On information and belief, the Verizon ‘368 Products comprise an automated processor, associated with the server system, that retrieves a public key having an associated private key, and associates a logging wrapper having a respective session key with the digital record, after validating the received request, wherein the session key is distinct from the public key and the private key.

407. On information and belief, the Verizon ‘368 Products comprise at least one VCIAM physical and/or virtual processor automated to, after validating the received request (e.g., the received REST API request from a VCIAM-credentialed mobile device, computer, or IoT device) including (1) Retrieve, from a VCIAM credential store, an RSA public key (which has an associated RSA private key) associated with the authenticated requestor (e.g., VCIAM-credentialed mobile device, computer, or IoT device); and (2) associate a logging wrapper (e.g., a Java or similarly lightweight applet configured, through logical association with (“wrapping of”) a content key, to ensure client-side reporting of certain VCIAM-specified audit events), having a respective session key (e.g., a ephemeral/FPS transport cryptographic key negotiated between the VCIAM server and the VCIAM-credentialed mobile device, computer, or IoT device). The session key is distinct from the public key and the private key (e.g., the RSA public

key and RSA private key associated with the VCIAM-credentialed mobile device, computer, or IoT device).

408. On information and belief, the Verizon ‘368 Products comprise an automated processor, associated with the server system.

409. Verizon documentation states that the Verizon ‘368 Products “[M]anage user and device identities to help secure your systems and data.”



Managed Certificate Services

Manage user and device identities to help secure your systems and data.

Your machines are talking. And what they're communicating is sensitive company and customer data that must be protected while keeping your business operating at full speed. Help mitigate security threats to your enterprise's devices, machines, and data by adding secure access measures to your people and machine-based operations.

Our Managed Certificate Services help you efficiently manage user and device identities across multiple systems and applications. Its digital certificate technology lets you manage access to secure information and proprietary systems, helping you prevent data breaches—even in an era of highly mobile workers and connected machines.

A single sign-on process that uses digital certificates to verify users and machines connecting to your enterprise gives you easy, yet secure authentication and data protection capabilities for your network, devices, business applications, services, and other IT resources.

Managed Certificate Services offer:

- Cloud-based identity management
- A central location to manage user, device, and machine access to resources
- A secure connection between your devices and the enterprise
- Usage-based pricing plans
- Specific deployment options based on your business needs
- A web-based portal to easily order large volumes of certificates as needed

If your organization requires a physical method or process to use resources or gain entry into your facility, we also provide Smart Credential Services. These services deliver identity verification through the use of physical smart cards or USB tokens. You can add these measures to your enterprise to manage secure, physical access to buildings, workstations and networks, or online systems that require a high degree of identity assurance. Plus, you may use these services to create one secure physical credential to permit access to any number of systems, resources, or facilities.

Manage User and Device Identities to Help Secure Your Systems and Data, VERIZON MANAGED CERTIFICATE SERVICES (2015), available at: <http://www.verizonenterprise.com/products/security/identity-access/managed-certificate.xml>.

410. On information and belief, the Verizon ‘368 Products comprise at least one VCIAM physical and/or virtual automated processor.

411. On information and belief, the Verizon '368 Products comprise at least one VCIAM physical and/or virtual processor automated to receive, through the interface computer, a logging event from the remote computer based on an operation of the wrapper and at least the session key.

412. On information and belief, the Verizon '368 Products comprise at least one VCIAM physical and/or virtual processor automated to record the logging event in an access log.

413. Verizon documentation of the Verizon '368 Products contains the following documentation of the object operations supported by Verizon Cloud Storage.

```

GET request

Request:

GET /bucketname/a/b HTTP/1.1
User-Agent: Mozilla/4.0 (Compatible; AMZS3; CVRF 1.0; Windows Server 2008 R2)
Host:storage-iad3a.cloud.verizon.com
Accept: */*
x-amz-acl: authenticated-read
x-amz-date: Mon, 27 Aug 2012 13:41:44 GMT
Authorization: AWS admin:wIVvN1W/VnYY+0aekW6FSG9xuCC=

Response:

HTTP/1.1 200 OK
DAV: 1,3
Date: Mon, 27 Aug 2012 13:42:03 GMT
Server:unknown-c111f895b629566707818005fa6ff8f66346011b
Content-Length: 0
Accept-Ranges: bytes
Last-Modified: Mon, 27 Aug 2012 13:41:06GMT
ETag: f0a602cd8cd2d4e01c811daa4ba1b451
HEAD request

Request:

HEAD /bucketname/a/b/c/d/e HTTP/1.1
User-Agent: Mozilla/4.0 (Compatible; AMZS3; CVRF 1.0; Windows Server 2008 R2)
Host:storage-iad3a.cloud.verizon.com
Accept: */*
x-amz-acl: authenticated-read
x-amz-date: Mon, 27 Aug 2012 13:42:42 GMT
Authorization: AWS admin:b+zPIV1T/pCyic0vJ4WHFNh0sEQ=

Response:

HTTP/1.1 200 OK
DAV: 1,3
Date: Mon, 27 Aug 2012 13:42:03 GMT
Server:unknown-c111f895b629566707818005fa6ff8f66346011b
Content-Length: 1048576
Accept-Ranges: bytes
Last-Modified: Mon, 27 Aug 2012 13:42:03 GMT
ETag: fdf3a80e1ce052e7cd021563d98cb53b

```

Verizon Cloud Storage API Reference: API Calls, VERIZON CLOUD STORAGE DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ObjectOperations.htm>.

414. On information and belief, Verizon has directly infringed and continues to directly infringe the '368 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for managing access to protected data, including but not limited to, the Verizon '368 Products, which include infringing encryption technologies. Such products and/or services include, by way of example and without limitation, Verizon Cloud Identity and Access Management; Verizon Secure Cloud Interconnect; Verizon Universal Identity Management; Verizon M2M Identity Management; and Verizon Managed Certificate Services.

415. By making, using, testing, offering for sale, and/or selling products and services for managing access to protected data, including but not limited to the Verizon '368 Products, Verizon has injured St. Luke and is liable to St. Luke for directly infringing one or more claims of the '368 patent, including at least claim 78, pursuant to 35 U.S.C. § 271(a).

416. On information and belief, Verizon also indirectly infringes the '368 patent by actively inducing infringement under 35 USC § 271(b).

417. Verizon has had knowledge of the '368 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the '368 patent and knew of its infringement, including by way of this lawsuit.

418. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon '368 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

419. Verizon specifically intended and was aware that the normal and customary use of the accused products would infringe the '368 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '368 patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '368 Products that have the capability of operating in a manner that infringe one or more of the claims of the '368 patent, including at least claim 78, and Verizon further provides documentation and training materials that cause customers and end

users of the Verizon '368 Products to utilize the products in a manner that directly infringe one or more claims of the Verizon patent. By providing instruction and training to customers and end-users on how to use the Verizon '368 Products in a manner that directly infringes one or more claims of the '368 patent, including at least claim 78, Verizon specifically intended to induce infringement of the '368 patent. On information and belief, Verizon engaged in such inducement to promote the sales of the Verizon '368 Products, e.g., through Verizon's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '368 patent.⁵⁸ Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '368 patent, knowing that such use constitutes infringement of the '368 patent.

420. Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '368 patent, knowing that such use constitutes infringement of the '368 patent.

421. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '368 patent.

422. As a result of Verizon's infringement of the '368 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 8,498,941

⁵⁸ See, e.g., *Verizon Cloud Documentation*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ObjectOperations.htm>; *Tips For Understanding Verizon Cloud*, VERIZON SUPPORT (2015), available at: <http://www.verizonwireless.com/support/how-to-use-verizon-cloud/>; *Verizon Cloud Control User Guide*, VERIZON DOCUMENTATION (2015), available at: <https://cloud.verizon.com/documentation/CloudConsoleUserGuide.htm>; *Verizon Cloud Storage API Reference*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/StorageAPIReference.htm>; *Verizon Cloud Desktop Application Help Guide*, VERIZON HELP GUIDE (2014).

423. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

424. Verizon designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for managing access to protected data.

425. Verizon makes, sells, offers to sell, imports, and/or uses the Verizon Cloud Identity and Access Management, Verizon Secure Cloud Interconnect, and Verizon Enterprise Virtual Private Cloud (collectively, the “Verizon Cloud System” or “Verizon ‘941 Products”).

426. On information and belief, the Verizon Cloud System is a system for controlling access to a plurality of records stored within a plurality of automated external databases.

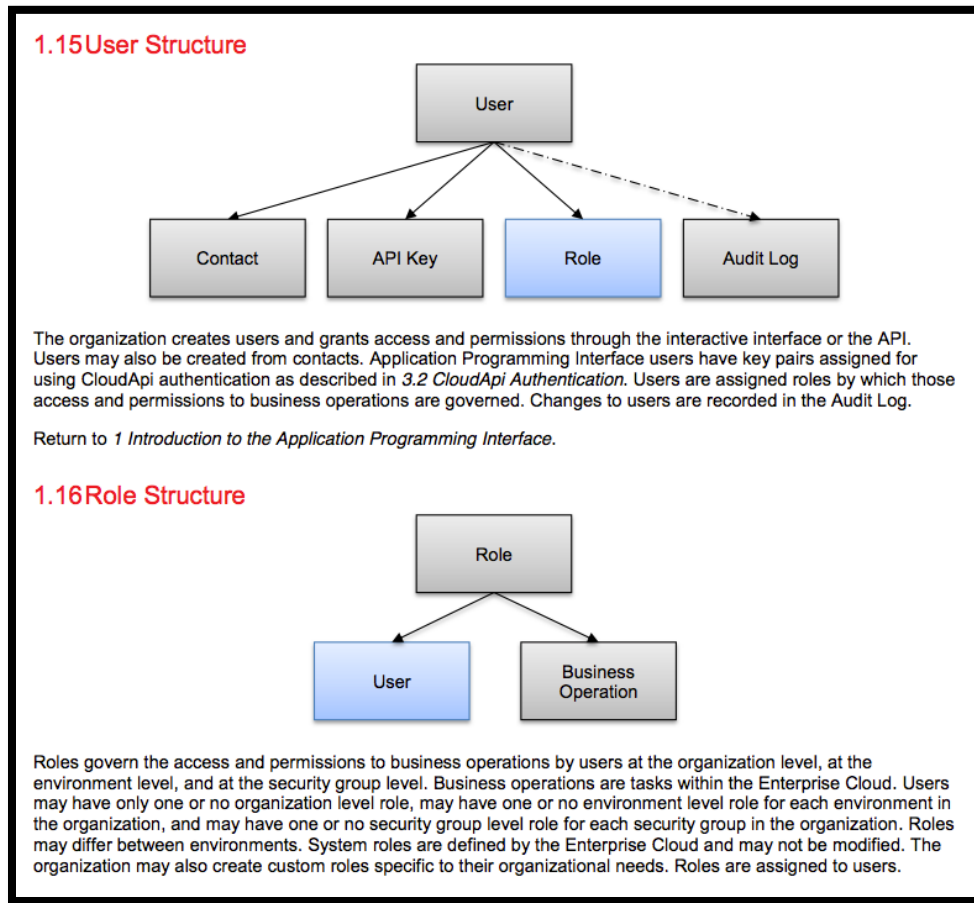
427. On information and belief, the Verizon ‘941 Products perform a method for controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules.

428. On information and belief, the Verizon Cloud System comprises a collection of physical and logical resources (e.g., physical and logical compute pool resources; physical and logical storage resources; physical and logical network resources; physical and logical information/content resources; etc.) under control of a single top-level “enterprise” entity. Beneath the enterprise entity are numerous subordinate entities with organizationally defined relationships, constraints, and permissions—e.g., environment, location, tag, user, role, billing, security group, etc.

429. On information and belief, the Verizon ‘941 Products are available to businesses and individuals throughout the United States.

430. On information and belief, the Verizon ‘941 Products are provided to businesses and individuals located in the Eastern District of Texas.

431. On information and belief, the below diagram from Verizon’s documentation shows the operational structure used by one or more of the Verizon ‘941 Products.



Enterprise Cloud Programming Interface, VERIZON ENTERPRISE CLOUD DOCUMENTATION (2015).

432. On information and belief, the Verizon Cloud System resources are controlled by rule-based policies. For example, each individually addressable record in a Verizon Enterprise Virtual Private Cloud (“VEVPC”) data store has a unique resource identifier (e.g., URI) in the VEVPC as well as an associated set of access rules for the records (the union of all IMB policy statements in the VEVPC potentially relevant to the record).

433. On information and belief, a VEVPC stores fully unstructured, non-transactional data in basic object storage (e.g., Verizon Cloud Storage). Relational SQL-type data to mostly unstructured NoSQL-type data—is stored in databases.

434. On information and belief, Verizon offers, sells, and distributes third-party database solutions for VEVPC through the Verizon Cloud Marketplace. For example, Verizon

offers more than a dozen Oracle database products for VEVPC through the Marketplace—and further serves as licensing and billing agent for Oracle with respect to these products.

435. On information and belief, a VEVPC includes a plurality of records provided within a plurality of automated electronic databases (e.g., one or more partially-structured data records in at least one NoSQL automated electronic database; one or more relationally-structured data records in at least one SQL-type automated electronic database; etc.). Each database record is a unique VEVPC resource, and has an associated set of IAM access rules.

436. On information and belief, the VEVPC IAM broker controls access to the VEVPC records based on IAM access rules associated with the respective records.

437. Verizon documentation states that the Verizon ‘941 Products “[M]anage user and device identities to help secure your systems and data.”

Managed Certificate Services

Manage user and device identities to help secure your systems and data.

Your machines are talking. And what they're communicating is sensitive company and customer data that must be protected while keeping your business operating at full speed. Help mitigate security threats to your enterprise's devices, machines, and data by adding secure access measures to your people and machine-based operations.

Our Managed Certificate Services help you efficiently manage user and device identities across multiple systems and applications. Its digital certificate technology lets you manage access to secure information and proprietary systems, helping you prevent data breaches—even in an era of highly mobile workers and connected machines.

A single sign-on process that uses digital certificates to verify users and machines connecting to your enterprise gives you easy, yet secure authentication and data protection capabilities for your network, devices, business applications, services, and other IT resources.

Managed Certificate Services offer:

- Cloud-based identity management
- A central location to manage user, device, and machine access to resources
- A secure connection between your devices and the enterprise
- Usage-based pricing plans
- Specific deployment options based on your business needs
- A web-based portal to easily order large volumes of certificates as needed

If your organization requires a physical method or process to use resources or gain entry into your facility, we also provide Smart Credential Services. These services deliver identity verification through the use of physical smart cards or USB tokens. You can add these measures to your enterprise to manage secure, physical access to buildings, workstations and networks, or online systems that require a high degree of identity assurance. Plus, you may use these services to create one secure physical credential to permit access to any number of systems, resources, or facilities.

Manage User and Device Identities to Help Secure Your Systems and Data, VERIZON MANAGED CERTIFICATE SERVICES (2015), available at: <http://www.verizonenterprise.com/products/security/identity-access/managed-certificate.xml>.

438. On information and belief, the VEVCP IAM broker contains functionality for receiving a REST API (e.g., HTTP GET) request from a requestor (e.g., a web application server). The request corresponds to an entity, and the requestor has at least one attribute:

439. On information and belief, the Verizon '941 Products comprise a requestor that is a targeted advertising web app server ("ADSERVO"), and the databases contains demographic and behavioral history information for thousands of (anonymized) mobile device users.

440. On information and belief, the Verizon '941 Products comprise a requestor that corresponds to an entity: a human end-user ("Frank") using a mobile app that is imminently scheduled to receive an in-app advertisement from ADSERVO. More particularly (for example),

a content field in the REST API “GET” request identifies Frank and/or describes him relatively uniquely.

441. On information and belief, the Verizon ‘941 Products comprise a requestor that has at least one attribute. For example, ADSERVO has an associated IAM user, group, role, and/or account. ADSERVO also has an associated environment, location, resource type, security group, and/or one or more associated tags.

442. On information and belief, the Verizon ‘941 Products search the plurality of automated electronic databases to find records relating to an entity corresponding to the request, and records having connections to records corresponding to the request, relating to transactions relationships or communications between the entity and another entity.

443. On information and belief, the VEVPC IAM broker searches the plurality of automated electronic databases (e.g., one or more web history databases; one or more purchase history databases; one or more demographic profile databases; etc.) to find records (e.g., web history records; purchase history records; demographic records; etc.) relating to “Frank” (*i.e.*, the actual entity name/identifier specified in the REST API request), and records having connections to records corresponding to “Frank” (e.g., web history records, purchase history records, and/or demographic records having various connections to records corresponding to “Frank”), relating to transactions, relationships, or communications between “Frank” and another entity.

Ultimately, imperfections in the standard, run-of-the-mill data identification, distinction, and deduplication process are serious enough that a non-negligible subset of the records electronically determined not to “relate to Frank,” but which “have connections to records relating to Frank,” will in fact simply be records relating to Frank that were incorrectly identified, labeled, packaged, etc.

444. On information and belief, the Verizon ‘941 Products apply a set of access rules associated with each found record by at least one automated processor, to produce a set of accessible records, at a server device.

445. On information and belief, the VEVPC IAM broker applies, by at least one automated processor, a set of IAM access control rules associated with each found record (e.g., each found web history record, purchase history record, or demographic information record from the plurality of automated electronic databases), to produce a set of accessible records, at a server device (e.g., a VEVPC server device capable of communicating the set of accessible records to ADSERVO, the information requestor).

446. On information and belief, the Verizon '941 Products contain functionality for applying at least one compensation rule by at least one automated processor, dependent on the at least one attribute of the requestor.

447. On information and belief, the VEVPC IAM broker applies, by at least one automated processor, at least a "data transfer" compensation rule dependent on at least one attribute of the requestor. According to the "data transfer" compensation rule, "Internet bandwidth is billed based on data transferred out of Verizon Cloud. Transfers in are included at no additional charge and outbound transfers are priced at \$0.05/GB transferred."

448. On information and belief, the above referenced "data transfer" compensation rule is dependent on the at least one attribute of the requestor (e.g., ADSERVO's associated IAM user, group, role, and/or account; ADSERVO's associated environment, location, resource type, security group; and/or one or more associated tags).

449. On information and belief, the Verizon '941 Products enable functionality where the amount of the data transfer compensation payment is dependent upon the access permissions attached to ADSERVO's attribute (e.g., role; security group; tag); the difference in compensation payable to Verizon from data transfer fees between seventy-three accessible records and four accessible records is not only non-zero, it is potentially sizable.

450. On information and belief, the Verizon '941 Products enable ADSERVO containing functionality for determining whether the Verizon '941 Products are owed *any* compensation under the data transfer rule for the communication of records to ADSERVO. Specifically, ADSERVO has several attributes (e.g., associated IAM user, group, role, and/or

account; associated environment, location, resource type, and/or security group) that determine ADSERVO's physical and/or logical network location—particularly, vis-à-vis the VEVPC IAM broker. For example, if ADSERVO's location and/or IAM account place ADSERVO physically and/or logically outside of the VEVPC, then the transfer constitutes a “data transfer out,” and the data transfer rule requires that Verizon be compensated. However, if ADSERVO's location and/or IAM account places ADSERVO physically and logically inside the VEVPC, then the transfer, even if voluminous, should not constitute a “data transfer out,” and therefore should not require any data transfer payment to Verizon.

451. On information and belief, the Verizon '941 Products enable functionality where the VEVPC IAM broker logs request for access to the plurality of records provided with a plurality of ad targeting databases by at least one automated processor (e.g., a secure audit virtual appliance automated processor).

452. On information and belief, the VEVPC IAM broker communicates the set of accessible records (e.g., the set of accessible web history records, purchase history records, demographic records, etc.) to the requestor (ADSERVO) to help ADSERVO make a better ad targeting decision vis-à-vis “Frank.”

453. On information and belief, Verizon has directly infringed and continues to directly infringe the '941 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for managing access to protected data, including but not limited to, the Verizon '941 Products, which include infringing encryption technologies. Such products and/or services include, by way of example and without limitation, Verizon Cloud Identity and Access Management, Verizon Secure Cloud Interconnect, and Verizon Enterprise Virtual Private Cloud.

454. By making, using, testing, offering for sale, and/or selling encryption products and services, including but not limited to the Verizon '941 Products, Verizon has injured St. Luke and is liable to St. Luke for directly infringing one or more claims of the '941 patent, including at least claims 16 and 18-19, pursuant to 35 U.S.C. § 271(a).

455. On information and belief, Verizon also indirectly infringes the '941 patent by actively inducing infringement under 35 USC § 271(b).

456. Verizon has had knowledge of the '941 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the '941 patent and knew of its infringement, including by way of this lawsuit.

457. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon '941 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

458. Verizon specifically intended and was aware that the normal and customary use of the accused products would infringe the '941 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '941 patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '941 Products that have the capability of operating in a manner that infringe one or more of the claims of the '941 patent, including at least claims 16 and 18-19, and Verizon further provides documentation and training materials that cause customers and end users of the Verizon '941 Products to utilize the products in a manner that directly infringe one or more claims of the '941 patent. By providing instruction and training to customers and end-users on how to use the Verizon '941 Products in a manner that directly infringes one or more claims of the '941 patent, including at least claims 16 and 18-19, Verizon specifically intended to induce infringement of the '941 patent. On information and belief, Verizon engaged in such inducement to promote the sales of the Verizon '941 Products, e.g., through Verizon's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '941 patent.⁵⁹ Accordingly,

⁵⁹ See, e.g., *Verizon Cloud Documentation*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ObjectOperations.htm>; *Tips For Understanding Verizon Cloud*, VERIZON SUPPORT (2015), available at: <http://www.verizonwireless.com/support/how-to-use-verizon-cloud/>; *Verizon Cloud Control User Guide*, VERIZON DOCUMENTATION (2015),

Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '941 patent, knowing that such use constitutes infringement of the '941 patent.

459. Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '941 patent, knowing that such use constitutes infringement of the '941 patent.

460. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '941 patent.

461. As a result of Verizon's infringement of the '941 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 8,380,630

462. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

463. Verizon designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for managing access to protected data.

464. Verizon makes, sells, offers to sell, imports, and/or uses the Verizon Cloud Identity and Access Management, Verizon Secure Cloud Interconnect, and Verizon Enterprise Virtual Private Cloud (collectively, the "Verizon Cloud System" or "Verizon '630 Products").

465. On information and belief, the Verizon Cloud System is a system for controlling access to a plurality of records stored within a plurality of automated external databases.

available at: <https://cloud.verizon.com/documentation/CloudConsoleUserGuide.htm>; *Verizon Cloud Storage API Reference*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/StorageAPIReference.htm>; *Verizon Cloud Desktop Application Help Guide*, VERIZON HELP GUIDE (2014).

466. On information and belief, the Verizon ‘630 Products perform a method for controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules.

467. On information and belief, the Verizon Cloud System comprises a collection of physical and logical resources (e.g., physical and logical compute pool resources; physical and logical storage resources; physical and logical network resources; physical and logical information/content resources; etc.) under control of a single top-level “enterprise” entity. Beneath the enterprise entity are numerous subordinate entities with organizationally defined relationships, constraints, and permissions—e.g., environment, location, tag, user, role, billing, security group, etc.

468. On information and belief, the Verizon ‘630 Products are available to businesses and individuals throughout the United States.

469. On information and belief, the Verizon ‘630 Products are provided to businesses and individuals located in the Eastern District of Texas.

470. On information and belief, the below diagram from Verizon’s documentation shows the operational structure used by one or more of the Verizon ‘630 Products.

Users

Users can be Cloud Console users or API users. API users have no access to the Cloud Console interface and are limited in access to a single account.

In Virtual Private Cloud, basic Role-based Access Control (RBAC) is implemented through user roles. Roles let administrators restrict access for every business operation of the management applications, based on the role of the user.

Virtual Private Cloud also offers role-based control over devices assigned to specific security groups, which is implemented through device [Security Groups](#) and security group level roles. Device security groups are defined for a CloudSpace and you assign devices to a security group from the Devices tab of a CloudSpace in Cloud Compute. Security group level roles are defined for an account and you manage those roles from the resource settings \ security groups of Account Manager.

Roles are divided into levels based on scope of operations:

- Organization-level roles – Permissions to activities upon the organization, essentially Account Manager activities
- CloudSpace-level roles – Permissions to activities upon a CloudSpace, essentially Cloud Compute activities
- Security group-level roles – Permissions to activities upon a security group, essentially the activities on the [Devices Tab](#) in Cloud Compute restricted to a Security Group.

Note: Role-based Access Control uses the same endpoint as the Account Management Service.

The principle of least privilege means giving a user account only those privileges which are essential to that user's work. RBAC provides the mechanism by which least privilege is applied. Roles define the privileges necessary to perform tasks within the system. Users who must perform those tasks as part of their job are assigned the role. Some key principles of RBAC include:

Subject

A subject is an actor – a person (user) or other automated agent (such as headless API keys) – that requests access to resources or to perform actions.

Verizon Cloud System Documentation: Role Based Access, VERIZON DOCUMENTATION (2015), available at: <https://cloud.verizon.com/documentation/Role-BasedAccessControl.htm>.

471. On information and belief, Verizon directly infringes the '630 patent at least by making, selling, offering for sale, and/or using the Verizon Secure Cloud Interconnect ("VSCI") system.

472. On information and belief, the VSCI system includes the Verizon Cloud Identity and Access Management ("VCIAM") security mediator.

473. On information and belief, the Verizon '630 Products comprise a security mediator.

474. On information and belief, the VCSI system comprises the VCIAM security mediator. The VCIAM comprises a secure, agile access control intermediary specifically

designed to enable enforcement of multilevel, fine-grained access conditions across cloud barriers in a multi-cloud VSCI resource environment.

475. On information and belief, the Verizon '630 Products comprise a security mediator that includes secure audit, enterprise key management, and usage metering integrating with enterprise key management solutions to enable cryptographically-enforced access controls. The VCIAM is configured to (among other things) securely control access and includes a stand-alone, modular authentication and authorization service. The service is securely and persistently interposed between Verizon Cloud clients (e.g., users) and client-addressable multi-cloud resources (e.g., storage and/or compute resources).

476. On information and belief, the Verizon '630 Products comprise an input port configured to receive a request for information stored in a plurality of external databases ("POEDs") from a user.

477. On information and belief, the Verizon '630 Products comprise an input port (e.g., wired and/or wireless Ethernet port) a REST API (e.g., HTTP GET) request from a requestor (e.g., a web application server). The request corresponds to an entity. For example, the Verizon '630 Products contain a requestor that is a targeted advertising web app server ("ADSERVO"), and the databases contain demographic and behavioral history information for thousands of (anonymized) mobile device users.

478. On information and belief, the Verizon '630 Products contain functionality where a request corresponds to an entity: a human end-user ("Client One") using a mobile app that is imminently scheduled to receive an in-app advertisement from ADSERVO. For example, a content field in the REST API "GET" request identifies Client One (perhaps anonymously), and/or otherwise describes him relatively uniquely.

479. On information and belief, the Verizon '630 Products contain functionality where a requestor has at least one attribute. For example, ADSERVO has an associated IAM user, group, role, and/or account. ADSERVO also has an associated environment, location, resource type, security group, and/or one or more associated tags.

480. On information and belief, the VSCI security mediator comprises an automated centralized index (“ACI”), stored in a memory, configured to store location information and associated access rules for information stored in the POEDs.

481. On information and belief, the Verizon ‘630 Products comprise an automated centralized index, stored in a memory (e.g., a Verizon Cloud server memory), configured to store location information and associated access rules for information stored in the POEDs.

482. On information and belief, the Verizon ‘630 Products comprise an automated processor.

483. On information and belief, the Verizon ‘630 Products include at least one processor that is configured to apply the access rules stored in the ACI to restrict access to the located requested information (“LRI”).

484. On information and belief, the Verizon ‘630 Products utilize a “Unified API” that according to Verizon’s documentation “unifies the application programming interface between Verizon cloud Products [e.g., Verizon ‘630 Products] . . . Everyone uses the same specification to access their environment. Most actions from the respective user interfaces from both the Environment tab and the My Account Tab, are available through the API.”⁶⁰

485. On information and belief, the Verizon ‘630 Products receive a request for authorization to access an external data source. The request received by the Verizon ‘630 Products includes the Client ID. The Verizon ‘630 Products authenticate the user and issue an authorization code response back to the client application’s redirect URL. The Verizon ‘630 Products then issue an authorization code response back, where the client application extracts the authorization code from the response. Using this authorization code, the client sends a request to the Verizon ‘630 Products that includes the authorization code. Next, the Verizon ‘630 Products validate the authorization code and information about the client.

⁶⁰ *Verizon Enterprise Cloud 2.10 Release Notes*, VERIZON ENTERPRISE CLOUD RELEASE NOTES (2015), available at: <http://support.theenterprisecloud.com/kb/print.asp?id=985>.

486. On information and belief, the Verizon ‘630 Products automatically communicate to each of the external databases storing located requested information: a query corresponding to the information request, and information sufficient to apply a set of native access rules of the respective external databases storing the located request information. For example, as explained on Verizon’s website, the Verizon ‘630 Products include granular, access security rules based on-defined user roles.

Enterprise Cloud Managed Edition delivers enterprise-class infrastructure plus additional managed services such as monitoring, backups, patching and incident management.

Verizon Terremark manages the environment for the clients, including the monitoring of physical and virtual servers, and diagnosing and resolving infrastructure incidents. Terremark applies critical security patches to operating systems and click-to-provision applications, and manages the backup of customer designated servers. Customers can dynamically deploy both physical and virtual servers as well as tiered disks and managed operating systems and applications.

SECURE CLOUD COMPUTING

Data is your business; keeping that data secure is our business. Enterprise Cloud Managed Edition allows you to better manage your costs and make your business more competitive without sacrificing security or performance.

Security is built into the entire infrastructure at every layer. Each server configuration consists of virtual firewalls with a multi-tiered network and load balancers to control application exposure to the Internet. Enterprise Cloud Managed Edition provides a highly secure foundation for business applications, with an architecture designed from the ground up to help address today's critical security requirements, including SSAE16 and PCI DSS.

At the heart of Enterprise Cloud Managed Edition is the Core, a proprietary Terremark developed software intelligence that leverages enterprise grade infrastructure to deliver on demand infrastructure services. This resource engine is a Terremark developed application that provides the intelligence to manage end user requests. By functioning as a broker to multiple resource pools the Core coordinates all infrastructure provisioning and management activities including requests to dynamically add both virtual and physical servers, turn down servers, reconfigure networks, etc. Using Enterprise

Verizon Enterprise Cloud Managed Edition, VERIZON FACT SHEET at 1 (2012) (The red box highlights the functionality of the resource engine that “provides intelligence to manage end user requests. By functioning as a broker to multiple resource pools the Core coordinates all infrastructure provisioning and management activities including requests to dynamically add both virtual and physical servers.”).

487. On information and belief, the Verizon ‘630 Products contain robust logging and audit trail functionality.⁶¹

488. On information and belief, Verizon has directly infringed and continues to directly infringe the ‘630 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for managing access to protected data, including but not limited to, the Verizon ‘630 Products, which include infringing technologies. Such products and/or services include, by way of example and without limitation, Verizon Cloud Identity and Access Management, Verizon Secure Cloud Interconnect, and Verizon Enterprise Virtual Private Cloud.

489. By making, using, testing, offering for sale, and/or selling infringing products and services, including but not limited to the Verizon ‘630 Products, Verizon has injured St. Luke and is liable to St. Luke for directly infringing one or more claims of the ‘630 patent, including at least claim 16, pursuant to 35 U.S.C. § 271(a).

490. On information and belief, Verizon also indirectly infringes the ‘630 patent by actively inducing infringement under 35 USC § 271(b).

491. Verizon has had knowledge of the ‘630 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the ‘630 patent and knew of its infringement, including by way of this lawsuit.

492. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon ‘630 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

493. Verizon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘630 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the ‘630

⁶¹ *Verizon M2M Management Center*, VERIZON ENTERPRISE CLOUD MACHINE-TO-MACHINE PRODUCTS AND SERVICES (2015), available at: <http://www.verizonenterprise.com/products/m2m/management-center/> (“Detailed audit trail of user activities, alerts, and system events.”).

patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '630 Products that have the capability of operating in a manner that infringe one or more of the claims of the '630 patent, including at least claim 16, and Verizon further provides documentation and training materials that cause customers and end users of the Verizon '630 Products to utilize the products in a manner that directly infringe one or more claims of the '630 patent. By providing instruction and training to customers and end-users on how to use the Verizon '630 Products in a manner that directly infringes one or more claims of the '630 patent, including at least claim 16, Verizon specifically intended to induce infringement of the '630 patent. On information and belief, Verizon engaged in such inducement to promote the sales of the Verizon '630 Products, e.g., through Verizon's user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '630 patent.⁶² Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '630 patent, knowing that such use constitutes infringement of the '630 patent.

494. Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '630 patent, knowing that such use constitutes infringement of the '630 patent.

495. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '630 patent.

496. As a result of Verizon's infringement of the '630 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's

⁶² See, e.g., *Verizon Cloud Documentation*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ObjectOperations.htm>; *Tips For Understanding Verizon Cloud*, VERIZON SUPPORT (2015), available at: <http://www.verizonwireless.com/support/how-to-use-verizon-cloud/>; *Verizon Cloud Control User Guide*, VERIZON DOCUMENTATION (2015), available at: <https://cloud.verizon.com/documentation/CloudConsoleUserGuide.htm>; *Verizon Cloud Storage API Reference*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/StorageAPIReference.htm>; *Verizon Cloud Desktop Application Help Guide*, VERIZON HELP GUIDE (2014).

infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

COUNT VII
INFRINGEMENT OF U.S. PATENT NO. 8,600,895

497. St. Luke references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

498. Verizon designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for managing access to protected data.

499. Verizon makes, sells, offers to sell, imports, and/or uses the Verizon Cloud Identity and Access Management, Verizon Secure Cloud Interconnect, and Verizon Enterprise Virtual Private Cloud (collectively, the “Verizon Cloud System” or “Verizon ‘895 Products”).

500. On information and belief, the Verizon Cloud System is a system for controlling access to a plurality of records stored within a plurality of automated external databases.

501. On information and belief, the Verizon ‘895 Products perform a method for controlling access to a plurality of records provided within a plurality of automated electronic databases.

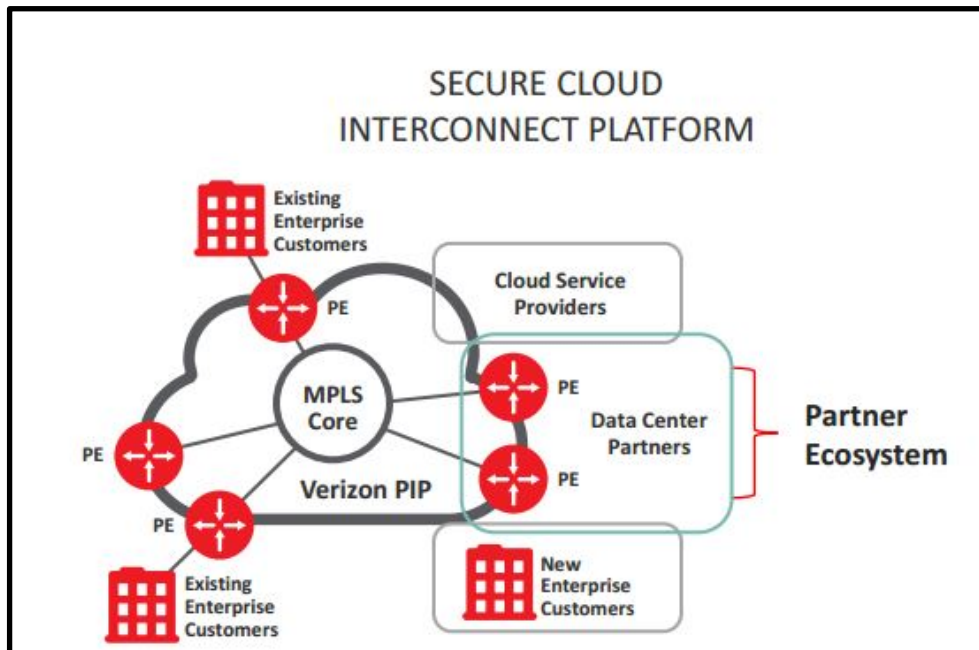
502. On information and belief, the Verizon ‘895 Products (e.g., Verizon Secure Cloud Interconnect) enable secure tunneling of Verizon Cloud instances into other clouds (e.g., preexisting private cloud) in such a way that Verizon Cloud Identity and Access Management (“Verizon Cloud IAM”) is extended into preexisting external cloud resources, thereby creating a system wherein there are a plurality of external databases with a centralized index and rules.

503. On information and belief, the Verizon ‘895 Products enable the use of native external rules in controlling access to records stored in an automated external database.

504. On information and belief, the Verizon ‘895 Products control access to external databases wherein each record has an associated set of access rules, a location identifier, and a content identifier maintained in an automated centralized index.

505. On information and belief, the Verizon ‘895 Products enable receiving a request containing a specified content identifier from a requestor at a centralized automated security processor (e.g., the Verizon Cloud IAM).

506. On information and belief, the Verizon ‘895 Products enable authenticating the requestor. For example, on information and belief, Verizon ‘895 Products create an “intermediation layer [that] automatically maps a data center server configuration to the cloud such that a server deployed in the cloud retains the same operating environment as if it were in the data center.”⁶³



Victoria R. Lonker, *Networks in the Age of the Cloud*, VERIZON PRESENTATION AT 7 (April 29, 2014) (slide showing the architecture of Verizon’s Secure Cloud Interconnect Platform).

507. On information and belief, the Verizon ‘895 Products enable querying the automated centralized index to find entries corresponding to the specified content identifier.

508. On information and belief, the Verizon Secure Cloud Interconnect Service offers secure, private connections to six cloud providers (Amazon Web Services, Google, HP,

⁶³ *Making Cloud Computing Secure for the Enterprise*, CLOUDSWITCH WHITE PAPER at 10 (2010).

Microsoft Azure Express Route for Microsoft Office 365/Skype for Business/Government Cloud, Salesforce; and Verizon) and three data center providers (Equinix, CoreSite, and Verizon).

509. On information and belief, the Verizon ‘895 Products enable granular access control. “We [Verizon] define, manage, and document access control policies. We grant only authorized personnel access to critical business applications and systems, based on position and job requirements. They receive the minimum level of access necessary to do their jobs. Policies take into account classification, business requirements, relevant legal considerations, and any contractual obligations.”⁶⁴

510. On information and belief, the Verizon ‘895 Products enable searching a plurality of automated electronic databases (e.g., a plurality of automated external databases located in another datacenter) to find records relating to an entry, corresponding to the request, and records having connections to records corresponding to the request relating to transactions relationships or communications between the entity and another entity.

511. On information and belief, the Verizon ‘895 Products enable searching a plurality of automated electronic databases to find records in dependence on the request and on connections between respective records.

512. On information and belief, the Verizon ‘895 Products, by at least one automated processor, enable applying an associated set of access rules associated with each found record. For example, on information and belief, the Verizon Cloud Access Control Policy applies a set of access rules associated with each found record in a database using at least one automated processor, to produce a set of accessible records, at a server device. The access control policy associated with one or more records is stored in a “policy.” A “policy” is a document that contains a set of statements that individual, grant or deny permission to a record based on some criteria.

⁶⁴ *What Makes a Secure Cloud*, VERIZON WHITE PAPER at 2 (2015).

The resource field identifies the resource or resources to which the policy statement applies. A single resource or multiple resources, as an array, are provided in a statement. When multiple resources are provided, the policy statement applies for any resource specified.

The resource is represented by a Resource Identifier. It is a distinguished name (DN) assembled from a hierarchical set of attributes using a string representation similar to LDAP (although in reverse). Resources are represented as a member of a large, virtual directory tree.

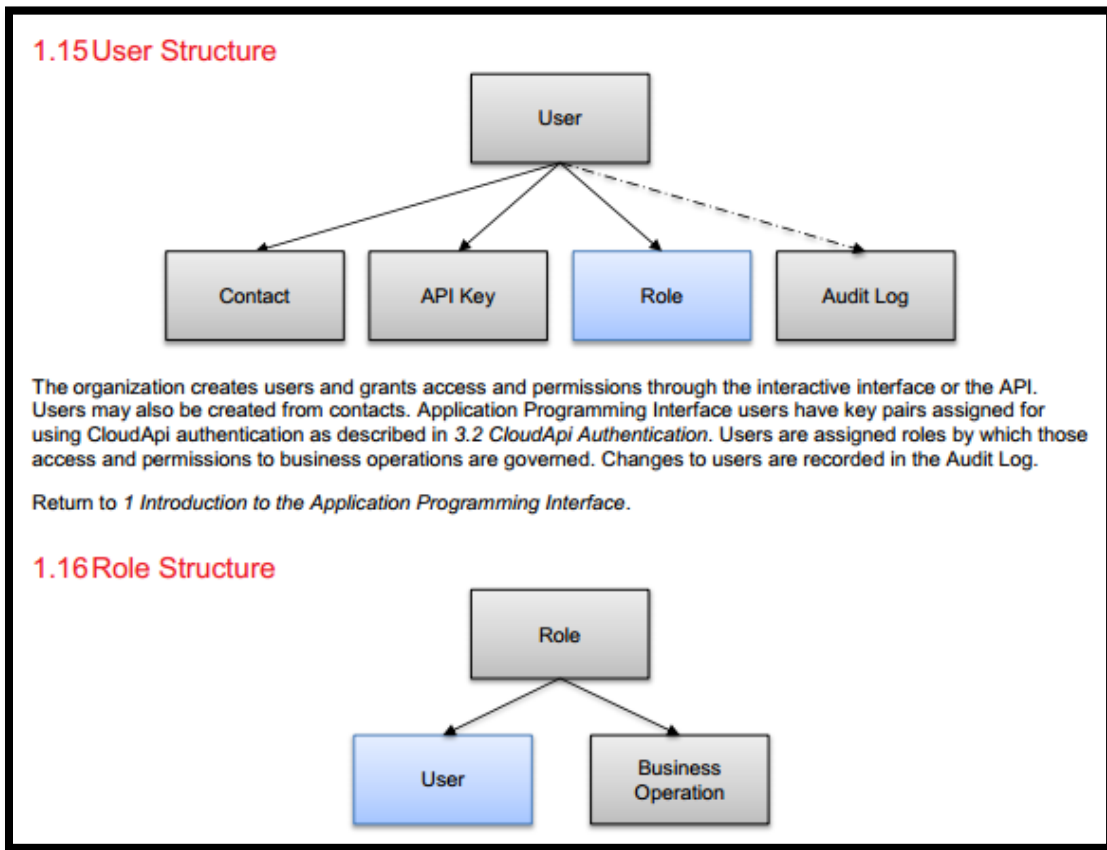
```
resource-dn ::= resource-attribute *(',' resource-attribute)
```

Verizon Cloud: Access Control Policy, VERIZON CLOUD DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/AccessControlPolicy.htm>.

513. On information and belief, for each accessible entry, the Verizon '895 Products enable applying a set of native access rules associated with the location identifier of each record located within an automated electronic database to determine which of said records is accessible. For example, the Verizon '895 Products enable applying a set of native access rules associated with the location identifier of the automated external database where each accessible record is located.⁶⁵

514. The below documentation from the Verizon shows that users are given roles that govern the access and permission to records stored in the automated external database.

⁶⁵ *Verizon Cloud: Resource Identifier*, VERIZON CLOUD DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ResourceIdentifier.htm>.



Enterprise Cloud: Application Programming Interface, VERIZON CLOUD - DOCUMENTATION
VERSION 2015-05-01 at 24 (May 1, 2015).

515. On information and belief, when a Verizon ‘895 Product receives a request for information regarding an entity at a site different from that to which the call was issued (e.g., external automated database), the Content-Location header field will be valued in the response with the complete URL to the entity, including the hostname of the host with the content.

516. On information and belief, for each accessible record, the Verizon ‘895 Products enable automatically communicating information sufficient to determine whether the accessible record is releasable by the automated external, electronic database storing the record by applying a set of native access rules maintained by the automated external, electronic database from the automated security processor to the external database.

517. On information and belief, the Verizon ‘895 Products enable associating the releasable records into a linked set and communicating the linked set of releasable records to the requestor.

518. On information and belief, the Verizon ‘895 Products perform a method for controlling access to a plurality of records provided within a plurality of automated electronic databases, each record having an associated set of access rules.

519. On information and belief, the Verizon Cloud System comprises a collection of physical and logical resources (e.g., physical and logical compute pool resources; physical and logical storage resources; physical and logical network resources; physical and logical information/content resources; etc.) under control of a single top-level “enterprise” entity. Beneath the enterprise entity are numerous subordinate entities with organizationally defined relationships, constraints, and permissions—e.g., environment, location, tag, user, role, billing, security group, etc.⁶⁶

520. On information and belief, the Verizon ‘895 Products are available to businesses and individuals throughout the United States.

521. On information and belief, the Verizon ‘895 Products are provided to businesses and individuals located in the Eastern District of Texas.

522. On information and belief, Verizon has directly infringed and continues to directly infringe the ‘895 patent by, among other things, making, using, offering for sale, and/or selling products and/or services for managing access to protected data, including but not limited to, the Verizon ‘895 Products, which include infringing encryption technologies. Such products and/or services include, by way of example and without limitation, Verizon Cloud Identity and Access Management, Verizon Secure Cloud Interconnect, and Verizon Enterprise Virtual Private Cloud.

523. By making, using, testing, offering for sale, and/or selling infringing products and services, including but not limited to the Verizon ‘895 Products, Verizon has injured St. Luke

⁶⁶ See *Enterprise Cloud: Application Programming Interface*, VERIZON CLOUD - DOCUMENTATION VERSION 2015-05-01 at 24-27 (May 1, 2015) (showing the structure of the Verizon Enterprise Cloud).

and is liable to St. Luke for directly infringing one or more claims of the '895 patent, including at least claims 1, 8, and 16, pursuant to 35 U.S.C. § 271(a).

524. On information and belief, Verizon also indirectly infringes the '895 patent by actively inducing infringement under 35 USC § 271(b).

525. Verizon has had knowledge of the '895 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Verizon knew of the '895 patent and knew of its infringement, including by way of this lawsuit.

526. On information and belief, Verizon intended to induce acts constituting patent infringement by third-party customers and users of the Verizon '895 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement.

527. Verizon specifically intended and was aware that the normal and customary use of the accused products would infringe the '895 patent. Verizon performed the acts that constitute induced infringement, and would induce actual infringement, with the knowledge of the '895 patent and with the knowledge, that the induced acts would constitute infringement. For example, Verizon provides the Verizon '895 Products that have the capability of operating in a manner that infringe one or more of the claims of the '895 patent, including at least claims 1, 8, and 16, and Verizon further provides documentation and training materials that cause customers and end users of the Verizon '895 Products to utilize the products in a manner that directly infringe one or more claims of the '895 patent. By providing instruction and training to customers and end-users on how to use the Verizon '895 Products in a manner that directly infringes one or more claims of the '895 patent, including at least claims 1, 8, and 16, Verizon specifically intended to induce infringement of the '895 patent. On information and belief, Verizon engaged in such inducement to promote the sales of the Verizon '895 Products, e.g., through Verizon's user manuals, product support, marketing materials, and training materials to

actively induce the users of the accused products to infringe the '895 patent.⁶⁷ Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '895 patent, knowing that such use constitutes infringement of the '895 patent.

528. Accordingly, Verizon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '895 patent, knowing that such use constitutes infringement of the '895 patent.

529. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '895 patent.

530. As a result of Verizon's infringement of the '895 patent, St. Luke has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Verizon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Verizon together with interest and costs as fixed by the Court.

⁶⁷ See, e.g., *Verizon Cloud Documentation*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/ObjectOperations.htm>; *Tips For Understanding Verizon Cloud*, VERIZON SUPPORT (2015), available at: <http://www.verizonwireless.com/support/how-to-use-verizon-cloud/>; *Verizon Cloud Control User Guide*, VERIZON DOCUMENTATION (2015), available at: <https://cloud.verizon.com/documentation/CloudConsoleUserGuide.htm>; *Verizon Cloud Storage API Reference*, VERIZON DOCUMENTATION (2015), available at: <http://cloud.verizon.com/documentation/StorageAPIReference.htm>; *Verizon Cloud Desktop Application Help Guide*, VERIZON HELP GUIDE (2014); *Enterprise Cloud: Application Programming Interface*, VERIZON CLOUD - DOCUMENTATION VERSION 2015-05-01 (May 1, 2015); Victoria R. Lonker, *Networks in the Age of the Cloud*, VERIZON PRESENTATION (April 29, 2014).

PRAYER FOR RELIEF

WHEREFORE, Plaintiff St. Luke respectfully requests that this Court enter:

- A. A judgment in favor of Plaintiff St. Luke that Verizon has infringed, either literally and/or under the doctrine of equivalents, the '237 patent, the '017 patent, the '591 patent, the '368 patent, the '941 patent, the '630 patent, and/or the '895 patent;
- B. An award of damages resulting from Verizon's acts of infringement in accordance with 35 U.S.C. § 284;
- C. A judgment and order requiring Verizon to provide accountings and to pay supplemental damages to St. Luke, including, without limitation, prejudgment and post-judgment interest; and
- D. Any and all other relief to which St. Luke may show itself to be entitled.

JURY TRIAL DEMANDED

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, St. Luke requests a trial by jury of any issues so triable by right.

Dated: October 15, 2015

Respectfully submitted,

/s/ Elizabeth L. DeRieux
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