

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF TEXAS
DALLAS DIVISION

BlackBerry Limited, a Canadian Corporation,
and BlackBerry Corporation, a Delaware
Corporation

Plaintiffs,

vs.

Avaya Inc., a Delaware Corporation

Defendant.

CASE NO.

**BLACKBERRY LIMITED'S AND
BLACKBERRY CORPORATION'S
COMPLAINT FOR PATENT
INFRINGEMENT**

DEMAND FOR JURY TRIAL

Plaintiffs BlackBerry Limited and BlackBerry Corporation (collectively “BlackBerry”) complain against Defendant Avaya Inc. (“Defendant” or “Avaya”) as follows:

INTRODUCTION

1. BlackBerry revolutionized the mobile communications industry. Its innovative, cutting-edge products changed the way millions of people around the world connect, converse, and share digital information.

2. BlackBerry was founded in 1984 in Waterloo, Ontario by two engineering students, Mike Lazaridis and Douglas Fregin. In its early years, the company—then named Research In Motion (“RIM”)—focused its inventive energies on wireless data transmission.

3. From its modest beginnings more than 30 years ago, BlackBerry has gone on to offer a portfolio of award-winning products, services, and embedded technologies to tens of millions of individual consumers and organizations around the world, including governments, educational institutions, and over 90% of Fortune 500 companies. By transforming the way

people communicate, BlackBerry laid a foundation for today's multibillion-dollar modern smartphone industry.

4. In the course of developing its ground-breaking mobile communications devices, BlackBerry (and the BlackBerry family of companies) has invented a broad array of new technologies that cover everything from enhanced security and cryptographic techniques, to mobile device user interfaces, to communication servers, and many other areas. To take just one example, security posed a critical challenge for BlackBerry to address when bringing its mobile devices to market. Commercial acceptance of such mobile devices required providing mechanisms to ensure safe and secure communications so that users and businesses could be confident that their confidential and private information stayed that way in spite of ever increasing threats. Due to its innovative technologies, BlackBerry has been universally recognized as the gold standard when it comes to safe and secure data communications over mobile devices.

5. Throughout its history, BlackBerry has demonstrated a commitment to innovation, including through its investments in research and development, which have totaled more than \$5.5 billion over the past five years. BlackBerry has protected the technical innovations resulting from these investments, including through seeking patent protection, and as detailed below, BlackBerry owns rights to an array of patented technologies in the United States.

6. Avaya infringes multiple BlackBerry patents by using, without authorization, BlackBerry's proprietary technology in a number of Avaya's commercial products and services across its product lines, including unified communications products and software, networking products (such as switches and routers), communication servers and client software, telepresence systems, softphones and deskphones, and software for mobile device communications.

7. By this action, BlackBerry seeks to put an end to Avaya's unlawful conduct and to obtain recompense for the harm that BlackBerry has suffered.

THE PARTIES

8. BlackBerry Limited is a Canadian company with its principal place of business at 2200 University Avenue East, Waterloo, Ontario, Canada N2K 0A7.

9. BlackBerry Corporation is a Delaware corporation with its principal place of business at 3001 Bishop Drive, Suite 400, San Ramon, CA 94583. BlackBerry maintains an office at 5000 Riverside Drive, Suite 100E, Irving, Texas 75039.

10. On information and belief, Avaya Inc. is a Delaware corporation with a principal place of business at 4655 Great American Parkway, Santa Clara, California 95054. Avaya maintains an office in Coppell, Texas. Avaya operates and/or owns the website located at <http://www.avaya.com/usa/>.

JURISDICTION AND VENUE

11. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331, 1338(a), 1338(b) and 35 U.S.C. § 271, *et seq.*

12. This Court has personal jurisdiction over Avaya. Defendant Avaya is subject to personal jurisdiction in this Court because, *inter alia*, and upon information and belief, Avaya has offices in the Northern District of Texas and elsewhere in the state of Texas, and directly and through agents regularly does, solicits and transacts business in the Northern District of Texas and elsewhere in the state of Texas, including through its website at <http://www.avaya.com/usa/>.

13. In particular, Avaya has committed and continues to commit acts of infringement in violation of 35 U.S.C. § 271, and has offered for sale, sold, marketed, and/or imported infringing products in the State of Texas, including in this District. Avaya's acts cause injury to BlackBerry, including within this District.

14. Upon information and belief, Avaya maintains and operates from a two-story, 96,500-square foot office building in Coppell, Texas within this District. The Avaya Coppell office has been referred to as Avaya's nationwide "hub for managed services," and further includes a "substantial data center." Upon information and belief, Avaya further engages in research and development and other back-office functions at its Coppell office in this District.

15. Upon information and belief, Avaya further has a contract with, and provides products and services to, the Texas Department of Information Resources ("DIR").

16. Upon information and belief, Avaya has availed itself of this forum to resolve its legal disputes. *See Avaya, Inc. v. Williams*, Case No. 3:03-cv-02677 (N.D. Tex.).

17. Upon information and belief, Avaya further provides at least 22 authorized Avaya resellers for the state of Texas, including multiple resellers located within this district.

18. Upon information and belief, Avaya further boasts having customers within the education industry in the state of Texas, including the University of Texas Health Services, whom Avaya has featured in public press releases.

19. Upon information and belief, Avaya has showcased many of its products throughout the state of Texas. For example, on information and belief, Avaya showcased numerous Avaya products and services at the Austin Convention Center in Austin, Texas on June 16-18, 2015.

20. Venue is proper in this District under the provisions of 28 U.S.C. § 1391(b)(2), because a substantial part of the events or omissions giving rise to the claims occurred in this judicial district. Venue is also proper due to the aforementioned presence that Avaya has in the Northern District of Texas, including but not limited to its maintaining a corporate campus in Coppell and conducting extensive business and sales activities within the District.

FACTS COMMON TO ALL CLAIMS

BlackBerry's Innovation and Industry Recognition

21. BlackBerry is a global leader in the mobile communications industry. Through its significant investment in research and development over the past 30 years, BlackBerry has developed innovative, cutting-edge technologies that have changed the face of telecommunications.

22. In the late 1990s, BlackBerry began to release a series of game-changing handheld mobile devices that enabled users to send and receive email and messages on the go, without needing to be tethered to a modem or a desktop computer. The innovative nature of the 1998 RIM 950 Wireless Handheld, for example, was instantly recognized, garnering both an Editor's Choice Award from CNET and Andrew Seybold's Outlook Award. In particular, the press praised the RIM 950's keyboard for its advanced ergonomic features, including an easy-to-type-on keyboard layout despite the device's miniature size.

23. In 2002, BlackBerry released the BlackBerry 6710 and 6720 – the first BlackBerry devices capable of both sending emails and making phone calls, and some of the earliest smartphones released in the United States. The next year, BlackBerry introduced smartphone models that added built-in audio hardware and color screens. Since those first smartphones, BlackBerry has continued to offer handheld wireless products incorporating its proprietary technologies in security, communications, mobile device user interfaces, and other areas.

24. BlackBerry's technologic innovations continue to this day, as embodied in the latest iterations of BlackBerry's mobile devices –including the BlackBerry Classic, Leap, Passport, and PRIV.

25. Each successive iteration of BlackBerry's wireless devices has received significant unsolicited coverage in the media. For example, GSMA – the largest and most well known association of mobile operators – recognized BlackBerry's devices as “chang[ing] the face of corporate communication.” Business Insider recognized BlackBerry as “the best at making keyboard phones.” Thomson Reuters named BlackBerry one of the World's Top 100 Most Innovative Organizations, based largely on the number of “important patents” BlackBerry has. In 2015, Forrester Research crowned BlackBerry as a “leader in mobile management” based on BlackBerry's focus in security software and mobile solutions.

26. BlackBerry's handheld devices have garnered widespread industry acclaim for both their unique design and their performance. BlackBerry mobile devices have garnered dozens of industry awards, including the GSMA Chairman's Award, InfoWorld Magazine's Product of the Year Award, PC World's World Class Award, the Network Industry Award for Best New Mobile Communications Product, the BusinessWeek Best Product of the Year award, Digit Magazine's “World's Best Mobile OS” award, Security Products “Govies” Government Security Award, and PC Magazine's Best Products of the Year Award.

27. This industry acclaim for BlackBerry's innovations continues to this day. For example, in 2015 BlackBerry's Passport was awarded the prestigious Red Dot “Best of the Best” award for innovative product design (from thousands of total entries). Similarly, in 2016, BlackBerry's PRIV was awarded the Red Dot “Design Award” for best product design.

BlackBerry's Patents

(’801 Patent)

28. U.S. Patent No. 9,143,801 (“’801 Patent”) is entitled “Significance Map Encoding and Decoding Using Partition Selection.” A true and correct copy of the ’801 Patent is attached as Exhibit A.

29. The '801 Patent was filed on October 28, 2014 as U.S. Patent Application No. 14/525,329 and is a continuation of U.S. Patent Application No. 13/279,397 filed October 24, 2011.

30. BlackBerry Limited is the owner of all right, title, and interest in and to the '801 Patent with the full and exclusive right to bring suit to enforce the '801 Patent, including the right to recover for past infringement.

31. The '801 Patent is valid and enforceable under United States Patent Laws.

('849 Patent)

32. U.S. Patent No. 8,964,849 ("849 Patent") is entitled "Multi-Level Significance Maps for Encoding and Decoding," and issued on February 24, 2015. A true and correct copy of the '849 Patent is attached as Exhibit B.

33. The '849 Patent was filed on November 1, 2011 as U.S. Patent Application No. 13/286,336.

34. BlackBerry Limited is the owner of all right, title, and interest in and to the '849 Patent with the full and exclusive right to bring suit to enforce the '849 Patent, including the right to recover for past infringement.

35. The '849 Patent is valid and enforceable under United States Patent Laws.

('739 Patent)

36. U.S. Patent No. 8,116,739 ("739 Patent") is entitled "Method and apparatus for dynamic session placeholder for message collection user interface," and issued on February 14, 2012. A true and correct copy of the '739 Patent is attached as Exhibit C.

37. The '739 Patent was filed on January 12, 2010 as U.S. Patent Application No. 12/685,737 and is a continuation of U.S. Patent Application No. 12/193,909 filed on August 19, 2008, which is a continuation of U.S. Patent Application No. 11/154,533 filed on June 17, 2005.

38. BlackBerry Limited is the owner of all right, title, and interest in and to the '739 Patent with the full and exclusive right to bring suit to enforce the '739 Patent, including the right to recover for past infringement.

39. The '739 Patent is valid and enforceable under United States Patent Laws.

('212 Patent)

40. U.S. Patent No. 8,886,212 ("212 Patent") is entitled "Mobile tracking" and issued on November 11, 2014. A true and correct copy of the '212 Patent is attached as Exhibit D.

41. The '212 Patent was filed on August 24, 2010 as U.S. Patent Application No. 12/861,979.

42. BlackBerry Limited is the owner of all right, title, and interest in and to the '212 Patent with the full and exclusive right to bring suit to enforce the '212 Patent, including the right to recover for past infringement.

43. The '212 Patent is valid and enforceable under United States Patent Laws.

('439 Patent)

44. U.S. Patent No. 8,688,439 ("439 Patent") is entitled "Method for speech coding, method for speech decoding and their apparatuses" and issued on April 1, 2014. A true and correct copy of the '439 Patent is attached as Exhibit E.

45. The '439 Patent was filed on March 11, 2013 as U.S. Patent Application No. 13/792,508 and is a continuation of U.S. Patent Application No. 13/618,345 filed on September 14, 2012, which is a continuation of U.S. Patent Application No. 13/399,830 filed on February 17, 2012, which is a continuation of U.S. Patent Application No. 13/073,560 filed on March 28, 2011, which is a division of U.S. Patent Application No. 12/332,601 filed on December 11, 2008, which is a division of U.S. Patent Application No. 11/976,841 filed on October 29, 2007,

which is a continuation of U.S. Patent Application No. 11/653,288 filed on January 16, 2007, which is a division of U.S. Patent Application No. 11/188,624 filed on July 26, 2005, which is a division of U.S. Patent Application No. 09/530,719 filed on May 4, 2000, which is a national stage entry of PCT Application No. PCT/JP98/05513 filed on December 7, 1998.

46. BlackBerry Limited is the owner of all right, title, and interest in and to the '439 Patent with the full and exclusive right to bring suit to enforce the '439 Patent, including the right to recover for past infringement.

47. The '439 Patent is valid and enforceable under United States Patent Laws.

('561 Patent)

48. U.S. Patent No. 7,440,561 ("561 Patent") is entitled "Method and apparatus for selectively establishing communication with one of plural devices associated with a single telephone number," and issued on October 21, 2008. A true and correct copy of the '561 Patent is attached as Exhibit F.

49. The '561 Patent was filed on August 21, 2007 as U.S. Patent Application No. 11/842,399 and is a continuation of U.S. Patent Application No. 11/604,740 filed on November 28, 2006, which is a continuation of U.S. Patent Application No. 09/593,541 filed on June 14, 2000, all of which claim priority to U.S. Provisional Patent Application Nos. 60/185,070 and 60/139,498 filed on February 25, 2000 and June 14, 1999, respectively.

50. BlackBerry Corporation is the owner of all right, title, and interest in and to the '561 Patent with the full and exclusive right to bring suit to enforce the '561 Patent, including the right to recover for past infringement.

51. The '561 Patent is valid and enforceable under United States Patent Laws.

(’218 Patent)

52. U.S. Patent No. 8,554,218 (“’218 Patent”) is entitled “Client Device Method and Apparatus for Routing a Call” and issued on October 8, 2013. A true and correct copy of the ’218 Patent is attached as Exhibit G.

53. The ’218 Patent was filed on April 11, 2012 as U.S. Patent Application No. 13/444,083 and is a division of U.S. Patent Application No. 13/178,936 filed on July 8, 2011, which is a division of U.S. Patent Application No. 11/875,278 filed on October 19, 2007, all of which claim priority to U.S. Provisional Patent Application No. 60/852,639 filed on October 19, 2006.

54. BlackBerry Limited is the owner of all right, title, and interest in and to the ’218 Patent with the full and exclusive right to bring suit to enforce the ’218 Patent, including the right to recover for past infringement.

55. The ’218 Patent is valid and enforceable under United States Patent Laws.

(’961 Patent)

56. U.S. Patent No. 7,372,961 (“’961 Patent”) is entitled “Method of public key generation” and issued on May 13, 2008. A true and correct copy of the ’961 Patent is attached as Exhibit H.

57. The ’961 Patent was filed on December 26, 2001 as U.S. Patent Application No. 10/025,924.

58. BlackBerry Limited is the owner of all right, title, and interest in and to the ’961 Patent with the full and exclusive right to bring suit to enforce the ’961 Patent, including the right to recover for past infringement.

59. The ’961 Patent is valid and enforceable under United States Patent Laws.

FIRST CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 9,143,801)

60. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-59 of this Complaint.

The '801 Patent

61. The '801 Patent discloses, among other things, methods and systems for “encoding and decoding [] video data [] in which significance maps are encoded and decoded using non-spatially-uniform partitioning of the map into parts, wherein the bit positions within each part are associated with a given context.” '801 Patent at Abstract.

62. The '801 Patent explains that encoding/decoding images and videos using “block-based coding processes” includes dividing the image or frame “into blocks, typically 4x4 or 8x8” that are “spectrally transformed into coefficients, quantized, and entropy encoded.” '801 Patent at 1:44-49. The '801 Patent further explains that spectrally transforming the image or frame data into coefficients is done with “the use of a discrete cosine transform (DCT) or some variant thereon,” wherein “[t]he resulting DCT coefficients are then quantized using a quantizer to produce quantized transform domain coefficients, or indices.” *Id.* at 1:55-59. “The block or matrix of quantized transform domain coefficients (sometimes referred to as a ‘transform unit’) is then entropy encoded using a particular context model.” *Id.* at 1:60-62.

63. As the '801 Patent explains, “[t]he entropy encoding of the symbols in significance map is based upon a context model. In the case of a 4×4 luma or chroma block or transform unit (TU), a separate context is associated with each coefficient position in the TU. That is, the encoder and decoder track a total of 30 (excluding the bottom right corner positions) separate contexts for 4×4 luma and chroma TUs.” *Id.* at 2:7-13.

64. However, as further explained by the '801 Patent, in the version of the H.265 standard proposed at the time of the '801 Patent, “the partitioning of the significance maps is uniformly distributed. That is, there are just as many contexts assigned to bit positions of the lower right quadrant as there are assigned to the upper left quadrant. A uniform distribution of contexts may not be optimal for many embodiments. The contexts associated with the upper left quadrant are more heavily used than the contexts in the bottom right quadrant (since the significance maps often end before reaching these bottom right bit positions). Accordingly, there is less data available for these contexts, making them less quickly adaptive and, more generally, less effective.” *Id.* at 7:53-63.

65. The '801 Patent provides a technological improvement for reconstructing encoded data in a significance map, including the reconstruction of significance maps in the H.265 standard. The '801 Patent discloses, for example, decoding with partitioning structures and context mappings that “result in an advantageous balancing of computational speed and compression efficiency.” *Id.* at 8:45-48.

66. Figure 3 shows an example of such a partition set and “diagrammatically illustrates a partitioning of a 4×4 block into six parts, individually labeled P1, P2, . . . , P6. This may be used, for example, for significance maps in the case of 4×4 blocks. The context (C0, C1, . . . , C5) associated with each bit position is shown in the block 100. Bit positions within the same part all share the same context. It will be noted that part P4 include two non-contiguous areas. The four bit positions in part P4 are each assigned to context C3. The partitioning shown in FIG. 3 may be denoted P4-6, to indicate that the partitioning relates to a 4×4 block and features 6 parts.” *Id.* at 8:49-59.

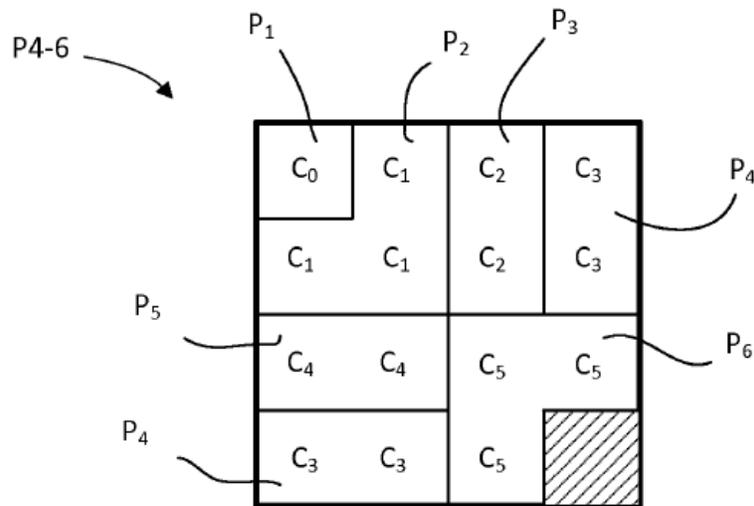
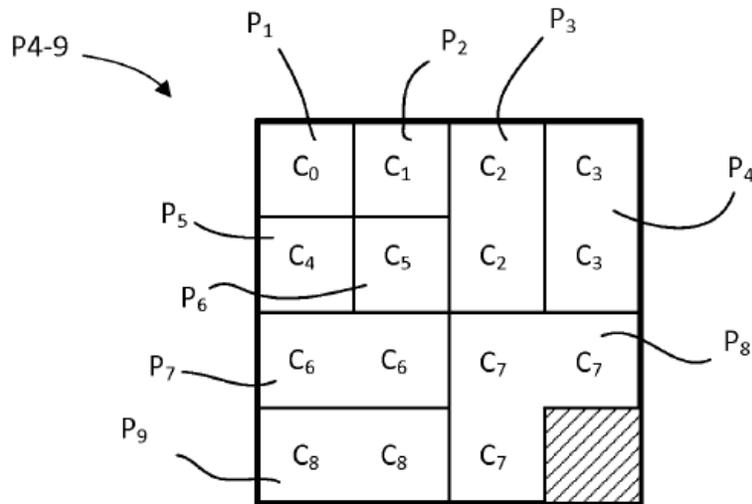


FIG. 3

67. Additionally, Figure 4 “diagrammatically shows a refinement of P4-6, in which further partitioning divides part P2 into three individual parts; those individual parts are labeled P2, P5 and P6. It will also be noted that part P4 has been divided in half such that the two non-contiguous areas are now separate parts, labeled P4 and P9 in this example illustration. This partitioning structure may be denoted P4-9 to signify that it assigns 9 contexts to the 9 distinct parts of the 4×4 block.” *Id.* at 8:60-67.

**FIG. 4**

68. As the '801 Patent discloses, “[i]n all the foregoing examples, it will be noted that the partitioning, and thus the allocation/assignment of contexts, is not uniformly distributed through the block. That is, the smaller parts in the partitioning tend to be clustered towards the upper left quadrant and the larger parts in the partitioning tend to locate towards the bottom and right side of the block. As a result, the contexts assigned to the upper left quadrant tend to have fewer bit positions associated with them (in general, but not always), and the context(s) assigned to the bottom or right side tend to have more bit positions associated with them. Over time, this will tend to result in a more uniform use of the contexts. That is, this non-uniform spatial allocation tends towards a more uniform allocation of bits to each context.” *Id.* at 9:11-24.

69. The '801 Patent thus describes, *inter alia*, “a method of decoding a bitstream of encoded data to reconstruct a significance map for a transform unit. The method includes, for each bit position in the significance map having a significant coefficient flag that is to be decoded using context-adaptive decoding, determining a context for that bit position based upon a partition set, decoding the encoded data based on the determined context to reconstruct a bit

value, and updating the context based on that reconstructed bit value. In one aspect, the reconstructed bit values form the decoded significance map, the transform unit is sized 4×4, and the partition set assigns contexts to bit positions within the transform unit such that a different context is assigned to each bit position in an upper left quadrant of the transform unit, contexts are shared by groups of two in an upper right and lower left quadrant of the transform unit, and a single context is shared by all bit positions in the lower right quadrant.” *Id.* at 3:18-34.

Historical Context of the '801 Patent

70. Using non-spatially uniform partitioning of significance maps in connection with context adaptive encoding and decoding was not common or conventional at the time of invention of the '801 Patent.

71. At the time of the invention of the '801 Patent, the “current state of the art for video encoding ITU-T H.264/AVC video coding standard” as well as the draft “next generation video encoding standard ... under development through MPEG-ITU: High Efficiency Video Coding” relied on relatively traditional means of encoding quantized transform coefficients by “(a) encoding a last significant coefficient position indicating the location of the last non-zero coefficient in the block, (b) encoding a significance map indicating the positions in the block (other than the last significant coefficient position) that contain non-zero coefficients” wherein “the partitioning of the significance maps is uniformly distributed,” “(c) encoding the magnitudes of the non-zero coefficients, and (d) encoding the signs of the non-zero coefficients.” '801 Patent at 1:62-2:4.

72. Because the encoding systems used by these prevailing standards relied on such uniform partitioning, “there are just as many contexts assigned to bit positions of the lower right quadrant as there are assigned to the upper left quadrant.” *Id.* at 7:53-56. However, the inventors of the '801 Patent recognized that “[t]he contexts associated with the upper left

quadrant are more heavily used than the contexts in the bottom right quadrant (since the significance maps often end before reaching these bottom right bit positions). Accordingly, there is less data available for these contexts, making them less quickly adaptive and, more generally, less effective.” *Id.* at 7:58-63. The inventors thereby identified a new encoder/decoder using a new context allocation scheme for entropy encoding and decoding that reduced by half the overall number of contexts used by the then-existing significance maps under consideration for the H.265 standard.¹

73. Given the state of the art at the time of the invention of the ’801 Patent, including the state of the then-under consideration, next generation video coding standard², the inventive concepts of the ’801 Patent cannot be considered to be conventional. The ’801 Patent discloses, among other things, an unconventional solution to an issue arising in the context of video encoders/decoders, and offered a technological solution to that issue.

74. The ’801 Patent claims cannot be performed in the human mind or by using pen and paper. As noted above, the ’801 Patent expressly states that it is drawn to address a specific, technical problem arising in the context of data compression: “Video presents a significant challenge to data compression because of the large amount of data required for each video frame and the speed with which encoding and decoding often needs to occur.” *Id.* at 1:34-37. At the time of the ’801 Patent inventions, this problem was further exacerbated by the “rapidly increasing demand and quality” of online video distribution.³

¹ See Korodi et al., JCT-VC Contribution G657, 7th Meeting of the JCT-VC, Geneva (Nov. 2011), (attached hereto as Ex. I).

² JCT-VC of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG1, WD4, Working Draft 4 of High-Efficiency Video Coding (July 28, 2011) (attached hereto as Ex. J).

³ Ex. M, <http://www.digitaltrends.com/computing/h-265-hevc-encoding-explained/>, last visited July 16, 2016.

75. As described above, the '801 Patent discloses embodiments using specific technologies for encoding and decoding video data streams, and a video encoder and decoder including a processor and memory (such as a frame store). *See, e.g., id.* at Figs. 1, 2. Thus, the '801 Patent discusses methods of implementing improved video compression techniques using video encoders and decoders.

76. Consistent with the problem addressed being rooted in video encoder/decoder technology, the '801 Patent's solutions naturally were also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

77. This technical context is reflected in the '801 Patent's claims. For example, each of the claims requires determining a context for each bit position in the significance map based upon a partition set, decoding the encoded data based on the determined context to reconstruct a bit value, and updating the context based on that reconstructed bit value, thereby addressing technical limitations of video encoders and decoders such as bandwidth and memory-capacity constraints, as well as providing a technological solution to the problem of insufficient speed and efficiency in video encoding and decoding.

78. A person having ordinary skill in the art at the time of the invention of the '801 Patent would not have understood that the invention could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '801 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors' detailed description of the invention and the language of the claims and be a practical impossibility.

'801 Patent Allegations

79. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '801 Patent in violation of 35 U.S.C. § 271 *et seq.*, directly and/or indirectly, by

making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, Accused Videoconferencing Products supporting the H.265 standard, including without limitation at least the Avaya Scopia® XT7100 Room System (hereinafter “the ’801 Accused Products”) that infringes at least claims 1 and 8 of the ’801 Patent.

80. On information and belief after reasonable investigation, the ’801 Accused Products contains a decoder and decoding functionality designed and used to decode a bitstream of data encoded according to the H.265 standard.

Avaya Scopia® XT Video Conferencing

The Latest in HD Video Collaboration Room Systems and Capabilities

[Overview](#) [Case Studies](#) [Documents and Videos](#) [Tech Specs](#) [Product Support](#)

Powerful Enterprise Video Solution Delivers an Exceptional User Experience

- **Experience outstanding video conferencing in any environment** with Avaya’s complete range of dedicated video conferencing endpoints.
- **Deliver an unparalleled video collaboration experience.** Avaya Scopia® XT Video Conferencing provides leading, powerful video communications technology that includes immersive telepresence, conference room systems, and desktop applications.
- **Achieve excellent video performance in real-world network conditions.** Experience crisp, smooth video quality with resolutions up to 1080p/60fps, stellar bandwidth efficiency, and error resiliency with H.265 High Efficiency Video Coding (HEVC) and Scalable Video Coding (SVC).

4

⁴ <http://www.avaya.com/en/product/avaya-scopia-xt-video-conferencing/>, last visited July 16, 2016 (all highlighting added unless otherwise noted).

Scopia XT7100 Specifications

Communications

- IP: H.323, SIP (RFC 3261)
- ISDN² supported through Scopia Gateway
- Bit rate: H.323, SIP: up to 6/12² Mbps; H.320: up to 2 Mbps
- MCU compatibility: H.243, H.231

Video

- 2 simultaneous 1080p60 channels: camera + auxiliary camera² or camera + content
- H.263, H.263+, H.263++, H.264, H.264 High Profile, H.265 HEVC, SVC
- Dual: H.239 (H.323); BFCP (SIP)

5

81. On information and belief, by complying with the H.265 standard, the '801 Accused Products decodes a bitstream of H.265-encoded data to reconstruct a significance map for a transform unit by:

for each bit position in the significance map having a significant coefficient flag that is to be decoded using context-adaptive decoding,

7.3.8.11 Residual coding syntax

| | |
|--|-------|
| <code>signHidden = (lastSigScanPos - firstSigScanPos > 3 && !cu_transquant_bypass_flag)</code> | |
| <code>if(lastGreater1ScanPos != -1)</code> | |
| <code>coeff_abs_level_greater2_flag[lastGreater1ScanPos]</code> | ae(v) |
| <code>for(n = 15; n >= 0; n--) {</code> | |
| <code>xC = (xS << 2) + ScanOrder[2][scanIdx][n][0]</code> | |
| <code>yC = (yS << 2) + ScanOrder[2][scanIdx][n][1]</code> | |
| <code>if(sig_coeff_flag[xC][yC] && (!sign_data_hiding_enabled_flag !signHidden (n != firstSigScanPos)))</code> | |
| <code>coeff_sign_flag[n]</code> | ae(v) |

6

⁵ Avaya Scopia® XT7100 Room System Product Sheet, (attached hereto as Ex. K).

7.2 Specification of syntax functions and descriptors

The functions presented here are used in the syntactical description. These functions are expressed in terms of the value of a bitstream pointer that indicates the position of the next bit to be read by the decoding process from the bitstream.

The following descriptors specify the parsing process of each syntax element:

- ae(v): context-adaptive arithmetic entropy-coded syntax element. The parsing process for this descriptor is specified in clause 9.3.

7

9.3 CABAC parsing process for slice segment data

9.3.1 General

This process is invoked when parsing syntax elements with descriptor ae(v) in clauses 7.3.8.1 through 7.3.8.11.

9.3.2.2 Initialization process for context variables

Outputs of this process are the initialized CABAC context variables indexed by ctxTable and ctxIdx.

8

determining a context for that bit position based upon a partition set,

9.3.4.2 Derivation process for ctxTable, ctxIdx and bypassFlag

9.3.4.2.1 General

Input to this process is the position of the current bin within the bin string, binIdx.

Outputs of this process are ctxTable, ctxIdx, and bypassFlag.

The values of ctxTable, ctxIdx, and bypassFlag are derived as follows based on the entries for binIdx of the corresponding syntax element in Table 9-37:

- If the entry in Table 9-37 is not equal to "bypass", "terminate", and "na", the values of binIdx are decoded by invoking the DecodeDecision process as specified in clause 9.3.4.3.2 and the following applies:
 - ctxTable is specified in Table 9-4.
 - The variable ctxInc is specified by the corresponding entry in Table 9-37 and when more than one value is listed in Table 9-37 for a binIdx, the assignment process for ctxInc for that binIdx is further specified in the clauses given in parenthesis.
 - The variable ctxIdxOffset is specified by the lowest value of ctxIdx in Table 9-4 depending on the current value of initType.
 - ctxIdx is set equal to the sum of ctxInc and ctxIdxOffset.
 - bypass Flag is set equal to 0.

9

⁶ ITU-T H.265 High Efficiency Video Coding (Edition 1.0, April 13, 2013) at Section 7.4.8.11, (attached hereto as Ex. L).

⁷ *Id.* at Section 7.2.

⁸ *Id.* at Sections 9.3.1, 9.3.2.2.

⁹ *Id.* at Section 9.3.4.2.

9.3.4.2.5 Derivation process of ctxInc for the syntax element sig_coeff_flag

Inputs to this process are the colour component index cIdx, the current coefficient scan location (xC, yC), the scan order index scanIdx, and the transform block size log2TrafoSize.

Output of this process is the variable ctxInc.

The variable sigCtx depends on the current location (xC, yC), the colour component index cIdx, the transform block size, and previously decoded bins of the syntax element coded_sub_block_flag. For the derivation of sigCtx, the following applies:

- If log2TrafoSize is equal to 2, sigCtx is derived using ctxIdxMap[] specified in Table 9-39 as follows:

$$\text{sigCtx} = \text{ctxIdxMap} [(\text{yC} \ll 2) + \text{xC}] \tag{9-23}$$

Table 9-39 – Specification of ctxIdxMap[i]

| | | | | | | | | | | | | | | | |
|--------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| i | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| ctxIdxMap[i] | 0 | 1 | 4 | 5 | 2 | 3 | 4 | 5 | 6 | 6 | 8 | 8 | 7 | 7 | 8 |

10

decoding the encoded data based on the determined context to reconstruct a bit value, and

7.3.8.11 Residual coding syntax

| | |
|---|-------|
| signHidden = (lastSigScanPos - firstSigScanPos > 3 && !cu_transquant_bypass_flag) | |
| if(lastGreater1ScanPos != -1) | |
| coeff_abs_level_greater2_flag[lastGreater1ScanPos] | ae(v) |
| for(n = 15; n >= 0; n--) { | |
| xC = (xS << 2) + ScanOrder[2][scanIdx][n][0] | |
| yC = (yS << 2) + ScanOrder[2][scanIdx][n][1] | |
| if(sig_coeff_flag[xC][yC] && (!sign_data_hiding_enabled_flag !signHidden (n != firstSigScanPos))) | |
| coeff_sign_flag[n] | ae(v) |

11

9.3 CABAC parsing process for slice segment data

9.3.1 General

This process is invoked when parsing syntax elements with descriptor ae(v) in clauses 7.3.8.1 through 7.3.8.11.

The parsing of syntax elements proceeds as follows:

For each requested value of a syntax element a binarization is derived as specified in clause 9.3.3.

The binarization for the syntax element and the sequence of parsed bins determines the decoding process flow as described in clause 9.3.4.

9.3.4 Decoding process flow

9.3.4.1 General

¹⁰ Id. at Section 9.3.4.2.5.

¹¹ Id. at Section 7.4.8.11.

The parsing of each bin is specified by the following two ordered steps:

1. The derivation process for `ctxTable`, `ctxIdx`, and `bypassFlag` as specified in clause 9.3.4.2 is invoked with `binIdx` as input and `ctxTable`, `ctxIdx`, and `bypassFlag` as outputs.
2. The arithmetic decoding process as specified in clause 9.3.4.3 is invoked with `ctxTable`, `ctxIdx`, and `bypassFlag` as inputs and the value of the bin as output.

12

updating the context based on that reconstructed bit value,

9.3.2.2 Initialization process for context variables

Outputs of this process are the initialized CABAC context variables indexed by `ctxTable` and `ctxIdx`.

Table 9-5 to Table 9-31 contain the values of the 8 bit variable `initValue` used in the initialization of context variables that are assigned to all syntax elements in clauses 7.3.8.1 through 7.3.8.11, except `end_of_slice_segment_flag`, `end_of_sub_stream_one_bit`, and `pcm_flag`.

9.3.2.3 Storage process for context variables

Inputs to this process are the CABAC context variables indexed by `ctxTable` and `ctxIdx`.

Outputs of this process are variables `tableStateSync` and `tableMPSSync` containing the values of the variables `pStateIdx` and `valMps` used in the initialization process of context variables that are assigned to all syntax elements in clauses 7.3.8.1 through 7.3.8.11, except `end_of_slice_segment_flag`, `end_of_sub_stream_one_bit`, and `pcm_flag`.

For each context variable, the corresponding entries `pStateIdx` and `valMps` of tables `tableStateSync` and `tableMPSSync` are initialized to the corresponding `pStateIdx` and `valMps`.

9.3.4.2.2 Derivation process of `ctxInc` using left and above syntax elements

Input to this process is the luma location (`x0`, `y0`) specifying the top-left luma sample of the current luma block relative to the top-left sample of the current picture.

Output of this process is `ctxInc`.

9.3.4.3.2.2 State transition process

Inputs to this process are the current `pStateIdx`, the decoded value `binVal` and `valMps` values of the context variable associated with `ctxTable` and `ctxIdx`.

Outputs of this process are the updated `pStateIdx` and `valMps` of the context variable associated with `ctxIdx`.

13

wherein the reconstructed bit values form the decoded significance map; wherein the transform unit is sized 4x4, and wherein the partition set assigns contexts to bit positions within the transform unit such that a different context is assigned to each bit position in an upper left quadrant of the transform unit, contexts are shared by groups of two in an

¹² *Id.* at Sections 9.3.1, 9.3.4.1.

¹³ *Id.* at Sections 9.3.2.2, 9.3.2.3, 9.3.4.2.2, and 9.3.4.3.2.2.

upper right and lower left quadrant of the transform unit, and a single context is shared by all bit positions in the lower right quadrant.

9.3.4.2.5 Derivation process of ctxInc for the syntax element sig_coeff_flag

Inputs to this process are the colour component index cIdx, the current coefficient scan location (xC, yC), the scan order index scanIdx, and the transform block size log2TrafoSize.

Output of this process is the variable ctxInc.

The variable sigCtx depends on the current location (xC, yC), the colour component index cIdx, the transform block size, and previously decoded bins of the syntax element coded_sub_block_flag. For the derivation of sigCtx, the following applies:

- If log2TrafoSize is equal to 2, sigCtx is derived using ctxIdxMap[] specified in Table 9-39 as follows:

$$\text{sigCtx} = \text{ctxIdxMap}[(\text{yC} \ll 2) + \text{xC}] \tag{9-23}$$

Table 9-39 – Specification of ctxIdxMap[i]

| | | | | | | | | | | | | | | | |
|--------------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| i | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| ctxIdxMap[i] | 0 | 1 | 4 | 5 | 2 | 3 | 4 | 5 | 6 | 6 | 8 | 8 | 7 | 7 | 8 |

14

82. Defendant has been, and currently is, an active inducer of infringement of the '801 Patent under 35 U.S.C. § 271(b) and a contributory infringer of the '801 Patent under 35 U.S.C. § 271(c).

83. Defendant knew of the '801 Patent, or should have known of the '801 Patent but was willfully blind to its existence. Upon information and belief, Defendant has had actual knowledge of the '801 Patent since at least as early as the filing and/or service of this Complaint. Additionally, Defendant was made aware of their infringement through a notice letter sent from BlackBerry on December 17, 2015. Defendant has provided the '801 Accused Products to its customers and, on information and belief, instructions to use the '801 Accused Products in an infringing manner while being on notice of or willfully blind to the '801 Patent and the Defendant's infringement. Therefore, on information and belief, Defendant knew or should have

¹⁴ *Id.* at Section 9.3.4.2.5.

known of the '801 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts.

84. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '801 Patent.

85. Upon information and belief, Defendant provides the '801 Accused Products and instructions to end-user customers so that such customers will use the '801 Accused Products in an infringing manner. For example, Defendant provides instructions to end-user customers on how to set up, configure, and deploy the '801 Accused Products, as well as to make calls and participate in meetings using the '801 Accused Products.¹⁵ Defendant also instructs end-user customers that they may make calls and participate in meetings using the H.265 standard.¹⁶

86. Defendant's end-user customers directly infringe at least claims 1 and 8 of the '801 Patent by using the '801 Accused Products in its intended manner to infringe. Defendant induces such infringement by providing the '801 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '801 Patent. Upon information and belief, Defendant specifically intends that its actions will result in infringement of at least claims 1 and 8 of the '801 Patent, or subjectively believes that its actions will result in infringement of the '801 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

¹⁵ See, e.g., Avaya Scopia® XT Series User Guide, For Solution 8.3.2 (Apr. 2015), <https://downloads.avaya.com/css/P8/documents/100179341>, last visited July 16, 2016; Avaya Scopia® XT Series Deployment Guide, Release 8.3.2 (Apr. 2015), <https://downloads.avaya.com/css/P8/documents/101009048>, last visited July 16, 2016.

¹⁶ *Id.* at 11 (“Designed for top performance and quality, the XT7000 Series offers excellent video quality (1080p video at 60 frames per second) while saving on bandwidth costs. With the new H.265 video compression standard, you can have the same high quality video while consuming less bandwidth (up to 50%, relative to endpoints with H.264 High Profile).”).

87. Defendant contributorily infringes at least claims 1 and 8 of the '801 Patent by providing the '801 Accused Products and/or software or hardware components thereof, that embody a material part of the claimed inventions of the '801 Patent, that are known by Defendant to be specially made or adapted for use in an infringing manner, and are not staple articles with substantial non-infringing uses. The '801 Accused Products are specially designed to infringe at least claims 1 and 8 of the '801 Patent, and their accused components have no substantial non-infringing uses.

88. BlackBerry provided notice to Defendant of the '801 Patent and its infringement in a letter dated December 17, 2015, which identified the '801 Patent in particular and the '801 Accused Products' infringement thereof. Despite said notice, Defendant has willfully and deliberately continued infringing the claims of the '801 Patent to the present day.

89. Additional allegations regarding Defendant's knowledge of the '801 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

90. Defendant's infringement of the '801 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

91. Defendant's infringement of the '801 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

92. BlackBerry has been damaged by Defendant's infringement of the '801 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

93. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '801 Patent, including without limitation lost profits and not less than a reasonable royalty.

SECOND CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 8,964,849)

94. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-93 of this Complaint.

The '849 Patent

95. The '849 Patent discloses, among other things, methods and systems for encoding and decoding "video data [] in which multi-level significance maps are used in the encoding and decoding processes. The significant-coefficient flags that form the significance map are grouped into contiguous groups, and a significant-coefficient-group flag signifies for each group whether that group contains no non-zero significant-coefficient flags. If there are no non-zero significant-coefficient flags in the group, then the significant-coefficient-group flag is set to zero. The set of significant-coefficient-group flags is encoded in the bitstream. Any significant-coefficient flags that fall within a group that has a significant-coefficient-group flag that is non-zero are encoded in the bitstream, whereas significant-coefficient flags that fall within a group that has a significant-coefficient-group flag that is zero are not encoded in the bitstream." '849 Patent at Abstract.

96. The '849 Patent explains that encoding/decoding images and videos using "block-based coding processes" includes dividing the image or frame "into blocks, typically 4x4 or 8x8" that are "spectrally transformed into coefficients, quantized, and entropy encoded." '849 Patent at 1:38-42. The '849 Patent further explains that spectrally transforming the image or frame data into coefficients is done with "the use of a discrete cosine transform (DCT) or some

variant thereon,” wherein “[t]he resulting DCT coefficients are then quantized using a quantizer to produce quantized transform domain coefficients, or indices.” *Id.* at 1:49-53. “The block or matrix of quantized transform domain coefficients (sometimes referred to as a ‘transform unit’) is then entropy encoded using a particular context model.” *Id.* at 1:54-56.

97. Among other things, the ’849 patent relates to significance maps. As explained by the ’849 Patent, “[a] significance map is a block, matrix or group of flags that maps to, or corresponds to, a transform unit. Each flag indicates whether the corresponding position in the transform unit contains a non-zero coefficient or not. In existing standards, these flags may be referred to as significant-coefficient flags. In existing standards, there is one flag per coefficient and the flag is a bit that is zero if the corresponding coefficient is zero and is set to one if the corresponding coefficient is non-zero.” ’849 Patent at 4:64-5:5.

98. Encoding and decoding the entire significance map was a feature of existing video codecs at the time of the ’849 Patent. Yet, as noted by the ’849 Patent, “in many instances the 16×16 and 32×32 significance maps contain a large number of zeros. Accordingly, there is a substantial cost involved in encoding and transmitting large maps that have few coefficient values.” ’849 Patent at 8:33-37.

99. The ’849 Patent provides a technological improvement allowing higher data compression of encoded data and reconstructing the data in a significance map more efficiently. The ’849 Patent discloses, for example, using multi-level significance maps for transform units wherein the transform unit is (conceptually) divided or partitioned into blocks. *See* ’849 Patent at 8:45-54. Each such block, or group, is assigned a significant-coefficient-group flag value of “0” or “1” depending on whether it contains any non-zero significant coefficient flag values therein. “A higher level significance map corresponding to the matrix of groups may then be generated. The higher level significance map is an ordered set of significant-coefficient-group

flags. There is one significant-coefficient-group flag for each group containing at least one significant-coefficient flag. The group containing the last-significant coefficient need not be included in the higher level significance map because it will already be known to contain at least one non-zero coefficient, i.e. the last-significant coefficient. The significance map may be referred to as the level 0, or L0, map. The higher level significance map (i.e. containing the significant-coefficient-group flags) may be referred to as the level 1, or L1, map.” ’849 Patent at 9:15-37.

100. Accordingly, an exemplary encoder operating in accordance with the principles and teachings of the ’849 Patent “encodes each significant-coefficient flag if that significant-coefficient flag falls in a group for which the significant-coefficient-group flag is set to 1. If the corresponding significant-coefficient-group flag is set to zero, then any of the significant-coefficient flags in that group are not encoded, i.e. they are skipped during the entropy encoding process. Accordingly, after the process 200 the encoder has produced a bitstream of encoded data which contains the encoded significant-coefficient-group flags and the encoded significant-coefficient flags that fall into a group that has at least one non-zero significant-coefficient flag. The bitstream does not include any significant-coefficient flags from any group that does not have at least one non-zero significant-coefficient flag.” ’849 Patent at 10:38-54.

101. Correspondingly, an exemplary decoder operating in accordance with the principles and teachings of the ’849 Patent is capable of determining and determines, *inter alia*, for each significant-coefficient flag “whether its corresponding significant-coefficient-group flag is zero. If the corresponding significant-coefficient-group flag is non-zero, then a significant-coefficient flag is decoded from the bitstream as indicated by operation 306[in Fig. 7]. That is, if the associated or corresponding significant-coefficient-group flag indicates that the group may contain at least one non-zero coefficient, then the decoder decodes a significant-coefficient flag

from the bitstream for the current position. If the associated or corresponding significant-coefficient-group flag is a zero, i.e. it indicates that there are no non-zero coefficients in the group, then the decoder sets or reconstructs the current significant-coefficient flag as a zero, as indicated by operation 308[in Fig. 7]. It does not decode it from the bitstream.” ’849 Patent at 11:43-57.

102. The ’849 Patent thus, *inter alia*, “describes a method of reconstructing significant-coefficient flags for a transform unit from a bitstream of encoded data. The method includes reconstructing significant-coefficient-group flags, wherein each significant-coefficient-group flag corresponds to a respective group of significant-coefficient flags; and, reconstructing each significant-coefficient flag by decoding the significant-coefficient flag from the bitstream if that significant-coefficient flag is in a group that has corresponding significant-coefficient-group flag that is non-zero, and setting the significant-coefficient flag to zero, if that significant-coefficient flag is in a group that has corresponding significant-coefficient-group flag that is zero.” ’849 Patent at 3:26-38.

Historical Context of the ’849 Patent

103. Using multi-level significance maps in connection with video data encoding and decoding was not common or conventional at the time of invention of the ’849 Patent.

104. At the time of the invention of the ’849 Patent, the “current state of the art for video encoding ITU-T H.264/AVC video coding standard” as well as the under development “next generation video encoding standard ... under development through MPEG-ITU: High Efficiency Video Coding” relied on relatively traditional means of encoding of quantized transform coefficients by “(a) encoding a last significant coefficient position indicating the location of the last non-zero coefficient in the block, (b) encoding a significance map indicating the positions in the block (other than the last significant coefficient position) that contain non-

zero coefficients” wherein the entire significance map was encoded, “(c) encoding the magnitudes of the non-zero coefficients, and (d) encoding the signs of the non-zero coefficients.” ’849 Patent at 1:30-37, 1:56-65; *see id.* at 8:20-37.

105. Because the encoding systems used by these prevailing standards relied on encoding and decoding the entire significance map, these processes “involve[] multiple memory accesses, which can be costly in memory bandwidth requirements. Moreover, in many instances the 16×16 and 32×32 significance maps contain a large number of zeros. Accordingly, there is a substantial cost involved in encoding and transmitting large maps that have few coefficient values.” *Id.* at 8:32-37.

106. However, the inventors of the ’849 patent recognized that, by also encoding and decoding a higher level significance map, the value of certain coefficient flags could be inferred during the decoding process, and in fact groups of significant coefficient flags would not have to be encoded or decoded. *See id.* at 11:36-57; 12:6-46. This technique reduced memory bandwidth costs in comparison with the significant coefficient flag encoding/decoding methods then under consideration for the H.265 standard.¹⁷

107. Given the state of the art at the time of the invention of the ’849 Patent, including the state of the then-under consideration, next generation video encoding standard¹⁸, the inventive concepts of the ’849 Patent cannot be considered to be conventional. The ’849 Patent discloses, among other things, an unconventional solution to an issue arising in the video data compression space, and offered a technological solution to that issue.

¹⁷ *See* Nguyen et al., JCT-VC Contribution G644, 7th Meeting of the JCT-VC, Geneva (Nov. 2011).

¹⁸ *See* Ex. J (Working Draft 4 of High-Efficiency Video Coding).

108. The '849 Patent claims cannot be performed in the human mind or by using pen and paper. As noted above, the '849 Patent expressly states that it is drawn to address a specific, technical problem arising in the context of data compression: "Video presents a significant challenge to data compression because of the large amount of data required for each video frame and the speed with which encoding and decoding often needs to occur." *Id.* at 1:27-30. At the time of the '849 Patent inventions, this problem was further exacerbated by the "rapidly increasing demand and quality" of online video distribution.¹⁹

109. As described above, the '849 Patent discloses embodiments using specific technologies for encoding and decoding video data streams, and a video encoder and decoder including a processor and memory (such as a frame store). *See, e.g., id.* at Figs. 1, 2. Thus, the '849 Patent discusses methods of implementing improved video compression techniques using video encoders and decoders.

110. Consistent with the problem addressed being rooted in video encoder/decoder technology, the '849 Patent's solutions naturally were also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

111. This technical context is reflected in the '849 Patent's claims. For example, each of the claims requires reconstructing significant-coefficient-group flags by either inferring or decoding significant coefficient flags depending upon the state of the significant-coefficient-group flag, thereby addressing technical limitations of video encoders and decoders such as bandwidth and memory-capacity constraints, as well as providing a technological solution to the problem of insufficient speed and efficiency in video encoding and decoding.

¹⁹ Ex. M (<http://www.digitaltrends.com/computing/h-265-hevc-encoding-explained/>).

112. A person having ordinary skill in the art at the time of the invention of the '849 Patent would not have understood that the invention could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '849 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors' detailed description of the invention and the language of the claims and be a practical impossibility.

'849 Patent Allegations

113. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '849 Patent in violation of 35 U.S.C. § 271 *et seq.*, directly and/or indirectly, by making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, Accused Videoconferencing Products supporting the H.265 standard, including without limitation at least the Avaya Scopia® XT7100 Room System (hereinafter "the '849 Accused Products") that infringes at least claims 1 and 11 of the '849 Patent.

114. On information and belief after reasonable investigation, the '849 Accused Products contains a decoder and decoding functionality designed and used to decode a bitstream of data encoded according to the H.265 standard.

Avaya Scopia® XT Video Conferencing

The Latest in HD Video Collaboration Room Systems and Capabilities

[Overview](#) [Case Studies](#) [Documents and Videos](#) [Tech Specs](#) [Product Support](#)

Powerful Enterprise Video Solution Delivers an Exceptional User Experience

- **Experience outstanding video conferencing in any environment** with Avaya's complete range of dedicated video conferencing endpoints.
- **Deliver an unparalleled video collaboration experience.** Avaya Scopia® XT Video Conferencing provides leading, powerful video communications technology that includes immersive telepresence, conference room systems, and desktop applications.
- **Achieve excellent video performance in real-world network conditions.** Experience crisp, smooth video quality with resolutions up to 1080p/60fps, stellar bandwidth efficiency, and error resiliency with H.265 High Efficiency Video Coding (HEVC) and Scalable Video Coding (SVC).

20

Scopia XT7100 Specifications

Communications

- IP: H.323, SIP (RFC 3261)
- ISDN² supported through Scopia Gateway
- Bit rate: H.323, SIP: up to 6/12² Mbps; H.320: up to 2 Mbps
- MCU compatibility: H.243, H.231

Video

- 2 simultaneous 1080p60 channels: camera + auxiliary camera² or camera + content
- H.263, H.263+, H.263++, H.264, H.264 High Profile, H.265 HEVC, SVC
- Dual: H.239 (H.323); BFCP (SIP)

21

115. On information and belief, by complying with the H.265 standard, the '849 Accused Products reconstruct significant-coefficient flags for a transform unit from a bitstream

²⁰ <http://www.avaya.com/en/product/avaya-scopia-xt-video-conferencing/>, last visited July 16, 2016.

²¹ Avaya Scopia® XT7100 Room System Product Sheet, (attached hereto as Ex. K).

of encoded data by reconstructing significant-coefficient-group flags for the transform unit and reconstructing each significant-coefficient flag by:

- (i) if the significant-coefficient flag is at position (0,0) in its group, a corresponding significant-coefficient-group flag is non-zero, the group is not the DC block, and all the previous significant-coefficient flags in that group are zero, inferring the significant-coefficient flag at position (0,0) in that group to be 1, and otherwise
- (ii) decoding the significant-coefficient flag from the bitstream if that significant-coefficient flag is in a group that has corresponding significant-coefficient-group flag that is non-zero, and setting the significant-coefficient flag to zero, if that significant-coefficient flag is in a group that has corresponding significant-coefficient-group flag that is zero;

7.4.9.11 Residual coding semantics

sig_coeff_flag[xC][yC] specifies for the transform coefficient location (xC, yC) within the current transform block whether the corresponding transform coefficient level at the location (xC, yC) is non-zero as follows:

- If **sig_coeff_flag[xC][yC]** is equal to 0, the transform coefficient level at the location (xC, yC) is set equal to 0.
- Otherwise (**sig_coeff_flag[xC][yC]** is equal to 1), the transform coefficient level at the location (xC, yC) has a non-zero value.

When **sig_coeff_flag[xC][yC]** is not present, it is inferred as follows:

- If (xC, yC) is the last significant location (LastSignificantCoeffX, LastSignificantCoeffY) in scan order or all of the following conditions are true, **sig_coeff_flag[xC][yC]** is inferred to be equal to 1:
 - (xC & 3, yC & 3) is equal to (0, 0)
 - inferSbDcSigCoeffFlag is equal to 1
 - coded_sub_block_flag[xS][yS] is equal to 1
- Otherwise, **sig_coeff_flag[xC][yC]** is inferred to be equal to 0.

22

²² Ex. L (ITU-T H.265 High Efficiency Video Coding (Edition 1.0, April 13, 2013)) at Section 7.4.9.11.

7.3.8.11 Residual coding syntax

| | |
|---|-------|
| <code>} while((xC != LastSignificantCoeffX) (yC != LastSignificantCoeffY)</code> | |
| <code>for(i = lastSubBlock; i >= 0; i--) {</code> | |
| <code> xS = ScanOrder[log2TrafoSize - 2][scanIdx][i][0]</code> | |
| <code> yS = ScanOrder[log2TrafoSize - 2][scanIdx][i][1]</code> | |
| <code> inferSbDcSigCoeffFlag = 0</code> | |
| <code> if((i < lastSubBlock) && (i > 0)) {</code> | |
| <code> coded_sub_block_flag[xS][yS]</code> | ae(v) |
| <code> inferSbDcSigCoeffFlag = 1</code> | |
| <code> }</code> | |
| <code> for(n = (i == lastSubBlock) ? lastScanPos - 1 : 15; n >= 0; n--) {</code> | |
| <code> xC = (xS << 2) + ScanOrder[2][scanIdx][n][0]</code> | |
| <code> yC = (yS << 2) + ScanOrder[2][scanIdx][n][1]</code> | |
| <code> if(coded_sub_block_flag[xS][yS] && (n > 0 !inferSbDcSigCoeffFlag)) {</code> | |
| <code> sig_coeff_flag[xC][yC]</code> | ae(v) |
| <code> if(sig_coeff_flag[xC][yC])</code> | |
| <code> inferSbDcSigCoeffFlag = 0</code> | |

23

9.3 CABAC parsing process for slice segment data

9.3.1 General

This process is invoked when parsing syntax elements with descriptor ae(v) in clauses 7.3.8.1 through 7.3.8.11.

Inputs to this process are a request for a value of a syntax element and values of prior parsed syntax elements.

Output of this process is the value of the syntax element.

24

wherein the transform unit is partitioned into non-overlapping blocks, each block containing a respective group of significant-coefficient flags, and wherein each significant-coefficient-group flag corresponds to a respective block and its respective group of significant-coefficient flags.

7.4.9.11 Residual coding semantics

`coded_sub_block_flag[xS][yS]` specifies the following for the sub-block at location (xS, yS) within the current transform block, where a sub-block is a (4x4) array of 16 transform coefficient levels:

`sig_coeff_flag[xC][yC]` specifies for the transform coefficient location (xC, yC) within the current transform block whether the corresponding transform coefficient level at the location (xC, yC) is non-zero as follows:

- If `sig_coeff_flag[xC][yC]` is equal to 0, the transform coefficient level at the location (xC, yC) is set equal to 0.
- Otherwise (`sig_coeff_flag[xC][yC]` is equal to 1), the transform coefficient level at the location (xC, yC) has a non-zero value.

25

²³ *Id.* at Section 7.3.8.11.

²⁴ *Id.* at Section 9.3.1.

116. Defendant has been, and currently is, an active inducer of infringement of the '849 Patent under 35 U.S.C. § 271(b) and a contributory infringer of the '849 Patent under 35 U.S.C. § 271(c).

117. Defendant knew of the '849 Patent, or should have known of the '849 Patent but was willfully blind to its existence. Upon information and belief, Defendant has had actual knowledge of the '849 Patent since at least as early as the filing and/or service of this Complaint. Additionally, Defendant was made aware of their infringement through a notice letter sent from BlackBerry on December 17, 2015. Defendant has provided the '849 Accused Products to its customers and, on information and belief, instructions to use the '849 Accused Products in an infringing manner while being on notice of or willfully blind to the '849 Patent and the Defendant's infringement. Therefore, on information and belief, Defendant knew or should have known of the '849 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts.

118. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '849 Patent.

119. Upon information and belief, Defendant provides the '849 Accused Products and instructions to end-user customers so that such customers will use the '849 Accused Products in an infringing manner. For example, Defendant provides instructions to end-user customers on how to set up, configure, and deploy the '849 Accused Products, as well as to make calls and participate in meetings using the '849 Accused Products.²⁶ Defendant also instructs end-user customers that they may make calls and participate in meetings using the H.265 standard.²⁷

²⁵ *Id.* at Section 7.4.9.11.

²⁶ *See, e.g.,* Avaya Scopia® XT Series User Guide, For Solution 8.3.2 (Apr. 2015), <https://downloads.avaya.com/css/P8/documents/100179341>, last visited July 16, 2016; Avaya (footnote continued)

120. Defendant's end-user customers directly infringe at least claims 1 and 11 of the '849 Patent by using the '849 Accused Products in its intended manner to infringe. Defendant induces such infringement by providing the '849 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '849 Patent. Upon information and belief, Defendant specifically intends that its actions will result in infringement of at least claims 1 and 11 of the '849 Patent, or subjectively believes that its actions will result in infringement of the '849 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

121. Defendant contributorily infringes at least claims 1 and 11 of the '849 Patent by providing the '849 Accused Products and/or software or hardware components thereof, that embody a material part of the claimed inventions of the '849 Patent, that are known by Defendant to be specially made or adapted for use in an infringing manner, and are not staple articles with substantial non-infringing uses. The '849 Accused Products are specially designed to infringe at least claims 1 and 11 of the '849 Patent, and their accused components have no substantial non-infringing uses.

122. BlackBerry provided notice to Defendant of the '849 Patent and its infringement in a letter dated December 17, 2015, which identified the '849 Patent in particular and the '849 Accused Products' infringement thereof. Despite said notice, Defendant has willfully and deliberately continued infringing the claims of the '849 Patent to the present day.

Scopia® XT Series Deployment Guide, Release 8.3.2 (Apr. 2015),

<https://downloads.avaya.com/css/P8/documents/101009048>, last visited July 16, 2016.

²⁷ *Id.* at 11 (“Designed for top performance and quality, the XT7000 Series offers excellent video quality (1080p video at 60 frames per second) while saving on bandwidth costs. With the new H.265 video compression standard, you can have the same high quality video while consuming less bandwidth (up to 50%, relative to endpoints with H.264 High Profile).”).

123. Additional allegations regarding Defendant's knowledge of the '849 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

124. Defendant's infringement of the '849 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

125. Defendant's infringement of the '849 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

126. BlackBerry has been damaged by Defendant's infringement of the '849 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

127. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '849 Patent, including without limitation lost profits and not less than a reasonable royalty.

THIRD CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 8,116,739)

128. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-127 of this Complaint.

The '739 Patent

129. As the '739 patent explains, at the time of the invention, "user interfaces, particularly graphical user interfaces (GUI) for displaying and accessing messages such as various types of data and voice messages communicated between a first communications device and one or more other devices are of a 'linear' nature." '739 Patent at 1:23-27. That is,

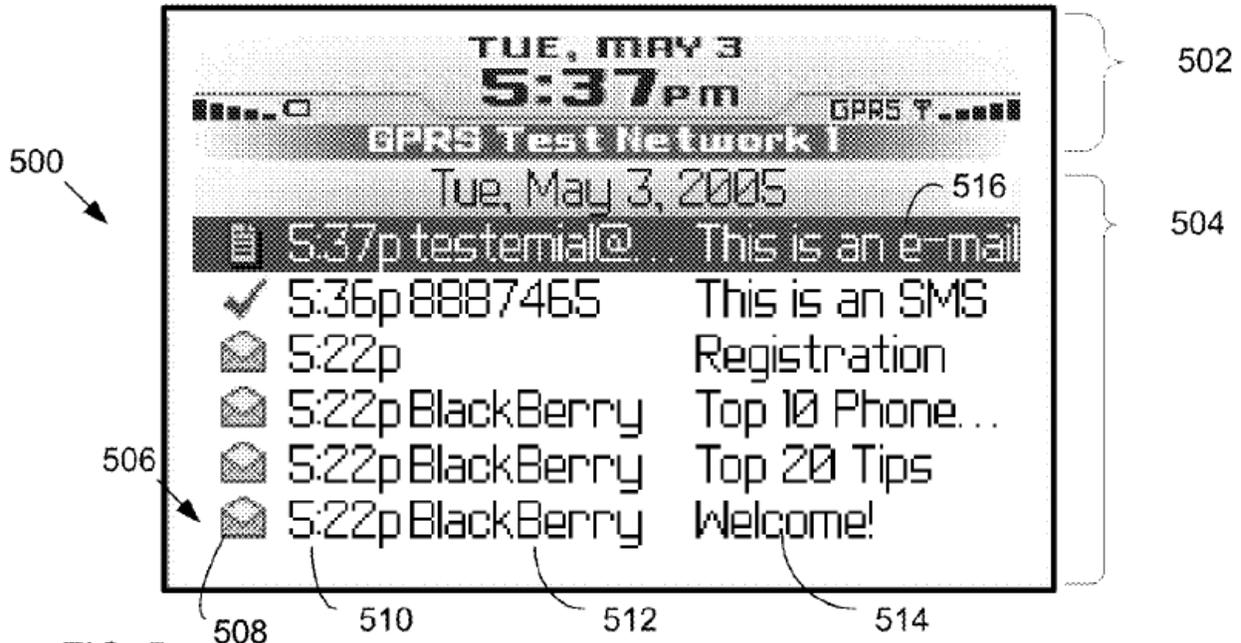
“messages are often presented in accordance with a chronological order of the message such as time sent or received.” *Id.* at 1:31-33.

130. The then-existing manner of presenting messages “makes it difficult for the user to find a particular message, reply to a particular message in a ‘thread’ (i.e. common subject) having a context of all the previous messages, or track the ‘thread history’, because different messages of the same ‘thread’ can be spread throughout the message collection GUI and can be separated by other messages from different ‘threads’.” ’739 Patent at 1:36-42.

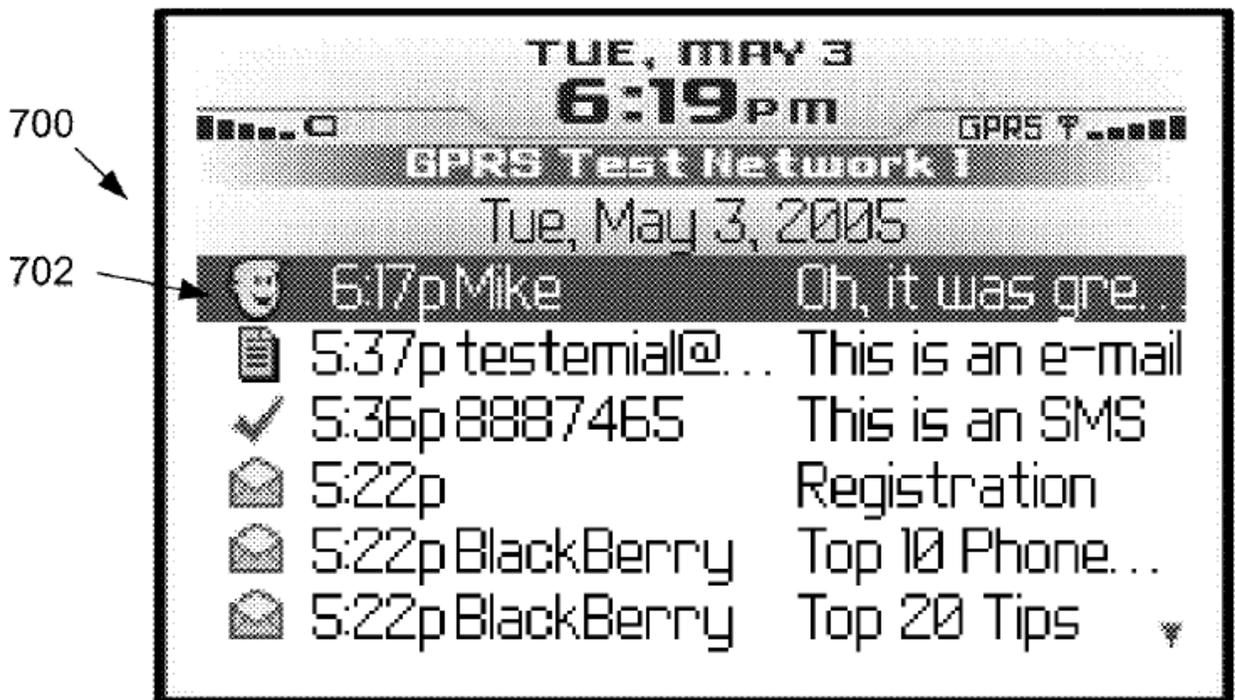
131. The ’739 Patent solves this problem by representing “[r]elated messages of a conversation [] as a part of a session.” ’739 Patent at 2:12-13. Further, “[a] particular session or conversation is represented in a message collection with a single dynamic placeholder.” *Id.* at 2:14-16. The invention thus “allows a user to get access to all the context related messages in ‘one shot’: from the placeholder straight into the active session (conversation).” *Id.* at 2:16-18.

132. Additionally, as disclosed in certain embodiments, users can have access to the most relevant and current conversations, because a “session's placeholder dynamically updates it's position in the message collection.” ’739 Patent at 2:18-20. Thus “[c]onversations that are started but which have not occasioned recent activity will automatically age to the bottom of the message collection GUI, leaving the top of the message collection GUI for active sessions defining a hot spot of context related messages.” *Id.* at 2:21-25.

133. As one example, “FIG. 5 illustrates an example view 500 of a message collection application adapted in accordance with an embodiment.” ’739 Patent at 7:50-52. “View 500 further comprises message collection application information 504 including a list of messages sent or received by station 202.” *Id.* at 7:56-58.



134. “FIG. 7 illustrates a view 700 of the message collection application showing a dynamic session placeholder 702 as a single entry of the messages list for representing [an] entire IM session” as depicted in Figure 6. ’739 Patent at 8:16-19.



135. “FIG. 8 shows the receipt of a new SMS message 802 subsequent to the last time or a message represented by dynamic session placeholder 702. Thus a dynamic session placeholder may age in a similar manner to regular message entries. Older conversations move down the list while newer messages and sessions are at the top of the list.” ’739 Patent at 8:22-28.

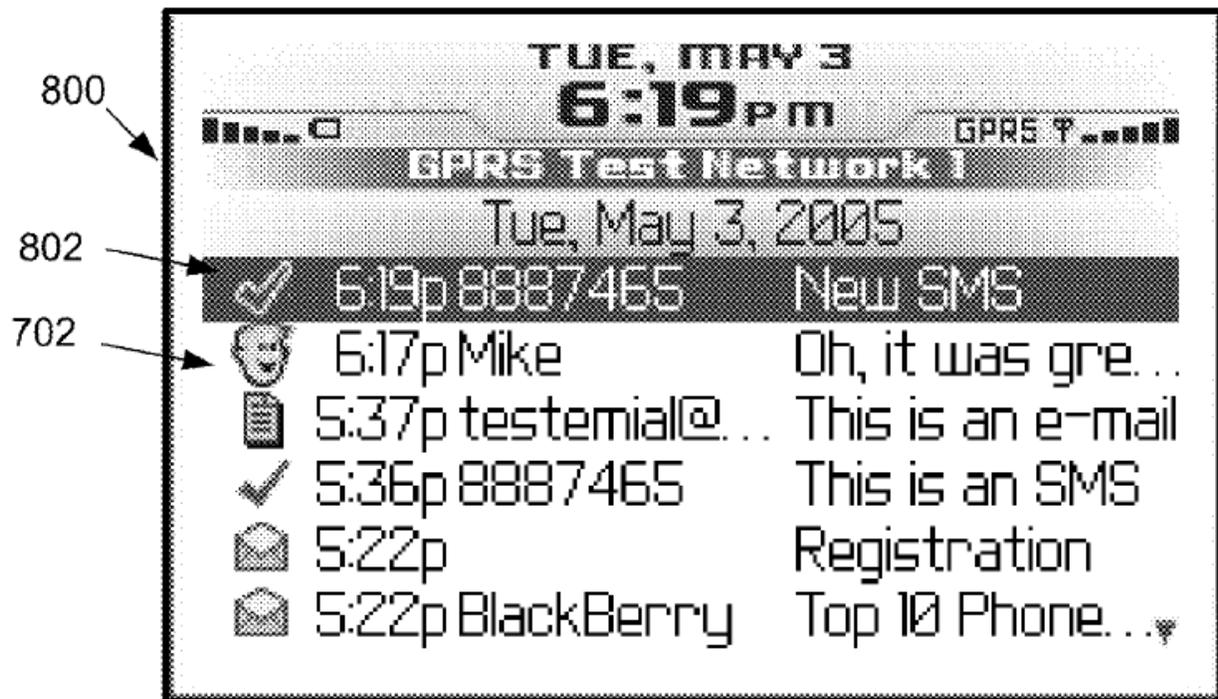


FIG. 8

136. As the ’739 patent explains, the session placeholders illustrated above are *dynamic*: “should new activity occur with a session (e.g. receiving or sending of a message), the time stamp of the dynamic session placeholder is updated and its position in the message collection changed accordingly. FIG. 9 shows a view 900 of the message collection with an updated dynamic session placeholder 902 in order ahead of aged SMS message 802. Message 702 (now message 902) is ‘removed’ accordingly.” ’739 Patent at 8:29-36.

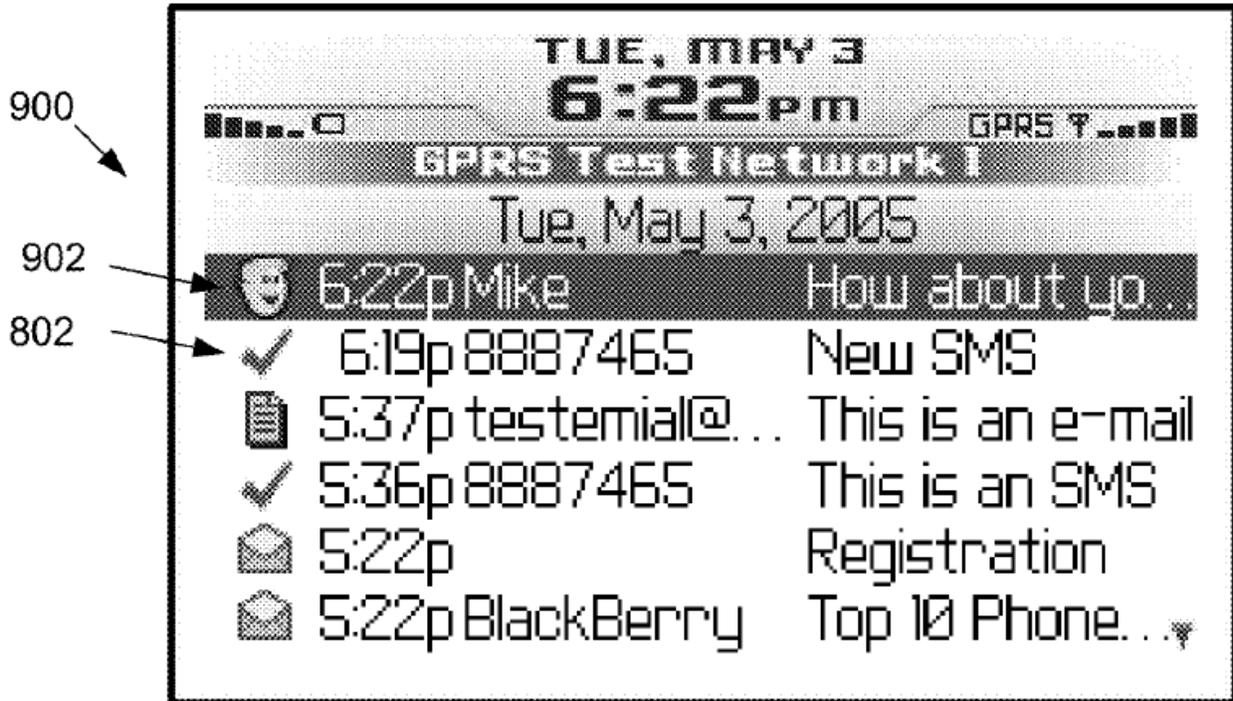


FIG. 9

137. In view of the historical context and development of message collection applications and displays, discussed below, a person of ordinary skill in the art would have understood that the '739 Patent's inventions provide unconventional solutions to solve the problems they address.

Historical Context of the '739 Patent

138. Collecting messages by conversation was not common or conventional at the time of invention of the '739 Patent.

139. At the time of invention of the '739 Patent, messaging applications displayed messages linearly. '739 Patent at 1:23-27. In other words, each incoming message was displayed separately, with the most recent message displayed first. *Id.* at 1:27-33.

140. This common and accepted way of presenting messages allowed users to see their most recent messages first. However, as the inventors of the '739 Patent realized, it also deprived users of the conversational context of those messages. For example, if a user was

communicating with both Alice and Bob at the same time, Alice's and Bob's messages would be interleaved in the message application. This made it difficult for a user to locate prior communications from Alice in the same conversation. '739 Patent at 1:36-42. As the number of conversations undertaken by a user increased, so too did the complexity.

141. Additionally, displaying each message from each conversation "causes the message collection GUI to be overstuffed with single messages." '739 Patent at 1:33-35. This is particularly a problem on handheld devices such as smartphones, which have reduced screen sizes as compared to conventional desktop computers.

142. Thus, to address the existing problems relating to the technical presentation of messages within a messaging application, the '739 Patent inventors developed the dynamic session placeholder detailed above. Given the state of the art at the time, the '739 Patent inventions were a novel, non-conventional solution that directly addressed problems arising in the field of messaging applications as implemented in various electronic devices.

143. As noted above, the '739 Patent is drawn to address a specific, technical problem arising in the context of messaging applications. Consistent with the problem addressed being rooted in messaging applications, the '739 Patent's solutions are also rooted in that same technology that cannot be performed with pen and paper or in the human mind. The '739 Patent discloses the use of, *inter alia*, machine readable mediums, program code, computer processors, dynamic session placeholders, communication subsystems, display screens, input devices, and storage devices. Moreover, the creation of a dynamic session placeholder within a communication application is not something that could be performed with pen and paper or in the human mind.

144. This technical context is reflected in the '739 Patent's claims. For example, a number of claims requires, *inter alia*, a processor that executes program code or instructions for displaying a dynamic session placeholder that represents a conversation of messages.

145. A person having ordinary skill in the art at the time of the inventions of the '739 Patent would not have understood that the inventions could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '739 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors' detailed description of the inventions and the language of the claims and be a practical impossibility.

'739 Patent Allegations

146. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '739 Patent in violation of 35 U.S.C. § 271 *et seq.*, directly and/or indirectly, by making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, the various versions of the Avaya Communicator Product (hereinafter "the '739 Accused Products") that infringe at least claims 1 and 21 of the '739 Patent.

147. On information and belief after reasonable investigation, each of the '739 Accused Products comprises or is designed to be used with: a machine readable medium having program code executable in a computer processor for implementing a method of listing messages, the program code comprising:

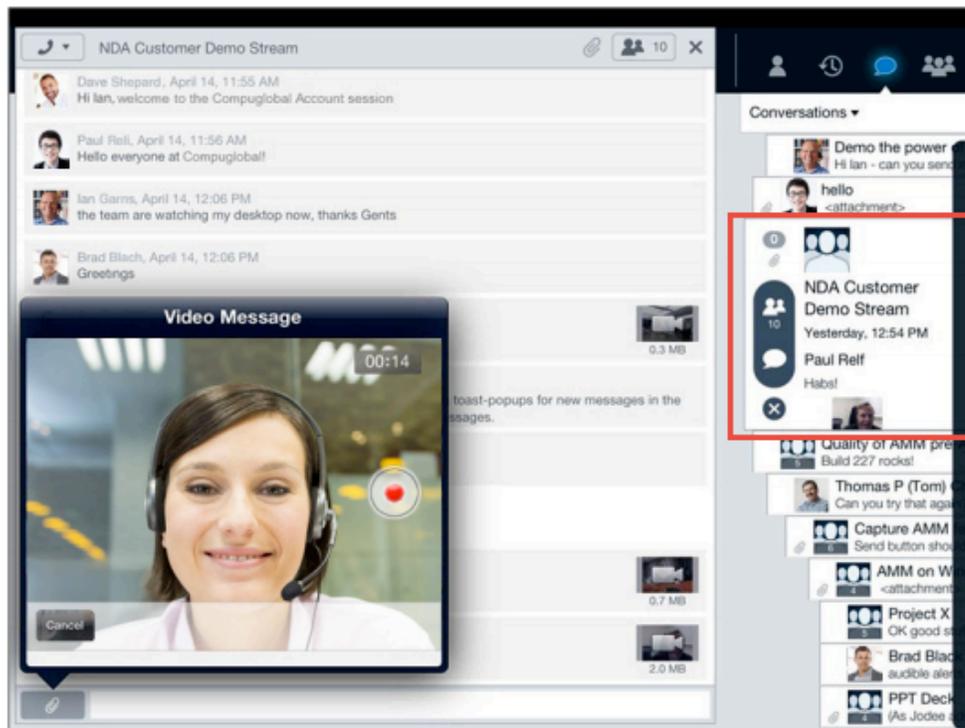
Avaya Communicator for iPad

Overview

Avaya Communicator for iPad is a new generation client that lets business professionals use their Apple iPad device for business communications.

28

code for listing messages comprising displaying a dynamic session placeholder in a message list, the dynamic session placeholder representing a conversation of messages.

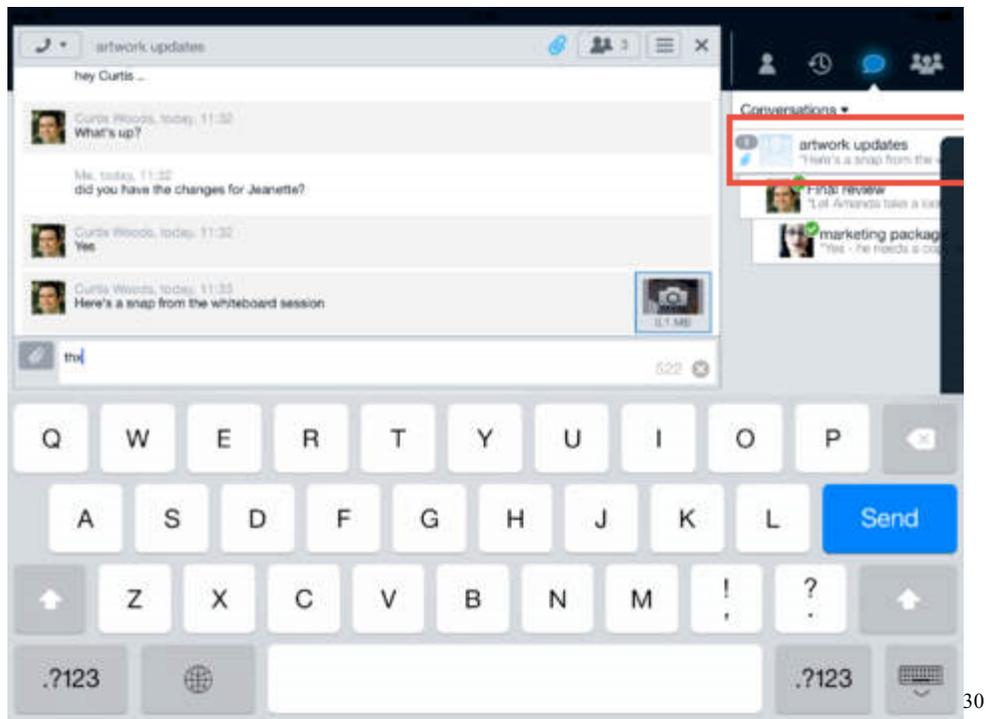


Avaya Communicator for iPad with Avaya Multimedia Messaging

29

²⁸ Avaya Communicator for iPad, (attached hereto as Ex. N) at p. 1.

²⁹ *Id.*



148. Defendant has been, and currently is, an active inducer of infringement of the '739 Patent under 35 U.S.C. § 271(b) and contributory infringers of the '739 Patent under 35 U.S.C. § 271(c).

149. Defendant knew of the '739 Patent, or should have known of the '739 Patent but was willfully blind to its existence. Upon information and belief, the Defendant has had actual knowledge of the '739 Patent since at least as early as the filing and/or service of this Complaint. Additionally, Defendant was made aware of their infringement through a notice letter sent from BlackBerry on December 17, 2015. Defendant has provided the '739 Accused Products to their customers and/or instructions to use the '739 Accused Products in an infringing manner while being on notice of or willfully blind to the '739 Patent and Defendant's infringement. Therefore,

³⁰ <https://itunes.apple.com/ca/app/avaya-communicator-for-ipad/id509528816?mt=8>, last visited July 16, 2016.

on information and belief, Defendant knew or should have known of the '739 Patent and of their own infringing acts, or deliberately took steps to avoid learning of those facts.

150. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '739 Patent.

151. Defendant also provides the '739 Accused Products and instructions to end-user customers so that such customers will use the '739 Accused Products in an infringing manner. For example, Avaya's marketing materials promote the use of the "Conversations" feature, as depicted above.

152. Defendant's end-user customers directly infringe at least claims 1 and 21 of the '739 Patent by using the '739 Accused Products in their intended manner to infringe. Defendant induces such infringement by providing the '739 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '739 Patent. Upon information and belief, Defendant specifically intends that their actions will result in infringement of at least claims 1 and 21 of the '739 Patent, or subjectively believes that its actions will result in infringement of the '739 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

153. Defendant contributorily infringes at least claims 1 and 21 of the '739 Patent by providing the '739 Accused Products and/or software or hardware components thereof, that embody a material part of the claimed inventions of the '739 Patent, that are known by Defendant to be specially made or adapted for use in an infringing manner, and are not staple articles with substantial non-infringing uses. The '739 Accused Products are specially designed to infringe at least claims 1 and 21 of the '739 Patent, and their accused components have no substantial non-infringing uses.

154. BlackBerry provided notice to Defendant of the '739 Patent and its infringement in a letter dated December 17, 2015, which identified the '739 Patent in particular and the '739 Accused Products' infringement thereof. Despite said notice, Defendant has willfully and deliberately continued infringing the claims of the '739 Patent to the present day.

155. Additional allegations regarding Defendant's knowledge of the '739 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

156. Defendant's infringement of the '739 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

157. Defendant's infringement of the '739 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285. BlackBerry has been damaged by Defendant's infringement of the '739 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

158. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '739 Patent, including without limitation lost profits and not less than a reasonable royalty.

FOURTH CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 8,886,212)

159. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-158 of this Complaint.

The '212 Patent

160. As the '212 patent explains, “[a]n increasing number of wireless communications devices or mobile devices have Global Positioning System (GPS) chipsets that provide current location data which may be used for various navigation applications.” ’212 Patent at 1:16-19. These devices can “[t]ransmit[] the current location data from one mobile device to another.” *Id.* at 1:20-21.

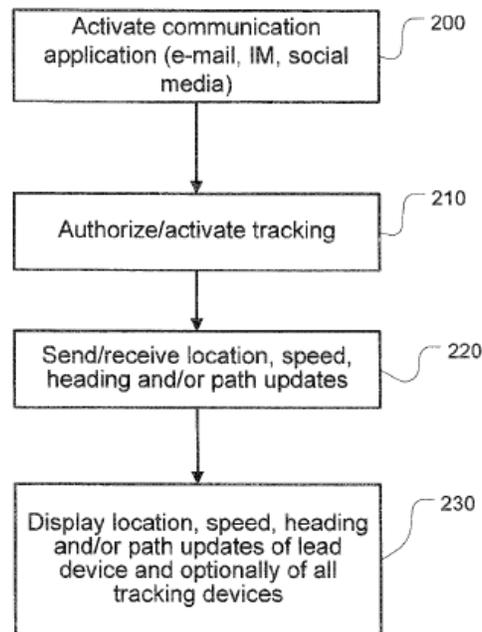
161. In the prior art, initiating the transmission of location information, and/or selecting the recipients of that location information, was done either in the mobile operating system or in a specialized application. While functional, this impacted user experience by forcing the user to switch or close out of a communication application in order to begin sharing location information.

162. Additionally, this prior art solution lacked any contextual information from the communication application. Thus a user would be forced to either share his location information with everyone—raising privacy concerns—or else undertake the time-intensive exercise of inputting identifying information for the specific users and/or devices with which he wished to share his location information.

163. Thus a “main aspect of this innovative technology is the ability to launch the tracking mode from within an instant message session, from a social networking platform or from within an e-mail thread.” ’212 Patent at 3:9-12.

164. “FIG. 4 is a flowchart outlining main steps of a novel tracking method in which tracking is initiated from a communication application such as e-mail, instant messaging or a social media application.” ’212 Patent at 5:17-20. “At step 200, the user activates a communication application.” *Id.* at 5:20-21. As the patent explains, “communication application” includes, but is not limited to “an email application,” “an instant messaging

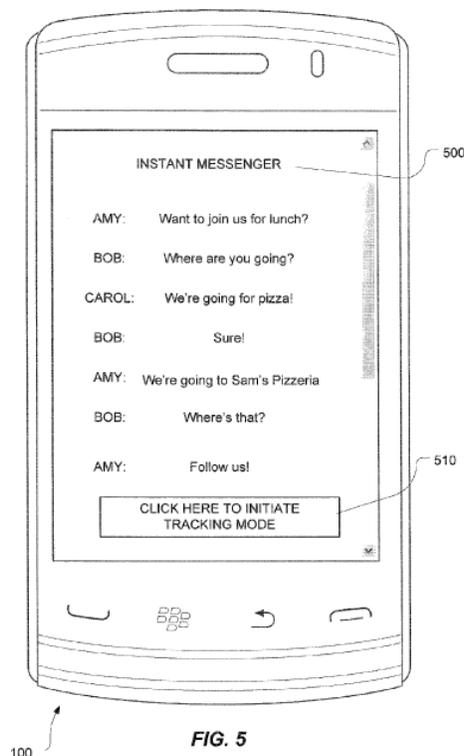
application or any text messaging such as MMS, SMS, etc.,” and “a social networking application that interacts with a social networking platform or site.” *Id.* at 5:21-26.



165. As Step 210, the user activates tracking mode from within the communication application. ’212 Patent at 5:27-28. Once activated, “this tracking data is then transmitted, broadcast or otherwise sent to multiple tracking devices, either directly or indirectly” in step 220. *Id.* at 4:58-60; 5:43-44.

166. “FIG. 5 depicts an example of a mobile device 100 executing an instant messenger application. The user interface **500** displays a touch-sensitive user interface element **510** to initiate tracking. In this example, by clicking on the virtual (touch-sensitive) button **510**, tracking mode is initiated whereby Amy's device (the lead device) provides tracking data to Bob's device and Carol's device.” ’212 Patent at 5:48-54. This ability to share location data using a single touch within the communication application is a clear improvement over prior art methods, whereby a user would need to [1] exit the application, [2] switch to a “location” OS

module or application, [3] turn on location tracking, and [4] enter or specify identification information for Bob's device and Carol's device as the recipients of that location information.



167. In view of the historical context and the separate development of communication applications and location sharing functionality, a person of ordinary skill in the art would have understood that the '212 Patent's inventions provide unconventional solutions to solve the problems they address.

Historical Context of the '212 Patent

168. Tracking of mobile devices using communication applications was not common or conventional at the time of invention of the '212 Patent.

169. At the time of the invention of the '212 Patent, communication applications were developed separately from applications and processes for initiating and gathering location information.

170. In particular, communication applications were generally developed by companies that sought to make their products platform-agnostic. Thus, each version of an application deployed on a given platform generally did not seek to make use of any platform-specific functionality available on that device.

171. In contrast, location applications and processes are inherently tied to the platform, so much so that location information is often supplied by the operating system itself.

172. Due to this difference in focus, companies that developed communication applications generally did not also develop location applications and processes. This precluded companies which developed communication applications from incorporating location initiation directly within the application. Rather, in an effort to maintain platform agnosticism, communication applications required users to initiate location tracking functionality outside of the application.

173. As noted above, the '212 Patent is drawn to address a specific, technical problem arising in the context of communication applications and location functionality. Consistent with the problem addressed being rooted in messaging applications, the '212 Patent's solutions naturally are also rooted in that same technology that cannot be performed with pen and paper or in the human mind. The '212 Patent discloses the use of, *inter alia*, mobile devices, communication applications, user input and user input devices, memory, processors, radio-frequency transceivers, and positioning subsystems. Moreover, the initiation of a tracking mode and the transmission of tracking data to other mobile devices is not something that could be performed with pen and paper or in the human mind.

174. This technical context is reflected in the '212 Patent's claims. For example, each of the claims requires, *inter alia*, a method or system which initiates a tracking mode, collects tracking data from mobile devices, and transmits that tracking data to other mobile devices.

175. A person having ordinary skill in the art at the time of the inventions of the '212 Patent would not have understood that the inventions could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '212 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors' detailed description of the inventions and the language of the claims and be a practical impossibility.

'212 Patent Allegations

176. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '212 Patent in violation of 35 U.S.C. § 271 *et seq.*, directly and/or indirectly, by making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, at least the various versions of the Avaya one-X® Mobile Preferred for IP Office (hereinafter “the '212 Accused Products”) that infringe at least claims 8 and 18 of the '212 Patent.

177. On information and belief after reasonable investigation, each of the '212 Accused Products comprises or is designed to be used with: a method of sharing tracking data on a mobile device with a plurality of other mobile devices.

Overview

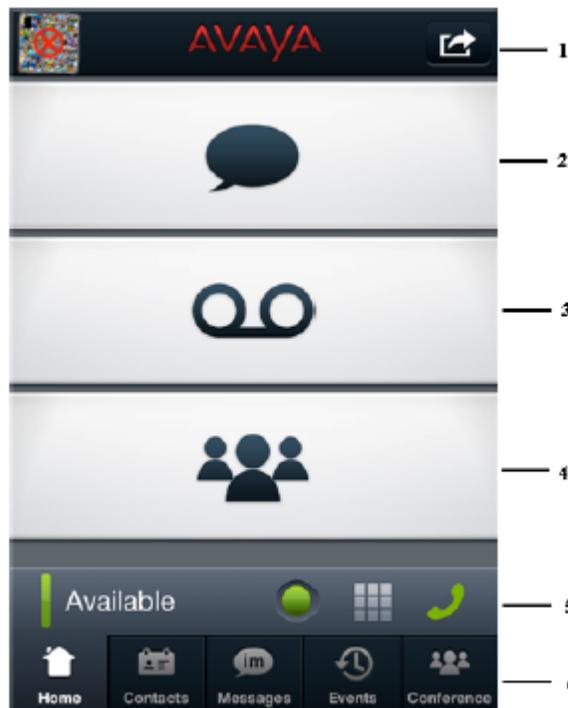
Avaya one-X® Mobile is an application that mobile phone users can use to connect to the IP Office communications server. Only IP Office release 8.0+ supports one-X Mobile Preferred.

Designed for a mobile workforce, the Avaya one-X® Mobile application provides rich unified communications (UC) capabilities that help users conduct business while on the move. Avaya one-X® Mobile release 9.0 features include:

- Geo-location presence and tracking using the on-board GPS of the mobile phone.

31

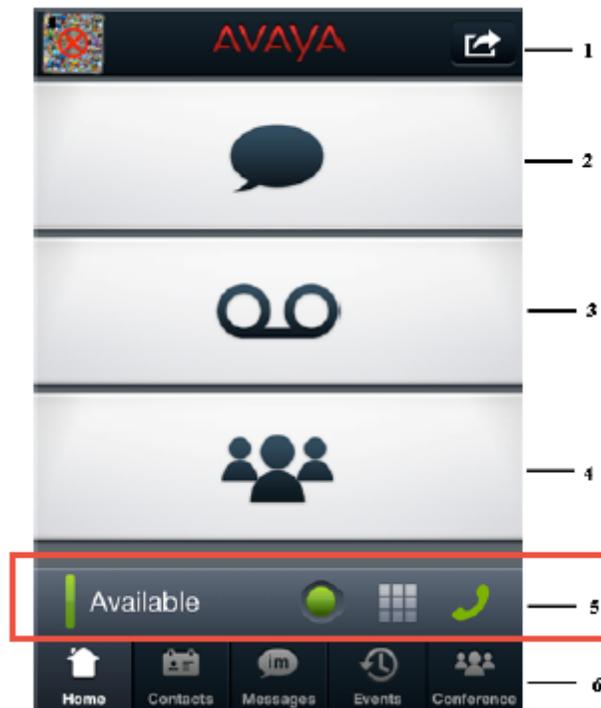
³¹ Using Avaya one-X® Mobile Preferred for IP Office on Apple, p. 7 (attached hereto as Ex. O).



32

The '212 Accused Products activate a communication application, and receive user input within the communication application to cause the mobile device to initiate a tracking mode that includes collecting tracking data for sharing with the plurality of other mobile (as well as non-mobile) devices that have been identified using the communication application as recipients of the tracking data. For example, the Avaya one-X® Mobile Preferred for IP Office contains a Status Bar that “contains information about your availability, and provides controls for setting your location and enabling or disabling GPS location information.”:

³² *Id.* at p. 9.

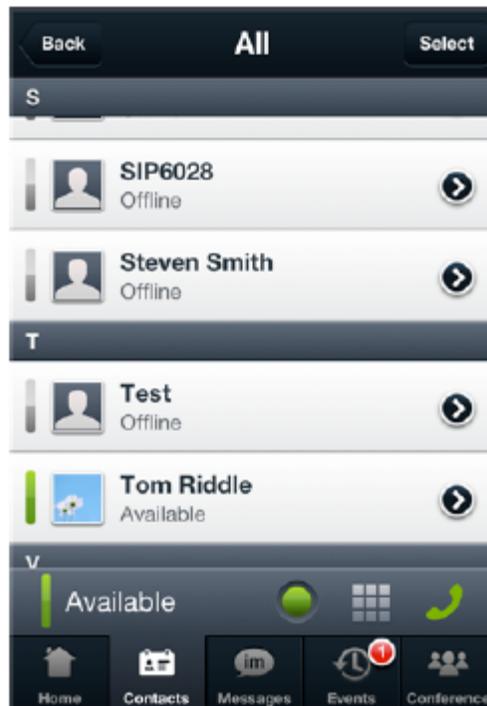


| No. | Description |
|-----|--|
| 1 | Connection button. Press to reveal Settings and Reconnect options. |
| 2 | Instant message status. |
| 3 | Events. |
| 4 | Conference status. |
| 5 | Status bar. |
| 6 | Navigation bar. |

The Status bar:

The Status bar is available on all the screens in the Avaya one-X® Mobile interface. The Status bar contains information about your availability, and provides controls for opening a dialpad, setting your location, and enabling or disabling GPS location information. The Status bar also indicates the status of your connection to the IP Office server.

³³ *Id.* at p. 9.



On the contact list, the color-coded bar to the left of a contact's name indicates the presence status of that contact. If the contact enters status text, the status message is shown below the contact's name. A black placemaker next to a contact's name indicates that the contact is publishing GPS information. The placemaker appears grey if geo-presence information is unavailable.

34

³⁴ *Id.* at p. 13-14.

Managing geo-presence information

Avaya one-X[®] Mobile uses the on-board GPS in a mobile phone to provide information about the geographical location of a user, known as geo-presence. Use the geo-presence feature to view the geo-presence of your contacts if the contacts agree to share this information. Similarly, if you decide to share your geo-presence, Avaya one-X[®] Mobile can publish your geographic location to other users.

If you publish your geographic location to other Avaya one-X[®] Mobile users, the application provides real time information. However, if real time information is unavailable, Avaya one-X[®] Mobile uses information stored on the server to provide your last published location. For example, you are in a location where a satellite signal is unavailable.

To use this feature, you must enable GPS on your mobile phone, and enable geo-presence in Avaya one-X[®] Mobile. For information on enabling geo-presence, and setting the level of information to publish, see [Configuring GPS information](#) on page 29.

When you view the geo-presence of other contacts, you can view the location of your contacts on a map and see specific location information. You can also place a call to that contact, send an instant message, or add the contact to a conference directly from the map view.

When you publish your own geo-presence, you can see whether a contact has requested for your geo-presence information.

35

Viewing requests for your geo-presence

Use the following procedure to see whether a contact has requested your geo-presence information.

Procedure

1. On the Contacts screen, to open a communication screen for a contact, tap the name of that contact.
2. Tap **Details**.
A dialog box indicates whether the contact has requested your geo-presence information.

Next steps

For information about setting the level of information to publish, see [Configuring GPS information](#) on page 29.

36

The '212 Accused Products also transmit the tracking data to the plurality of other mobile devices.

³⁵ *Id.* at p. 69.

³⁶ *Id.* at p. 70.

Managing geo-presence information

Avaya one-X[®] Mobile uses the on-board GPS in a mobile phone to provide information about the geographical location of a user, known as geo-presence. Use the geo-presence feature to view the geo-presence of your contacts if the contacts agree to share this information. Similarly, if you decide to share your geo-presence, Avaya one-X[®] Mobile can publish your geographic location to other users.

If you publish your geographic location to other Avaya one-X[®] Mobile users, the application provides real time information. However, if real time information is unavailable, Avaya one-X[®] Mobile uses information stored on the server to provide your last published location. For example, you are in a location where a satellite signal is unavailable.

To use this feature, you must enable GPS on your mobile phone, and enable geo-presence in Avaya one-X[®] Mobile. For information on enabling geo-presence, and setting the level of information to publish, see [Configuring GPS information](#) on page 29.

When you view the geo-presence of other contacts, you can view the location of your contacts on a map and see specific location information. You can also place a call to that contact, send an instant message, or add the contact to a conference directly from the map view.

When you publish your own geo-presence, you can see whether a contact has requested for your geo-presence information.

37

Viewing requests for your geo-presence

Use the following procedure to see whether a contact has requested your geo-presence information.

Procedure

1. On the Contacts screen, to open a communication screen for a contact, tap the name of that contact.
2. Tap **Details**.
A dialog box indicates whether the contact has requested your geo-presence information.

Next steps

For information about setting the level of information to publish, see [Configuring GPS information](#) on page 29.

38

178. Defendant has been, and currently is, an active inducer of infringement of the '212 Patent under 35 U.S.C. § 271(b) and contributory infringers of the '212 Patent under 35 U.S.C. § 271(c).

³⁷ *Id.* at p. 69.

³⁸ *Id.* at p. 70.

179. Defendant knew of the '212 Patent, or should have known of the '212 Patent but was willfully blind to its existence. Upon information and belief, Defendant has had actual knowledge of the '212 Patent since at least as early as the filing and/or service of this Complaint. Additionally, Defendant was made aware of its infringement through a notice letter sent from BlackBerry on December 17, 2015. Defendant has provided the '212 Accused Products to its customers and/or instructions to use the '212 Accused Products in an infringing manner while being on notice of or willfully blind to the '212 Patent and Defendant's infringement. Therefore, on information and belief, Defendant knew or should have known of the '212 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts.

180. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '212 Patent.

181. Defendant also provides the '212 Accused Products and instructions to end-user customers so that such customers will use the '212 Accused Products in an infringing manner. For example, Avaya's marketing materials promote the use of the "Status Bar" and its controls for "enabling or disabling GPS location information", as depicted above.

182. Defendant's end-user customers directly infringe at least claims 8 and 18 of the '212 Patent by using the '212 Accused Products in their intended manner to infringe. Defendant induces such infringement by providing the '212 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '212 Patent. Upon information and belief, Defendant specifically intends that its actions will result in infringement of at least claims 8 and 18 of the '212 Patent, or subjectively believes that its actions will result in infringement of the '212 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

183. Defendant contributorily infringes at least claims 8 and 18 of the '212 Patent by providing the '212 Accused Products and/or software or hardware components thereof, that embody a material part of the claimed inventions of the '212 Patent, that are known by Defendant to be specially made or adapted for use in an infringing manner, and are not staple articles with substantial non-infringing uses. The '212 Accused Products are specially designed to infringe at least claims 8 and 18 of the '212 Patent, and their accused components have no substantial non-infringing uses.

184. BlackBerry provided notice to Defendant of the '212 Patent and its infringement in a letter dated December 17, 2015, which identified the '212 Patent in particular and the '212 Accused Products' infringement thereof. Despite said notice, Defendant has willfully and deliberately continued infringing the claims of the '212 Patent to the present day.

185. Additional allegations regarding Defendant's knowledge of the '212 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

186. Defendant's infringement of the '212 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

187. Defendant's infringement of the '212 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285. BlackBerry has been damaged by Defendant's infringement of the '212 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

188. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant’s infringement of the ’212 Patent, including without limitation lost profits and not less than a reasonable royalty.

FIFTH CLAIM FOR RELIEF

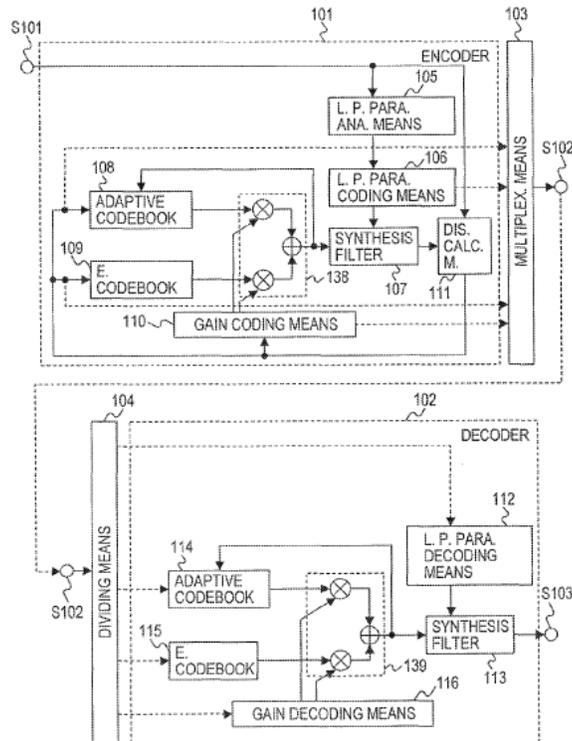
(INFRINGEMENT OF UNITED STATES PATENT NO. 8,688,439)

189. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-188 of this Complaint.

The ’439 Patent

190. At the time of the invention, code-excited linear prediction (CELP) coding was a well-known and efficient speech coding method. ’439 Patent at 1:36-38. “FIG. 6 illustrates an example of a whole configuration of a CELP speech coding and decoding method.” *Id.* at 1:42-43:

**Fig. 6
Prior Art**



191. “In the decoder 102, the linear prediction parameter decoding means 112 decodes the linear prediction parameter code to the linear prediction parameter, and sets the linear prediction parameter as a coefficient for the synthesis filter 113. The adaptive codebook 114 outputs a time series vector corresponding to an adaptive code, which is generated by repeating an old excitation signal periodically. The excitation codebook 115 outputs a time series vector corresponding to an excitation code. The time series vectors are weighted by using respective gains, which are decoded from the gain codes by the gain decoding means 116, and added by the weighting-adding means 139. An addition result is provided to the synthesis filter 113 as an excitation signal, and an output speech S103 is produced.” ’439 Patent at 2:29-42.

192. However, this prior art CELP coding solution had a known problem: “non-noise time series vectors with many pulses should be stored in the excitation codebook to produce a high quality coded speech even at low bit rates. Therefore, when a noise speech, e.g., background noise, fricative consonant, etc., is coded and synthesized, there is a problem that a coded speech produces an unnatural sound, e.g., ‘Jiri-Jiri’ and ‘Chiri-Chiri.’ This problem can be solved, if the excitation codebook includes only noise time series vectors. However, in that case, a quality of the coded speech degrades as a whole.” ’439 Patent at 3:22-33.

193. Figure 7 illustrates another prior art solution that attempts to address this problem using two excitation codebooks, along with a switching means for selecting one of them. “In FIG. 7, the encoder 101 includes a speech state deciding means 117, excitation codebook switching means 118, first excitation codebook 119, and second excitation codebook 120. The decoder 102 includes an excitation codebook switching means 121, first excitation codebook 122, and second excitation codebook 123.” ’439 Patent at 2:53-58.

194. As the ’439 Patent explains, “In the decoder 102, the excitation codebook switching means 121 switches the first excitation codebook 122 and the second excitation

codebook 123 based on a code showing which excitation codebook was used in the encoder 101, so that the excitation codebook, which was used in the encoder 101, is used in the decoder 102. According to this configuration, excitation codebooks suitable for coding in various speech states are provided, and the excitation codebooks are switched based on a state of an input speech. Hence, a high quality speech can be reproduced.” ’439 Patent at 3:4-13.

195. However, the prior art solution in Figure 7 created another problem: “since the excitation codebook used in coding is also used in decoding, it becomes necessary to code and transmit data which excitation codebook was used. It becomes an obstacle for lowering bit rates.” ’439 Patent at 3:44-47. Moreover, “[a]ccording to the speech coding and decoding method of switching the plurality of excitation codebooks without increasing a transmission bit number [of the] the related art, the excitation codebooks are switched based on a pitch period selected in the adaptive codebook. However, the pitch period selected in the adaptive codebook differs from an actual pitch period of a speech, and it is impossible to decide if a state of an input speech is noise or non-noise only from a value of the pitch period. Therefore, ***the problem that the coded speech in the noise period of the speech is unnatural cannot be solved.***” *Id.* at 53-58 (emphasis added).

196. However, the inventors of the ’439 patent recognized, that by using a decoding method in which “noise levels of time series vectors stored in excitation codebooks are changed based on an evaluation result of the noise level of the speech,” this would allow the decoder to adjust to noise and non-noise speech without requiring the transmission of additional data as required in the prior art. *See* ’439 Patent at 4:11-14. Thus, this technique reduced memory bandwidth costs in comparison with the two excitation codebook solution, while preserving quality of the coded speech that the prior art methods failed to address.

197. In one embodiment of the invention, “[t]he excitation codebook 28 stores a plurality of time series vectors generated from random noises, for example, and outputs a time series vector corresponding to an excitation code inputted by the distance calculator 11. If the noise level is low in the evaluation result of the noise, the sampler 29 outputs a time series vector, in which an amplitude of a sample with an amplitude below a determined value in the time series vectors, inputted from the excitation code book 28, is set to zero, for example. If the noise level is high, the sampler 29 outputs the time series vector inputted from the excitation codebook 28 without modification.” ’439 Patent at 8:50-60.

198. In view of the historical context and development of speech decoders, discussed below, a person of ordinary skill in the art would have understood that the ’439 Patent’s inventions provide unconventional solutions to solve the problems they address.

Historical Context of the ’439 Patent

199. Modifying the number of non-zero samples from an excitation codebook based on the evaluation of a noise level of speech was not common or conventional at the time of invention of the ’439 Patent.

200. At the time of the invention of the ’439 Patent, speech decoders would use a combination of an adaptive codebook and an excitation codebook to decode incoming signals, as illustrated in the context of Fig. 6. While this was a common and accepted way of decoding speech signals, it suffered from generating unnatural sounds like “Jiri-Jiri” or “Chiri-Chiri” when noise speech was decoded. ’439 Patent at 3:27-30. This was a consequence of handling non-noise speech by storing “non-noise time series vectors with many pulses” in the excitation codebook. *Id.* at 3:24-27.

201. The alternative approach discussed in the art the time of the ’439 patent invention, as illustrated in Fig. 7, allowed the decoder to store non-noise vectors separately from

noise vectors, which prevented the former from synthesizing unnatural sounds when decoding the noise signals. '439 Patent at 3:37-43. However, this purported solution created another problem: the signal needed to encode and transmit data corresponding to the excitation codebook selected, which in turn increased bit rates. *Id.* at 3:44-47.

202. However, the inventors of the '439 Patent realized that, by changing “noise levels of time series vectors stored in excitation codebooks ... based on an evaluation result of the noise level of the speech,” this would allow speech decoding to avoid unnatural sounds without increasing the bit rate of the signal.

203. As noted above, the '439 Patent is drawn to address a specific, technical problem arising in the context of speech decoding. Consistent with the problem addressed being rooted in speech decoding, the '439 Patent's solutions naturally are also rooted in that same technology that cannot be performed with pen and paper or in the human mind. The '439 Patent discloses the use of, *inter alia*, decoders, excitation codebooks, and speech synthesizers. Moreover, the decoding of a speech signal or the synthesizing of a speech signal using a modified time series vector is not something that could be performed with pen and paper or in the human mind.

204. Given the state of the art at the time of the invention of the '439 Patent, the inventive concepts of the '439 Patent cannot be considered to be conventional. The '439 Patent discloses, among other things, an unconventional solution to an issue arising in the audio data compression space, and offered a technological solution to that issue.

205. The '439 Patent claims cannot be performed in the human mind or by using pen and paper. As noted above, the '439 Patent expressly states that it is drawn to address specific, technical problems arising in the context of audio data compression, i.e., “when a noise speech, e.g., background noise, fricative consonant, etc., is coded and synthesized, there is a problem that

a coded speech produces an unnatural sound”, and the use of multiple excitation codebooks “becom[ing] an obstacle for lowering bit rates.” *Id.* at 3:22-57.

206. As described above, the ’439 Patent discloses embodiments using specific technologies for encoding and decoding audio data streams, and audio encoders and decoders including a processor and memory *See, e.g., id.* at Figs. 1-4 and accompanying text. Thus, the ’439 Patent discusses methods of implementing improved audio compression techniques using audio encoders and decoders.

207. Consistent with the problem addressed being rooted in speech decoder technology, the ’439 Patent’s solutions naturally were also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

208. This technical context is reflected in the ’439 Patent’s claims. For example, each of the claims requires modifying a time series vector obtained from an excitation codebook that includes a number of samples with zero amplitude-value, and synthesizing a speech signal based on the modified time series vector, thereby addressing technical limitations of audio encoders decoders such as speech quality and bandwidth constraints.

209. A person having ordinary skill in the art at the time of the invention of the ’439 Patent would not have understood that the invention could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the ’439 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors’ detailed description of the invention and the language of the claims and be a practical impossibility.

’439 Patent Allegations

210. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the ’439 Patent in violation of 35 U.S.C. § 271 et seq., directly and/or indirectly, by

making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, Accused Avaya Products implementing the G722.2 standard and/or Adaptive Multi-Rate Wideband (AMR-WB), including without limitation at least the 1100 Series IP Deskphones, 1200 Series IP Deskphones, 1400 Series Digital Deskphones, 1600 Series IP Deskphones, 3700 Series DECT Handsets, 3900 Series Digital Deskphones, 7000 Series Digital Deskphones, 9400 Series Digital Deskphones, 9500 Series Digital Deskphones, 9600 Series Digital Deskphones, B100 Series Conference Phones, E100 Series SIP Phones (including the E159 and E169 Media Stations), H100 Series Video Collaboration Stations, IP Wireless phones, and TSG-Certified Secure IP Phones, and Avaya Aura Communication Manager (hereinafter “the ’439 Accused Products”) that infringe at least claims 1 and 11 of the ’439 Patent.

211. On information and belief, by complying with the “anti-sparseness processing” portions of the G722.2, 3GPP TS 26.190 (v.5.1.0 or later), and/or Adaptive Multi-Rate Wideband (AMR-WB) standards (which adjust the number of zero-amplitude samples), each of the ’439 Accused Products comprises or is designed to be used with a speech decoding method for an apparatus having a decoder:

Support for Internet codec G722.2

To support high-quality audio over low-bandwidth links and also to support 96x1-series SIP Release 6.2 codec, Communication Manager provides signaling support for the G.722.2 wideband codec. The G.722.2 codec uses a 16 KHz sampling frequency and an adaptive and variable bit rate, ranging from 6.6 Kbps to 23.85 Kbps. The G.722.2 codec does not support media resources, such as Medpro and branch gateways. Communication Manager uses the G.722.2 codec to enable SIP and H.323 endpoints for direct IP calls.

39

³⁹ See, e.g., What's New in Avaya Aura® Communication Manager, Communication Manager Messaging, and Session Manager Release 6.2, (attached hereto as Ex. P) at p. 17.

6 Functional description of the decoder

The function of the decoder consists of decoding the transmitted parameters (LP parameters, adaptive codebook vector, adaptive codebook gain, fixed codebook vector, fixed codebook gain and high-band gain) and performing synthesis to obtain the reconstructed speech. The reconstructed speech is then postprocessed and upsampled (and upscaled). Finally high-band signal is generated to the frequency band from 6 to 7 kHz. The signal flow at the decoder is shown in Figure 3.

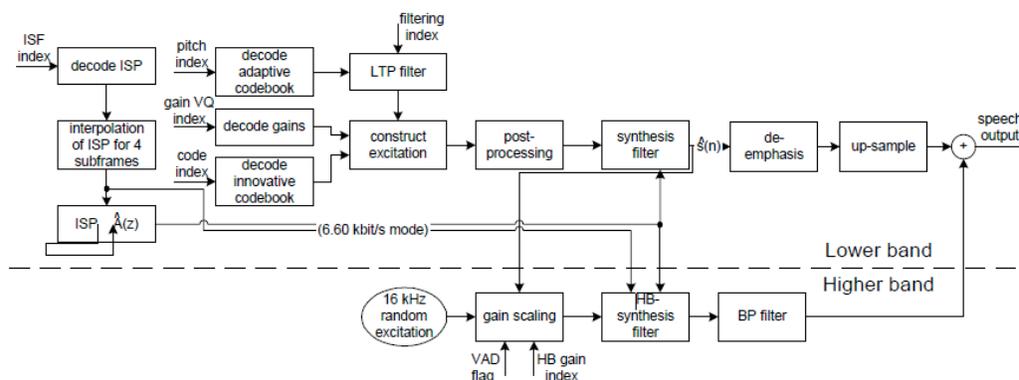


Figure 3 Detailed block diagram of the ACELP decoder

40

The 439 Accused Products further receive, by the decoder, a coded speech signal including a gain code

4.4 Principles of the adaptive multi-rate speech decoder

The signal flow at the decoder is shown in Figure 3. At the decoder, the transmitted indices are extracted from the received bitstream. The indices are decoded to obtain the coder parameters at each transmission frame. These parameters are the ISP vector, the 4 fractional pitch lags, the 4 LTP filtering parameters, the 4 innovative codevectors, and the 4 sets of vector quantized pitch and innovative gains. In 23.85 kbit/s mode, also high-band gain index is decoded. The ISP vector is converted to the LP filter coefficients and interpolated to obtain LP filters at each subframe. Then, at each 64-sample subframe:

- The excitation is constructed by adding the adaptive and innovative codevectors scaled by their respective gains.
- The 12.8 kHz speech is reconstructed by filtering the excitation through the LP synthesis filter.
- The reconstructed speech is de-emphasized.

Finally, the reconstructed speech is upsampled to 16 kHz and high-band speech signal is added to the frequency band from 6 kHz to 7 kHz.

41

⁴⁰ 3GPP TS 26.19 Speech Codec speech processing functions; AMR Wideband speech codec; Transcoding functions, v.5.1.0, (attached hereto as Ex. Q) at Section 6; Section 8.4 Figure 3.

⁴¹ *Id.* at Section 4.4.

5.9 Quantization of the adaptive and fixed codebook gains

The adaptive codebook gain (pitch gain) and the fixed (algebraic) codebook gain are vector quantized using a 6-bit codebook for modes 8.85 and 6.60 kbit/s and using a 7-bit codebook for all the other modes.

42

decode, by the decoder, a gain from the gain code;

6.1 Decoding and speech synthesis

The decoding process is performed in the following order:

Decoding of LP filter parameters: The received indices of ISP quantization are used to reconstruct the quantized ISP vector. The interpolation described in Section 5.2.6 is performed to obtain 4 interpolated ISP vectors (corresponding to 4 subframes). For each subframe, the interpolated ISP vector is converted to LP filter coefficient domain a_k , which is used for synthesizing the reconstructed speech in the subframe.

The following steps are repeated for each subframe:

3. **Decoding of the adaptive and innovative codebook gains:** The received index gives the fixed codebook gain correction factor \hat{g}_c . The estimated fixed codebook gain g'_c is found as described in Section 5.8. First, the predicted energy for every subframe n is found by

$$\tilde{E}(n) = \sum_{i=1}^4 b_i \hat{R}(n-i) \quad (59)$$

and then the mean innovation energy is found by

$$E_i = 10 \log \left(\frac{1}{N} \sum_{i=0}^{N-1} c^2(i) \right) \quad (60)$$

The predicted gain g'_c is found by

$$g'_c = 10^{0.05(\tilde{E}(n) + \bar{E} - E_i)} \quad (61)$$

The quantized fixed codebook gain is given by

$$g_c \approx \hat{g}_c g'_c \quad (62)$$

43

obtain a time series vector with a number of samples with zero amplitude-value from an excitation codebook and modify the time series vector based on the decoded gain such that the number of samples with zero amplitude-value is changed;

⁴² *Id.* at Section 5.9.

⁴³ *Id.* at Section 6.1; *see also id.* at Section 5.9.

6.1 Decoding and speech synthesis

The decoding process is performed in the following order:

Decoding of LP filter parameters: The received indices of ISP quantization are used to reconstruct the quantized ISP vector. The interpolation described in Section 5.2.6 is performed to obtain 4 interpolated ISP vectors (corresponding to 4 subframes). For each subframe, the interpolated ISP vector is converted to LP filter coefficient domain a_k , which is used for synthesizing the reconstructed speech in the subframe.

The following steps are repeated for each subframe:

2. **Decoding of the innovative vector:** The received algebraic codebook index is used to extract the positions and amplitudes (signs) of the excitation pulses and to find the algebraic codevector $c(n)$. If the integer part of the pitch lag is less than the subframe size 64, the pitch sharpening procedure is applied which translates into modifying $c(n)$ by filtering it through the adaptive prefilter $F(z)$ which consists of two parts: a periodicity enhancement part $1/(1-0.85z^{-T})$ and a tilt part $(1 - \beta_1 z^{-1})$, where T is the integer part of the pitch lag and $\beta_1(n)$ is related to the voicing of the previous subframe and is bounded by $[0.0, 0.5]$.
5. **Anti-sparseness processing (6.60 and 8.85 kbit/s modes):** An adaptive anti-sparseness post-processing procedure is applied to the fixed codebook vector $c(n)$ in order to reduce perceptual artifacts arising from the sparseness of the algebraic fixed codebook vectors with only a few non-zero samples per subframe. The anti-sparseness processing consists of circular convolution of the fixed codebook vector with an impulse response. Three pre-stored impulse responses are used and a number $impNr=0,1,2$ is set to select one of them. A value of 2 corresponds to no modification, a value of 1 corresponds to medium modification, while a value of 0 corresponds to strong modification. The selection of the impulse response is performed adaptively from the adaptive and fixed codebook gains. The following procedure is employed:

```

if  $\hat{g}_p < 0.6$  then
     $impNr = 0$ ;
else if  $\hat{g}_p < 0.9$  then
     $impNr = 1$ ;
else
     $impNr = 2$ ;

```

44

and synthesize a speech signal based on the modified time series vector:

6.1 Decoding and speech synthesis

The decoding process is performed in the following order:

Decoding of LP filter parameters: The received indices of ISP quantization are used to reconstruct the quantized ISP vector. The interpolation described in Section 5.2.6 is performed to obtain 4 interpolated ISP vectors (corresponding to 4 subframes). For each subframe, the interpolated ISP vector is converted to LP filter coefficient domain a_k , which is used for synthesizing the reconstructed speech in the subframe.

The following steps are repeated for each subframe:

4. **Computing the reconstructed speech:** The following steps are for $n = 0, \dots, 63$. The total excitation is constructed by:

$$u(n) = \hat{g}_p v(n) + \hat{g}_c c(n), \quad (63)$$

Before the speech synthesis, a post-processing of excitation elements is performed

8. **Post-processing of excitation elements (6.60 and 8.85 kbit/s modes):** A post-processing of excitation elements procedure is applied to the total excitation $u(n)$ by emphasizing the contribution of the adaptive codebook vector:

$$\hat{u}(n) = \begin{cases} u(n) + 0.25\beta\hat{g}_p v(n), & \hat{g}_p > 0.5 \\ u(n), & \hat{g}_p \leq 0.5 \end{cases} \quad (70)$$

The reconstructed speech for the subframe of size 64 is given by

$$\hat{s}(n) = \hat{u}(n) - \sum_{i=1}^{16} \hat{a}_i \hat{s}(n-i), \quad n = 0, \dots, 63. \quad (73)$$

where \hat{a}_i are the interpolated LP filter coefficients.

45

212. Defendant has been, and currently is, an active inducer of infringement of the '439 Patent under 35 U.S.C. § 271(b) and contributory infringers of the '439 Patent under 35 U.S.C. § 271(c).

213. Defendant knew of the '439 Patent, or should have known of the '439 Patent but was willfully blind to its existence. Upon information and belief, Defendant has had actual knowledge of the '439 Patent since at least as early as the filing and/or service of this Complaint. Defendant has provided the '439 Accused Products to its customers and/or instructions to use the '439 Accused Products in an infringing manner while being on notice of or willfully blind to the '439 Patent and Defendant's infringement. Therefore, on information and belief, Defendant

⁴⁵ *Id.*

knew or should have known of the '439 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts. Defendant furthermore has willfully and deliberately continued infringing the claims of the '439 Patent, despite this knowledge, to the present day.

214. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '439 Patent.

215. Defendant's end-user customers directly infringe at least claims 1 and 11 of the '439 Patent by using the '439 Accused Products in their intended manner to infringe. Defendant induces such infringement by providing the '439 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '439 Patent. Upon information and belief, Defendant specifically intends that its actions will result in infringement of at least claims 1 and 11 of the '439 Patent, or subjectively believes that its actions will result in infringement of the '439 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

216. Defendant contributorily infringes at least claims 1 and 11 of the '439 Patent by providing the '439 Accused Products and/or software or hardware components thereof, that embody a material part of the claimed inventions of the '439 Patent, that are known by Defendant to be specially made or adapted for use in an infringing manner, and are not staple articles with substantial non-infringing uses. The '439 Accused Products are specially designed to infringe at least claims 1 and 11 of the '439 Patent, and their accused components have no substantial non-infringing uses.

217. Additional allegations regarding Defendant's knowledge of the '439 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

218. Defendant's infringement of the '439 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

219. Defendant's infringement of the '439 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285. BlackBerry has been damaged by Defendant's infringement of the '439 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

220. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '439 Patent, including without limitation lost profits and not less than a reasonable royalty.

SIXTH CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 7,440,561)

221. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-220 of this Complaint.

The '561 Patent

222. The '561 Patent discloses, among other things, methods and systems for "selectively establishing communication with one of plural devices associated with a single telephone number." '561 Patent at Abstract.

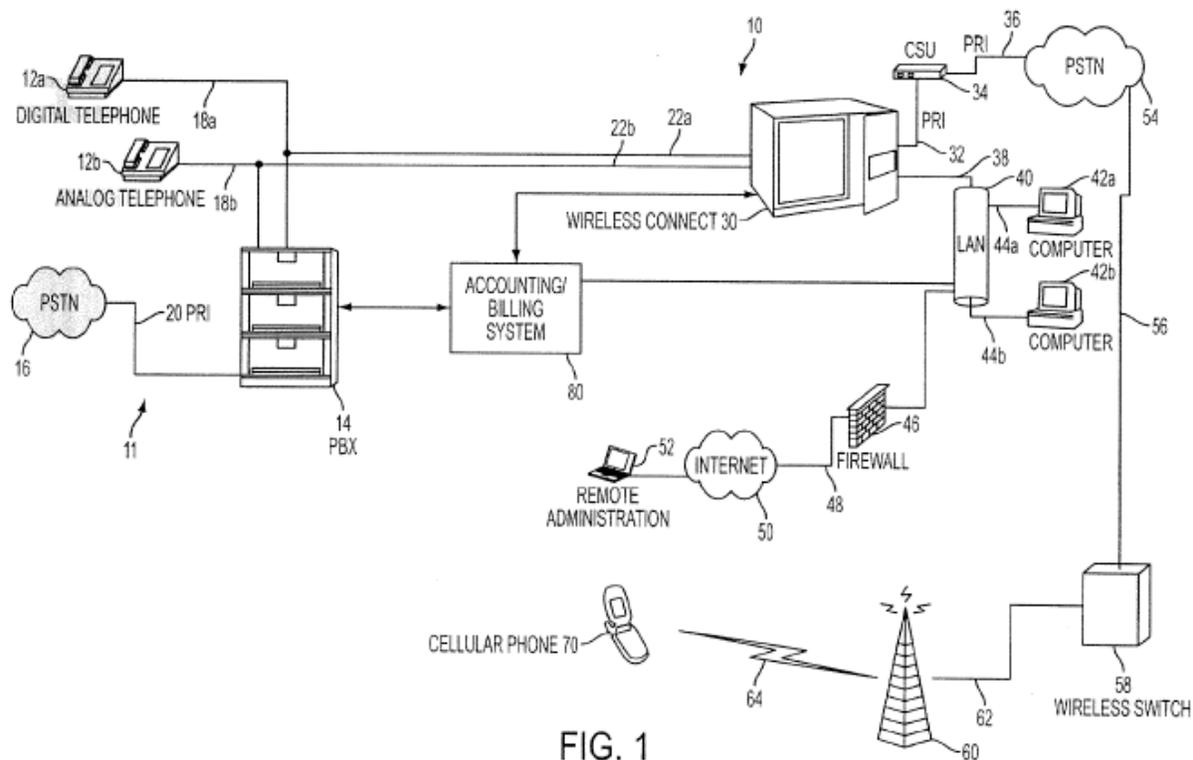
223. The '561 Patent explains that "it has become relatively common for individuals to possess a number of different devices through which they communicate." '561 Patent at 1:20-22. As the '561 patent also explains, "as the population becomes increasing mobile, making contact with a person through one of these communication devices as become more difficult." *Id.* at 1:23-26.

224. At the time of invention, other attempted solutions to this problem included (i) call forwarding, and (ii) the incorporation of wireless telephones into enterprise private branch exchange (PBX) networks. However, each of these purported solutions had drawbacks.

225. For example, as explained in the '561 patent, call forwarding allows users to enter another number to which a call is forwarded if not answered by a specified number of rings. However, "if several telephones are involved, this approach becomes complicated ... [and] ... it requires the calling party to remain on the line for a significant period of time if the call is to be forwarded multiple times." *Id.* at 1:33-36. And incorporating wireless telephones into PBX networks "require specialized cellular equipment and wireless handsets. ... In addition, these systems cannot use the wireless telephone as a conventional wireless telephone" at some times. *Id.* at 2:49-54.

226. The inventions of the '561 Patent solve these problems by, for example, associating multiple devices with a single telephone number and, when the system receives an incoming call, "rout[ing] the call to a office phone and one or more remote devices simultaneously or as desired by the user." *Id.* at 2:58-3:6.

227. "FIG. 1 illustrates an exemplary telecommunication system 10 constructed in accordance with an embodiment of the invention." *Id.* at 3:65-67. "The system 10 as particularly illustrated herein includes a conventional office PBX network 11. ... The PBX 14 ... is connected to a calling network such as a public switched telephone network (PSTN) 16 ..." *Id.* at 4:19-26. And "the PBX 14 is coupled to a wireless connect unit (WC) 30." *Id.* at 4:39. "The WC 30 is also connected to a PSTN 54 ..." *Id.* at 4:41-42. And "PSTN 54 is connected in this embodiment to a commercial wireless carrier ..." *Id.* at 5:9-10.



228. As further described, “the WC 30 is connected to a wireless carrier through a PSTN 54 and not by unique hardware or an in-office cellular network. As a result, WC 30 only has to interface with conventional components, such as the PBX 14 and PSTN 54. Thus, the system is substantially technology independent. Moreover, special wireless devices are not required, which allows the remote device to function in its conventional manner ... and as part of the PBX network 11 (if so desired).” *Id.* at 5:25-33.

229. In a preferred embodiment, WC 30 may be either “a processor-based stand-alone unit capable of handling communications directed to the PBX network 11” or “composed of one or more processors generically represented by processor module 310 executing one or more computer programs stored in one or more memory units generically represented by memory module 320, which is coupled to a processor module 310 via bus 330, as shown in Fig. 2.” *Id.* at 5:50-55. “Memory module 320 also contains one or more databases and other processing

memory used during the overall operation of system 10 ... Receiving and transmitting modules 340, 350, respectively ... are employed to receive and transmit information to the PBX and PSTN during call processing, as well as receiving and transmitting other information such as administrative information.” *Id.* at 5:55-53.

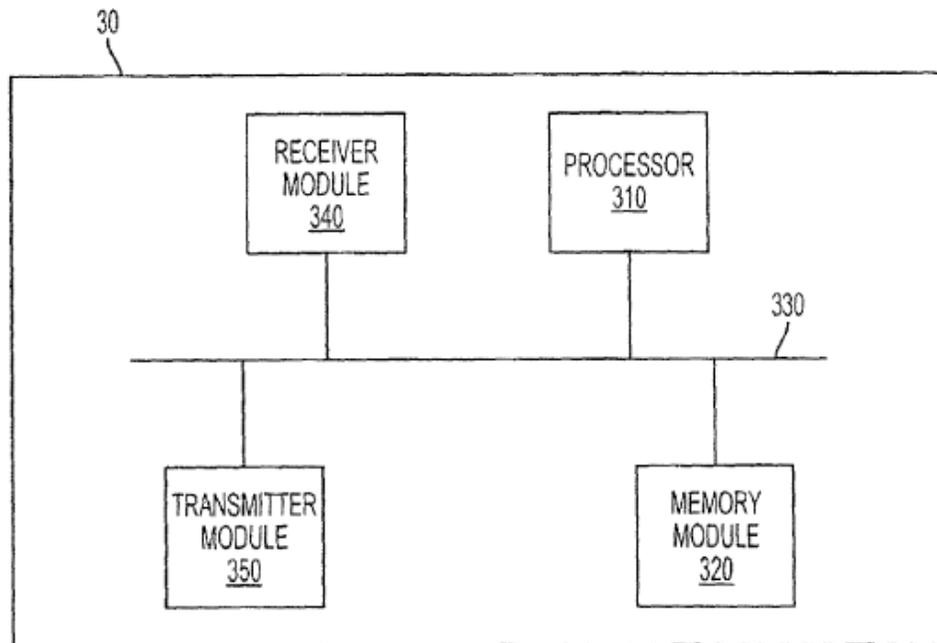


FIG. 2

230. The '561 Patent makes clear that “the modules (310, 320, 330, 340, 350) making up WC 30 may be implemented using any known hardware or software devices.” *Id.* at 5:64-66.

231. In view of the historical context and development of call forwarding, discussed below, a person of ordinary skill in the art would have understood that the '561 Patent's inventions provide unconventional solutions to solve the problems they address.

Historical Context of the '561 Patent

232. Associating one or more remote communication devices with a single number that is also associated with a PBX extension was not common or conventional at the time of invention of the '561 Patent.

233. More particularly, at the time of the '561 Patent inventions, there were two solutions generally used to address the problem of individual business users having multiple devices, including a desk phone and one or more mobile devices.

234. First, and most common, was call forwarding: “certain telephone systems allow users to enter another number to which a call is forwarded if not answered by a specified number of rings.” At least in theory, call forwarding “should allow an individual with multiple telephone devices to forward the call to such devices until the telephone at which the individual is located finally rings.” *Id.* at 1:27-33.

235. However, in practice, and as recognized by the '561 Patent inventors, call forwarding systems such as these become impracticable with larger numbers of devices, and result in long wait times for the caller. *See id.* at 1:33-40.

236. As an alternative, certain systems attempted to incorporate wireless telephones into PBX networks directly; however, these systems likewise come with substantial drawbacks. For example, systems developed by Ericsson and Nortel Networks created wireless networks within office buildings, and allow routing of calls to wireless phones. But these systems require “specialized cellular equipment and wireless handsets” and the “systems cannot use the wireless telephone as a conventional wireless telephone (i.e. not part of the enterprise’s PBX network) within the building.” *Id.* at 2:47-54.

237. The '561 Patent provided innovative solutions to these problems by allowing incorporation of wireless devices into PBX networks without the use of specialized wireless handsets or cumbersome call forwarding chains. Instead, one or more remote communication devices are associated with a single number that is also associated with a PBX extension. “When the system receives an incoming call, it can route the call to an office telephone and one or more of the remote devices simultaneously or as desired by the user.” *Id.* at 3:4-6.

238. Given the state of the art at the time of the invention of the '561 Patent, the inventive concepts of the '561 Patent cannot be considered to be conventional. The '561 Patent discloses, among other things, an unconventional solution to an issue arising in the context of interconnection of multiple phone devices (including, e.g., a PBX telephone on a mobile device), and offered a technological solution to that issue.

239. The 561 Patent claims cannot be performed in the human mind or by using pen and paper. As noted above, the '561 Patent expressly states that it is drawn to address a specific, technical problem arising in the context of interconnection of multiple phone devices in the context of corporate PBX networks: "As the population becomes increasingly mobile, making contact with a person through one of these communication devices has become more difficult."

Id. at 1:23-26. Further:

because the corporate workforce is becoming increasingly mobile, more business people are using wireless telephones to conduct their business when they are out of the office. This has resulted in corporations spending a larger portion of their telecommunications budget on wireless communications, with far less favorable negotiated rates than the rates of their corporate network. In addition, wireless communication systems often lack the enhanced conveniences (e.g., interoffice voice mail, direct extension dialing, etc.) that corporate users have come to expect in the office environment. ...

[S]ystems [such as proposed by Ericsson and Nortel] allow inbound calls to be routed to an office telephone and a wireless telephone, but they are not without their shortcomings. For example, each system requires specialized cellular equipment and wireless handsets. Moreover, the systems only use the wireless telephones for inbound telephone calls. In addition, these systems cannot use the wireless telephone as a conventional wireless telephone (i.e., not part of the enterprise's PBX network) within the building.

Id. at 2:10-55.

240. At the time of the '561 Patent inventions, these problems were further exacerbated by the increase in the number of communication devices associated with a single person, especially as telecommuting and other flexible work arrangements have become more common. *See id.* at 1:22-23.

241. The numbers of such people has continued to rise in the years since. As of 2012, “about 13.4 million currently work from home in the United States ... about 4 million more Americans since 1999.” *Work from home soars 41% in 10 years*, available at <http://money.cnn.com/2012/10/04/news/economy/work-from-home/>.

242. Focusing only on employees, rather than self employed workers, this increase has been even more dramatic in recent years. Per statistics available at <http://globalworkplaceanalytics.com/telecommuting-statistics>, total telework growth from 2005 to 2014 was 102.1%:

| Teleworkers by Type of Employer | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | % |
|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------|
| For Profit Employer | 1,468,084 | 1,712,562 | 1,877,271 | 2,159,915 | 2,225,497 | 2,284,006 | 2,387,745 | 2,501,855 | 2,696,963 | 2,860,517 | 2.9% |
| Non Profit Employer | 173,271 | 238,554 | 247,952 | 273,620 | 298,436 | 306,598 | 320,494 | 324,984 | 355,327 | 355,327 | 3.1% |
| Local Government Employer | 73,714 | 81,171 | 88,302 | 103,740 | 113,007 | 114,150 | 123,001 | 119,622 | 122,530 | 131,597 | 1.4% |
| State Government Employer | 74,018 | 102,457 | 115,299 | 131,245 | 138,801 | 151,244 | 158,362 | 164,382 | 160,661 | 170,932 | 2.6% |
| Fed Government Employer | 30,268 | 161,521 | 147,213 | 157,858 | 153,492 | 167,030 | 158,711 | 157,682 | 144,966 | 158,688 | 3.4% |
| Total Employee Teleworkers | 1,819,355 | 2,296,265 | 2,476,037 | 2,826,378 | 2,929,233 | 3,023,028 | 3,148,313 | 3,268,525 | 3,480,447 | 3,677,061 | 2.8% |

| Table 2: Telework Growth Multi-Year | 2005 to 2014 |
|-------------------------------------|---------------|
| For Profit Companies | 94.8% |
| Non Profit Organizations | 105.1% |
| Local Government | 78.5% |
| State Government | 130.9% |
| Fed Government | 424.3% |
| Total Telework Growth | 102.1% |

| Table 3: Total vs Work at Home Population Growth 2012 to 2013 | 2013 | 2014 | % Change Total Workforce | % Change Work at Home |
|---|-------------|-------------|--------------------------|-----------------------|
| For Profit Employer | 94,501,760 | 96,604,512 | 2.2% | 6.1% |
| Non Profit Employer | 11,065,263 | 11,292,048 | 2.0% | 8.3% |
| Local Government | 9,455,871 | 9,569,355 | 1.2% | 7.4% |
| State Government | 6,466,069 | 6,439,315 | -0.4% | 6.4% |
| Federal Government | 4,564,120 | 4,447,097 | -2.6% | 9.5% |
| Total | 126,053,083 | 128,352,327 | 1.8% | 6.5% |

243. As described above, the '561 patent discloses embodiments using specific technologies for establishing connections between multiple telephone devices, using, e.g., PBX networks, PSTNs, computer processor modules, memory units, and network connections. *See, e.g., id.* at Figs. 1-5 and accompanying text.

244. Consistent with the problem addressed being rooted in office and wireless telephony, the '561 Patent's solutions naturally are also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

245. This technical context is reflected in the '561 Patent's claims. For example, each of the claims requires, *inter alia*, a physical connection to a plurality telephone or communication device associated with a first or primary telephone number or extension.

246. A person having ordinary skill in the art at the time of the inventions of the '561 Patent would not have understood that the inventions could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '561 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors' detailed description of the inventions and the language of the claims and be a practical impossibility.

'561 Patent Allegations

247. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '561 Patent in violation of 35 U.S.C. § 271 *et seq.*, directly and/or indirectly, by making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, Accused telecommunications products, including without limitation at least the Avaya EC500 Extension to Cellular, which is provided and used with the Avaya Aura Communication Manager running on all Avaya Communication Server platforms, such as DEFINITY, ProLogix, BCS, GustWorks, DEFINITY One, and ECLIPS (hereinafter "the '561 Accused Products") that infringe at least claims 1, 8, and 12 of the '561 Patent.

248. Avaya markets EC500 Extension to Cellular by touting the same advantages that the '561 patent presents over prior art. For example, Avaya's supporting documentation says "Once enabled, your cell phone becomes an extension of your work phone, allowing you to

answer calls placed to your office number on your cell phone.”⁴⁶ Avaya also assures users that “regardless of whether EC500 is enabled, your cell phone still operated as it always has. You still receive personal calls on your cell phone, because personal calls come in through your standard cellular number and service provider.”⁴⁷

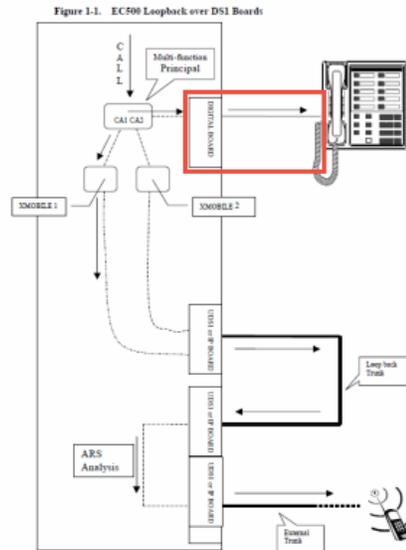
249. On information and belief after reasonable investigation, each of the ’561 Accused Products is an apparatus for providing telephone communication between a first telephone having a first telephone number and a first telephone extension of a first telephone network and a second telephone associated with a second telephone network, the apparatus comprising: connection means comprising a physical connection to the first telephone extension;

Feature Implementation

EC500 builds on an Avaya Communications Server feature called X-Mobility that allows extensions to be remoted over an ISDN trunk. Unlike traditional off-premise extensions, the stations are not tied to fixed channels on the T1/E1 interface. Instead, channels are allocated dynamically with each new call, allowing significantly more efficient usage of the T1/E1 interfaces via traffic engineering. In most respects, these stations, administered with a station type of XMOBILE, behave like regular analog (POTS) telephones. In particular, they can be bridged to office numbers.

⁴⁶ EC500 Extension to Cellular User’s Guide (May 2003) at 12, *available at* <http://downloads.avaya.com/css/P8/documents/100009897>, last visited on July 16, 2016.

⁴⁷ *Id.* at 11.



48

a processing unit having an internet connection for remote administration of the apparatus;

Platforms

Release 2 of EC500 is available in Avaya Communications Server switch software release 9.5 running on all Avaya Communication Server platforms, such as DEFINITY, ProLogix, BCS, GuestWorks®, DEFINITY One™, and ECLIPS. Any capacity differences are due to differences in the numbers of stations, trunks, and circuit packs supported on the different Avaya Communications Server platforms.

49

Overview

Avaya Aura™ Communication Manager is the centerpiece of Avaya applications. Running on a variety of Avaya S8XXX Servers and DEFINITY Servers, and providing control to Avaya Media Gateways and Avaya communications devices, Communication Manager can be designed to operate in either a distributed or networked call processing environment.

Communication Manager carries forward all of a customer's current DEFINITY capabilities, plus offers all the enhancements that enable them to take advantage of new distributed technologies, increased scalability, and redundancy. Communication Manager evolved from DEFINITY software and delivers no-compromise enterprise IP solutions.

Communication Manager is an open, scalable, highly reliable and secure telephony application. The software provides user and system management functionality, intelligent call routing, application integration and extensibility, and enterprise communications networking.

50

⁴⁸ EC500 Extension to Cellular, Release 2, Installation and Administration Guide, (attached hereto as Ex. R) at p. 1-5.

⁴⁹ *Id.* at p. 1-2.

⁵⁰ Administering Avaya Aura™ Communication Manager, (attached hereto as Ex. S) at p. 9.

System Manager overview

System Manager is a central management system that delivers a set of shared management services and provides common console for Avaya Aura® applications and systems.

51

Logging on to System Manager web console

Before you begin

Obtain a user account to log on to System Manager web console. If you do not have a user account, go to the Avaya Support website at <https://support.avaya.com> to create your account.

About this task

System Manager web console is the main interface of Avaya Aura® System Manager. You must log on to System Manager web console to perform any task. The System Manager home page displays the navigation menu that provides access to shared services to perform various operations that System Manager supports. The tasks that you can perform depends on the role that you are assigned with.

Important:

On System Manager web console, do not use the back arrow on the upper-left corner of the browser to navigate to the previous page. If you click the back arrow, the system might not return to the earlier page and might display an error.

Procedure

1. On the web browser, enter the System Manager URL `https://<Fully Qualified Domain Name>/SMGR`.
2. In the **User ID** field, enter the user name.
3. In the **Password** field, enter the password.
4. Click **Log On**.

52

⁵¹ Administering Avaya Aura Communication Manager, Release 6.3 (attached hereto as Ex. T) at 84.

⁵² *Id.* at 85-86.

a memory, wherein a computer program is stored in said memory for execution by said processing unit to detect and attempt to initiate communications with the first communication device via said connection means, to attempt to initiate communications with a second communication device, and.

Configuration/Environment Requirements

Software and Platforms

Release 2 of EC500 is available in Avaya Communications Server switch software release 9.5 running on all Avaya Communication Server models, such as DEFINITY, ProLogix, BCS, GuestWorks, DEFINITY One, and ECLIPS. Any capacity differences are due to differences in the numbers of stations, trunks, and circuit packs supported on the different Avaya Communications Server platforms.

53

X-Mobility Outbound and Inbound Trunk Administration

An EC500 call actually consists of two distinct calls within the Avaya Communications Server. The first call leg terminates on a station which may be a standard office number with an XMOBILE extension bridged to it. This XMOBILE extension is mapped to the cell phone number. (See Appendix A: Avaya EC500 - Other Configurations for information on customer configurations other than Dual Bridge mode — two bridged extensions to a cell phone).

The second call leg is routed over a pair of trunk groups that are administered for EC500 calls. These trunks are connected in a loop back arrangement. Calls are routed out of the Avaya Communications Server via the trunk group which is identified on the XMOBILE station screen as the **Mobility Trunk Group**. As a result of the loop back arrangement, the call is routed back into the Avaya Communications Server via the other trunk in the loop back arrangement. The calls routed back into the Avaya Communications Server are then rerouted via ARS Analysis to the cell phone.

⁵³ Ex. R (EC500 Extension to Cellular, Release 2, Installation and Administration Guide) at p. 2-1.

Receiving Calls

EC500 is a solution for delivering office calls to a cell phone and not for originating calls from the cell phone through the Avaya Communications Server.

With EC500, when a call is made to an office number with a mapped XMOBILE bridge, the call is extended out of the Avaya Communications Server to alert a cell phone. If the Avaya Communications Server is administered to send calling number information, then it is presented to the cell phone. When the cell phone answers the call, the Avaya Communications Server treats it like a local answer of a physically connected station, and the following is true:

54

to establish communications with either the first or second communication device, wherein the first communication device is part of a first communication network, the second communication device is part of a second communication network:

X-Mobility Outbound and Inbound Trunk Administration

An EC500 call actually consists of two distinct calls within the Avaya Communications Server. The first call leg terminates on a station which may be a standard office number with an XMOBILE extension bridged to it. This XMOBILE extension is mapped to the cell phone number. (See [Appendix A: Avaya EC500 - Other Configurations](#) for information on customer configurations other than Dual Bridge mode — two bridged extensions to a cell phone).

The second call leg is routed over a pair of trunk groups that are administered for EC500 calls. These trunks are connected in a loop back arrangement. Calls are routed out of the Avaya Communications Server via the trunk group which is identified on the XMOBILE station screen as the **Mobility Trunk Group**. As a result of the loop back arrangement, the call is routed back into the Avaya Communications Server via the other trunk in the loop back arrangement. The calls routed back into the Avaya Communications Server are then rerouted via ARS Analysis to the cell phone.

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55

⁵⁴ *Id.* at p. 3-3, 1-9.

⁵⁵ *Id.*

250. Defendant has been, and currently is, an active inducer of infringement of the '561 Patent under 35 U.S.C. § 271(b) and a contributory infringer of the '561 Patent under 35 U.S.C. § 271(c).

251. Defendant knew of the '561 Patent, or should have known of the '561 Patent but was willfully blind to its existence. Upon information and belief, Defendant has had actual knowledge of the '561 Patent since at least as early as the filing and/or service of this Complaint. Additionally, Defendant was made aware of their infringement of the '561 patent through a notice letter sent from BlackBerry on December 17, 2015. Defendant has provided the '561 Accused Products to its customers and, on information and belief, instructions to use the '561 Accused Products in an infringing manner while being on notice of or willfully blind to the '561 Patent and the Defendant's infringement. Therefore, on information and belief, Defendant knew or should have known of the '561 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts.

252. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '561 Patent.

253. Upon information and belief, Defendant provides the '561 Accused Products and instructions to end-user customers so that such customers will use the '561 Accused Products in an infringing manner. For example, Defendant provides instructions to end-user customers on how to set up, configure, and deploy the '561 Accused Products, as well as to receive calls using the '561 Accused Products.⁵⁶

⁵⁶ See, e.g., Avaya EC500 Extension to Cellular Release 2 Installation and Administration Guide (Jul. 2001), https://downloads.avaya.com/elmodocs2/EC500/EC500Rel2_admin_121301.pdf, last visited July 16, 2016.

254. Defendant's end-user customers directly infringe at least claims 1, 8 and 12 of the '561 Patent by using the '561 Accused Products in their intended manner to infringe. Defendant induces such infringement by providing the '561 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '561 Patent. Upon information and belief, Defendant specifically intends that its actions will result in infringement of at least claims 1, 8 and 12 of the '561 Patent, or subjectively believes that its actions will result in infringement of the '561 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

255. Defendant contributorily infringes at least claims 1, 8, and 12 of the '561 Patent by providing the '561 Accused Products and/or software or hardware components thereof, that embody a material part of the claimed inventions of the '561 Patent, that are known by Defendant to be specially made or adapted for use in an infringing manner, and are not staple articles with substantial non-infringing uses. The '561 Accused Products are specially designed to infringe at least claims 1, 8, and 12 of the '561 Patent, and their accused components have no substantial non-infringing uses.

256. BlackBerry provided notice to Defendant of the '561 Patent and its infringement in a letter dated December 17, 2015, which identified the '561 Patent in particular and the '561 Accused Products' infringement thereof. Despite said notice, Defendant has willfully and deliberately continued infringing the claims of the '561 Patent to the present day.

257. Additional allegations regarding Defendant's knowledge of the '561 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

258. Defendant's infringement of the '561 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

259. Defendant's infringement of the '561 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

260. BlackBerry has been damaged by Defendant's infringement of the '561 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

261. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '561 Patent, including without limitation lost profits and not less than a reasonable royalty.

SEVENTH CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 8,554,218)

262. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-261 of this Complaint.

The '218 Patent

263. The '218 Patent discloses, among other things, "a telecommunication method, server and system that route an outbound telephone communication initiated by a wireless remote device through an enterprise communication network." '218 Patent at Abstract.

264. The '218 Patent explains that "the office telephone is the primary point of contact of most business people." *Id.* at 2:14-15. "However, because the corporate workforce is becoming increasingly mobile, more business people are using wireless telephones or devices to conduct their business when they are out of the office." *Id.* at 2:21-24. And "wireless communication systems often lack the enhanced conveniences (e.g., interoffice voicemail, direct

extension dialing, etc.) that corporate users have come to expect in the office environment.” *Id.* at 28-32.

265. The '218 Patent addresses this issue by allowing an outbound call from a wireless phone to be routed through an enterprise PBX network.

266. “FIG. 1 illustrates a telecommunication system 10 constructed in accordance with an embodiment. ...the system 10 provides for a full integration of remote telephony devices, such as remote device 70 ... into an office, enterprise or hotel PBX or other communications network.” *Id.* at 5:12-19. “The system 10 as particularly illustrated herein includes a conventional office PBX network 11. ... The PBX 14 ... is connected to a calling network such as a public switched telephone network (PSTN) 16 ...” *Id.* at 5:60-6:1. And “the PBX 14 is coupled to a server 30 constructed in accordance with an embodiment of this invention ... The server 30 is also connected to a PSTN 54 ...” *Id.* at 6:14-21. And “PSTN 54 is connected in this embodiment to a commercial wireless carrier ...” *Id.* at 6:58-59. While Figure 1 represents an embodiment of the invention, it is by no means the only embodiment, and the invention is not limited to what is displayed in Figure 1.

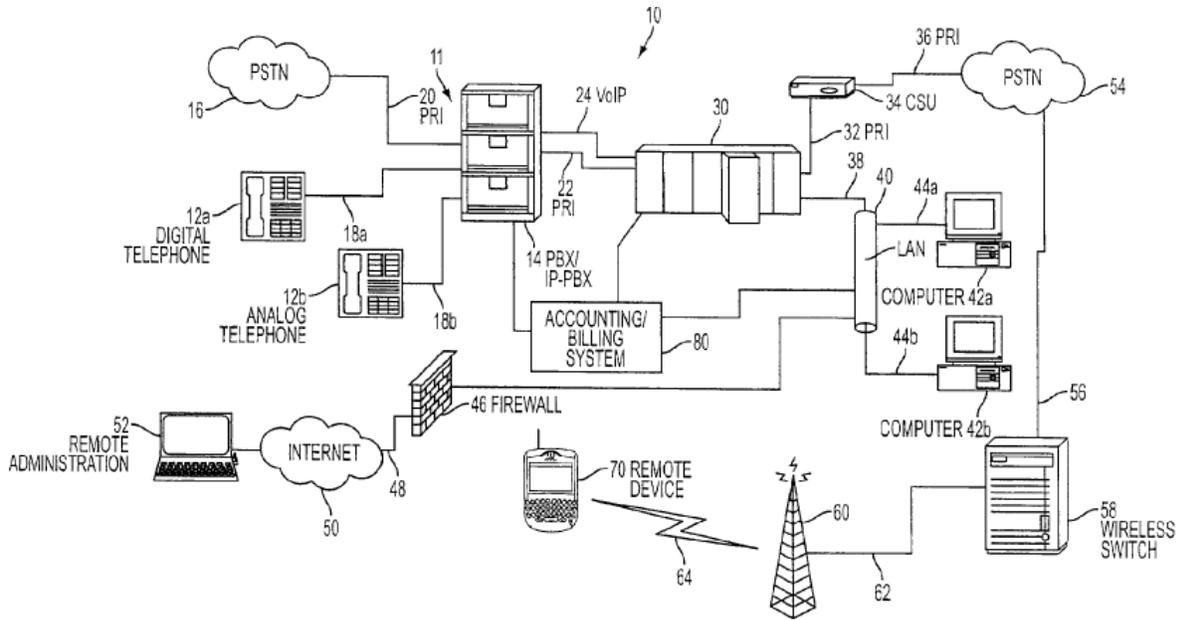


FIG. 1

267. Note that “the server 30 is connected to a wireless carrier through a PSTN 54 and/or data network (e.g., WLAN) and not by unique hardware or an in-office cellular network. As a result, server 30 only has to interface with conventional components, such as the PBX 14 and PSTN 54. Thus, the system, 10 is substantially technology independent.” *Id.* at 7:6-11. “Moreover, special wireless devices are not required, which allows the remote device to function in its conventional manner ... and as part of the PBX network 11 (if so desired).” *Id.* at 7:12-15.

268. “In accordance with an embodiment, server 30 is a processor-based stand-alone unit capable of handling communications directed to the PBX network 11. In a first embodiment, shown in FIG. 2, server 30 comprises a plurality of receiving and transmitting modules 220a, 220b, 220c, first and second buses 275, 285, at least one processor module (Obj) 250, a network interface card 240 and a memory module operable to comprise a database 270 ...” *Id.* at 7:33-41.

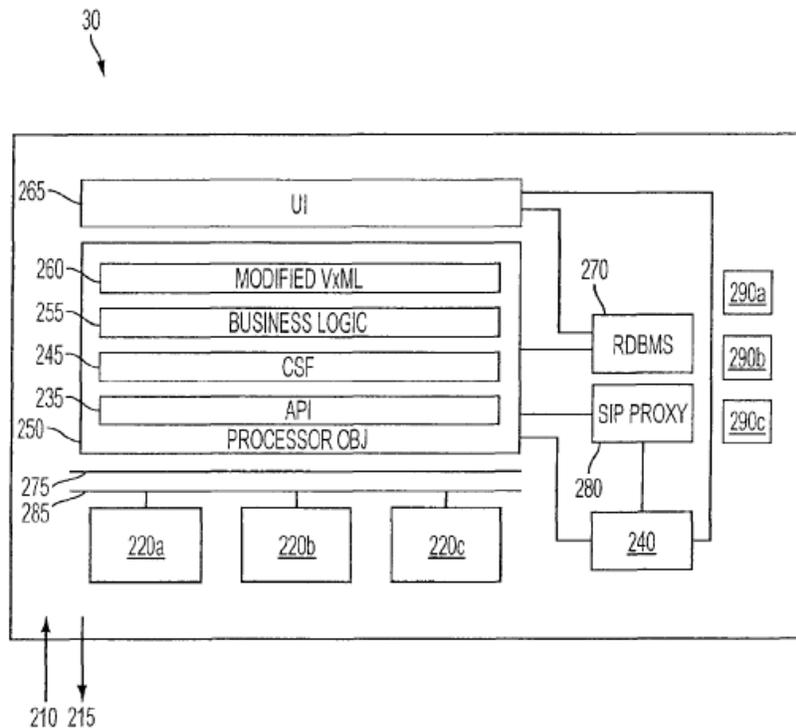
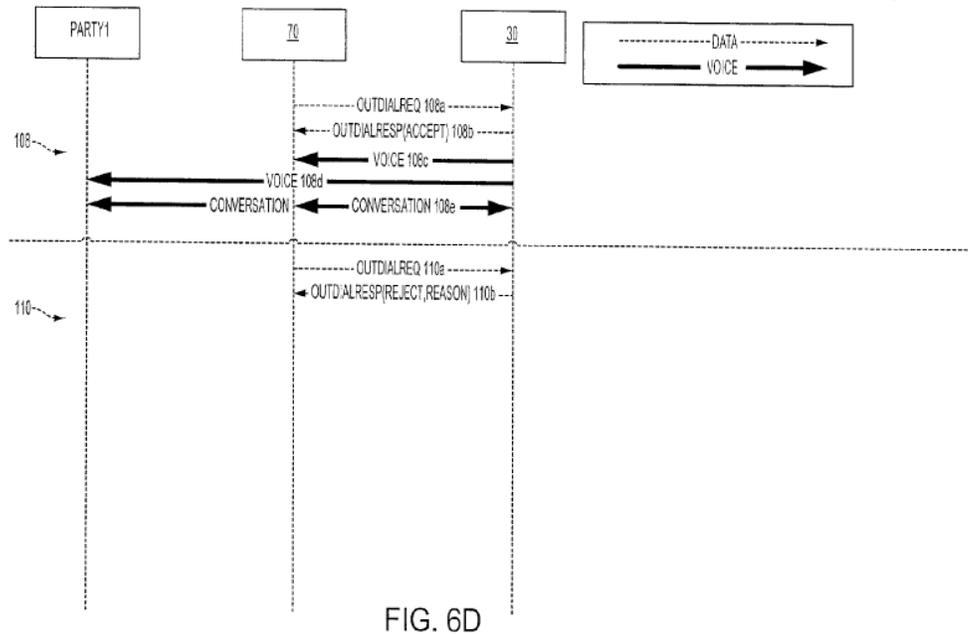


FIG. 2

269. Note that “the modules described herein such as the modules making up server 30, as well as server 30 and PBX 14 themselves, may be one or more hardware, software, or hybrid components residing in (or distributed among) one or more local or remote systems.” *Id.* at 32:28-42.

270. “In FIG. 6D, scenarios 108 and 110 illustrate outgoing (from the remote device 70 through the server 30 and thus, the PBX) call scenarios.” *Id.* at 13:19-21. If a user wants to place a call to party 1, the user has the remote device 70 send an out dial request data signal (flow lines 108a and 110a) to server 30 requesting to place an outbound call through the server 30 ...” *Id.* at 13:21-24. “[In] (scenario 108) the server 30 will place an outbound voice call (flow line 108c) to the remote device 70 and another voice call (flow line 108d) to the called party (e.g., party 1). The server 30 then essentially seamlessly connects the two calls allowing

voice communications ... between the called party and the user of the remote device 70.” *Id.* at 47-54.



271. In view of the historical context and development of incorporating remote devices into enterprise networks, discussed below, a person of ordinary skill in the art would have understood that the '218 Patent's inventions provide unconventional solutions to solve the problems they address.

Historical Context of the '218 Patent

272. Routing an outbound telephone communication initiated by a wireless remote device through an enterprise communication network” was not common or conventional at the time of invention of the '218 Patent.

273. At the time of the invention of the '218 patent, the office telephone was the primary point of contact of most business people. However, corporate workforces were becoming more mobile, and were using more different communication devices. As a result

corporations were “spending a larger portion of their telecommunications budget on wireless communications.” *Id.* at 2:24-26.

274. Moreover, “wireless communication systems often lack the enhanced conveniences (e.g., interoffice voicemail, direct extension dialing, etc.) that corporate users have come to expect in the office environment.” *Id.* at 2:28-32.

275. Prior solutions, such as call forwarding, could help an employee on a mobile device receive calls, but were of less help in sending business calls from a mobile device. The ’218 Patent addresses these issues by allowing an outbound call from a wireless phone to be routed through an enterprise PBX network.

276. The ’218 Patent provided innovative solutions to these problems by providing telecommunication systems that “can selectively establish communications with one of a plurality of telephony devices associated with a particular telephone number or other addressing method Moreover, the system allows remote devices to perform as a functional standard office telephone for both inbound and outbound communications.” *Id.* at 3:32-39.

277. Given the state of the art at the time of the invention of the ’218 Patent, the inventive concepts of the ’218 Patent cannot be considered to be conventional. The ’218 Patent discloses, among other things, an unconventional solution to an issue arising in the context of telecommunication servers coupled to enterprise computer networks, and offered a technological solution to that issue.

278. The 218 Patent claims cannot be performed in the human mind or by using pen and paper. As noted above, the ’218 Patent expressly states that it is drawn to address a specific, technical problem arising in the context of telecommunication servers: “As the population becomes increasingly mobile, making contact with a person through one of these communication devices has become more difficult.” *Id.* at 1:23-26. Further:

because the corporate workforce is becoming increasingly mobile, more business people are using wireless telephones to conduct their business when they are out of the office. This has resulted in corporations spending a larger portion of their telecommunications budget on wireless communications, with far less favorable negotiated rates than the rates of their corporate network. In addition, wireless communication systems often lack the enhanced conveniences (e.g., interoffice voice mail, direct extension dialing, etc.) that corporate users have come to expect in the office environment.

Id. at 2:21-32.

279. At the time of the '218 Patent inventions, these problems were further exacerbated by the increase in the number of communication devices associated with a single person, especially as telecommuting and other flexible work arrangements have become more common. *See id.* at 1:26-28.

280. As described above, the '218 patent discloses embodiments using specific technologies for establishing connections between multiple telephone devices, using, e.g., PBX networks, PSTNs, servers computer processors, telephones, and network connections. *See, e.g., id.* at Figs. 1-5A and accompanying text.

281. Consistent with the problem addressed being rooted in office and wireless telephony, the '218 Patent's solutions naturally are also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

282. This technical context is reflected in the '218 Patent's claims. For example, each of the decoding/decoder claims requires, *inter alia*, a telecommunications server and a processor adapted to route communications.

283. A person having ordinary skill in the art at the time of the inventions of the '218 Patent would not have understood that the inventions could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '218 Patent and the problem it was specifically designed to address. Doing so would also run

counter to the inventors' detailed description of the inventions and the language of the claims and be a practical impossibility.

'218 Patent Allegations

284. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '218 Patent in violation of 35 U.S.C. § 271 et seq., directly and/or indirectly, by making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, Accused Telecommunications Products, including without limitation at least the Avaya one-X® Mobile client operating in conjunction with the Avaya Communications Manager, which is available on at least the following Avaya Servers: S8300, S8400, S8500, and S8700 Media Servers, and DEFINITY CSI and SI Servers (hereinafter "the '218 Accused Products") that infringe at least claim 1 of the '218 Patent.

285. Avaya one-X® Mobile client is marketed as providing the same advantages as the '218 Patent presented over prior art. For example marketing materials say "the Avaya one-X Mobile client helps enterprises maintain business continuity and lower expenses by delivering UC applications and services to mobile users. The extension of business communications to mobile devices helps ensure that employees can be accessible and productive while on the move

...⁵⁷

286. On information and belief after reasonable investigation, each of the '218 Accused Products comprises or is designed to be used as a telecommunication server comprising: a processor adapted to route an outbound communication initiated by a wireless device through an enterprise communications network by:

⁵⁷ Avaya one-X® Mobile Overview (July 2013), (attached hereto as Ex. U) at p. 1.

3. Reference Configuration

The configuration used in these Application Notes is shown in **Figure 1**. The Avaya Aura® Solution for Midsize Enterprise is installed on Avaya System Platform on a S8800 Server. Avaya Aura® Solution for Midsize Enterprise contains Avaya Aura® System Manager, Avaya Aura® Session Manager and Avaya Aura® Communication Manager as virtual machines running with the Avaya Aura® Solution for Midsize Enterprise. Avaya Aura® Communication Manager running as an Evolution Server is used for Off-PBX Station Mapping (OPS). Avaya Aura® Messaging is a template installed on Avaya System Platform on an S8800 Server. The Avaya Session Border Controller Advanced for Enterprise software is installed and configured on Red Hat Linux 5.6 Operating System on an S8800 Server. The diagram indicates logical signaling connections. All components in the Corporate LAN are physically connected to a single Avaya Ethernet Routing Switch (ERS) 2550T-PWR, and are administered in subnet range 192.168.1.x. The Avaya one-X Mobile SIP for IOS Application was obtained from the iTunes App Store and installed on an Apple iPhone 4S. The Avaya one-X Mobile SIP for IOS with SRTP as a Remote User registers to the B1 external interface of the Avaya Session Border Controller Advanced for Enterprise Server

58

1.2. Call Flows

To understand how the Avaya one-X™ Mobile solution manages outbound and inbound calls, several call flows are described in this section.

The fourth call scenario illustrated in **Figure 5** is similar to the third call scenario, except that the destination number is another Avaya Communication Manager extension, e.g., another office extension.

1. Using the Avaya one-X™ Mobile UC client application, the user enters a request to make a business call between the mobile phone and another Avaya Communication Manager extension. The request is delivered over the Internet via HTTP/HTTPS to Avaya one-X™ Mobile.

⁵⁸ Configuring Avaya one-X® Mobile SIP for iOS 6.2 as a Remote User with SRTP to Avaya Session Border Controller Advanced for Enterprise 6.2 Server with Avaya Aura® Midsize Enterprise 6.2 Server & Avaya Aura® Messaging 6.2 Server – Issue 1.1 (attached hereto as Ex. V), at p. .6.

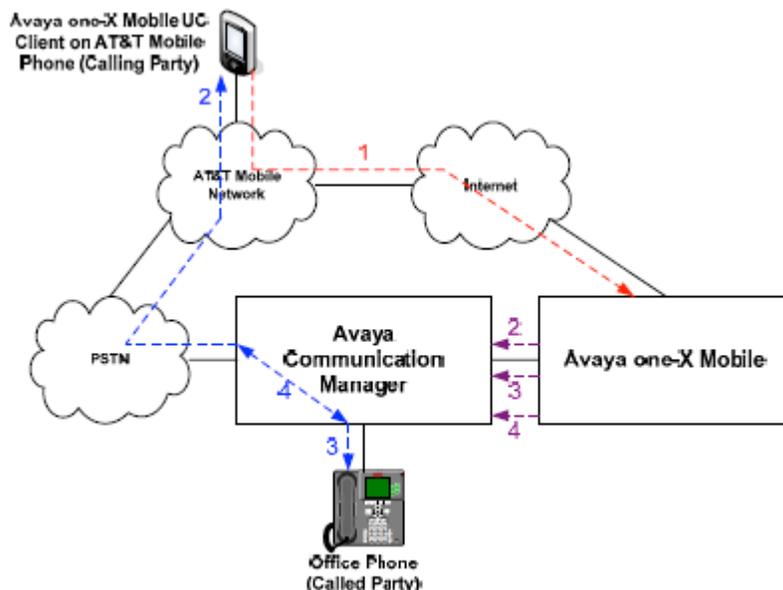


Figure 5: Outbound Internal Call From Mobile Phone Call Scenario

59

registering the wireless device with a server associated with the enterprise communications network;

1. Introduction

These Application Notes describe the steps for configuring Avaya one-X™ Mobile and Avaya Communication Manager with AT&T Mobile Extension and ISDN-PRI trunks. Avaya one-X™ Mobile is an enterprise mobility solution that allows users roaming or otherwise located away from the office to access enterprise telephony and unified communications services. More specifically, users can:

1.1. Sample Configuration

The sample configuration used in these Application Notes is shown in Figure 1. The Avaya one-X™ Mobile solution consists of several components:

- Avaya Communication Manager provides the enterprise voice communications services. In this configuration, Avaya Communication Manager runs on an Avaya S8710 Media Server. This solution is extensible to other Avaya S8xxx Media Servers.
- The Avaya Media Gateway provides the physical interfaces and resources for enterprise voice communications. In this configuration, an Avaya G650 Media Gateway is used. This solution is extensible to other Avaya Media Gateways.
- Avaya Application Enablement (AE) Services provides the Computer Telephony Integration (CTI) interfaces to allow CTI applications such as Avaya one-X™ Mobile to monitor and invoke voice communications services on Avaya Communication Manager.

60

⁵⁹ Application Notes for Configuring Avaya one-X™ Mobile and Avaya Communication Manager with AT&T Mobile Extension and ISDN-PRI Trunks – Issue 1.0 (attached hereto as Ex. W), p. 10.

⁶⁰ *Id.* at p. 4-5.

Assigning a Mobile Telephony resource to a user

About this task

If you do not assign a mobile telephony resource to a user, the user cannot log in to the Avaya one-X® Mobile client application.

When you assign this resource to a user, Client Enablement Services enables the extension of the user on Communication Manager for Also Ring, Call back, Call logging, Block all calls, and VIP calling features.

Procedure

1. Click the **Users** tab.
2. In the left pane, click **Provisioned Users**.
3. Search for and select the user to whom you want to assign the mobile telephony resource.
4. In the **Mobile Telephony** group box, click **Add**.
You can assign only one mobile telephony resource to a user.
5. On the Add Resource page, complete the following fields:
 - a. Select a routing configuration from the **Mobile Routing** drop-down list.
Server routes all incoming calls to a mobile number based on the Mobile routing configured for the user.
 - b. Select a routing configuration from the **Ring-also Routing** drop-down list.
Server routes all incoming calls to a number other than the mobile number based on the Ring-also routing configured for the user.
 - c. Select a routing configuration from the **Callback Routing** drop-down list.
Server routes the calls to a number specified by the user for callback based on the routing configuration selected for callback.

Result

When you assign a mobile telephony resource to a user and the user logs in the client application, the mobile number of the user is saved as an ONE-X mapping on the STATION TO OFF-PBX TELEPHONE MAPPING screen on Communication Manager. To verify the Client Enablement Services control on the extension of the user on Communication Manager, use the command `status station < extension number >`.

The **one-X Server Status** field displays the status as either: **Trigger**, **Normal**, **No-ring**, **Voicemail**. However, when you delete this resource, the server withdraws control and the status is set to **N/A**.⁶¹

inputting a first data signal from the registered wireless device, the first data signal comprising a first device indicator of an intended recipient device of the outbound communication;

⁶¹ Administering Avaya one-X® Client Enablement Services, <http://downloads.avaya.com/css/P8/documents/100173257>, last visited July 16, 2016, p. 108-10.

translating the first device indicator into a first address suitable for establishing a first communication path with the intended recipient device; establishing the first communication path using the first address; establishing a second communication path to the wireless device; and connecting the first and second communication paths to route the outbound communication from the wireless device to the recipient.

1.2. Call Flows

To understand how the Avaya one-X™ Mobile solution manages outbound and inbound calls, several call flows are described in this section.

The fourth call scenario illustrated in **Figure 5** is similar to the third call scenario, except that the destination number is another Avaya Communication Manager extension, e.g., another office extension.

1. Using the Avaya one-X™ Mobile UC client application, the user enters a request to make a business call between the mobile phone and another Avaya Communication Manager extension. The request is delivered over the Internet via HTTP/HTTPS to Avaya one-X™ Mobile.
2. Avaya one-X™ Mobile decomposes the request into parts. First, Avaya one-X™ Mobile instructs Avaya Communication Manager (via Avaya AE Services) to place a call to the calling user's mobile phone number. As in the third call scenario, this leg of the overall business call is referred to as the "Callback" call. The calling user answers the "Callback" call.
3. Avaya one-X™ Mobile then instructs Avaya Communication Manager (via Avaya AE Services) to place a call to the destination extension. The destination extension answers.
4. Avaya one-X™ Mobile instructs Avaya Communication Manager to merge the two call legs, thereby connecting the calling user (on the mobile phone) to the destination extension. Note that if the destination extension is also that of another Avaya one-X™ Mobile user, then as in the first call scenario, the called user's selected receive destinations will simultaneously ring, and the called user may answer the call at his/her office phone, mobile phone, or other selected receive destinations.

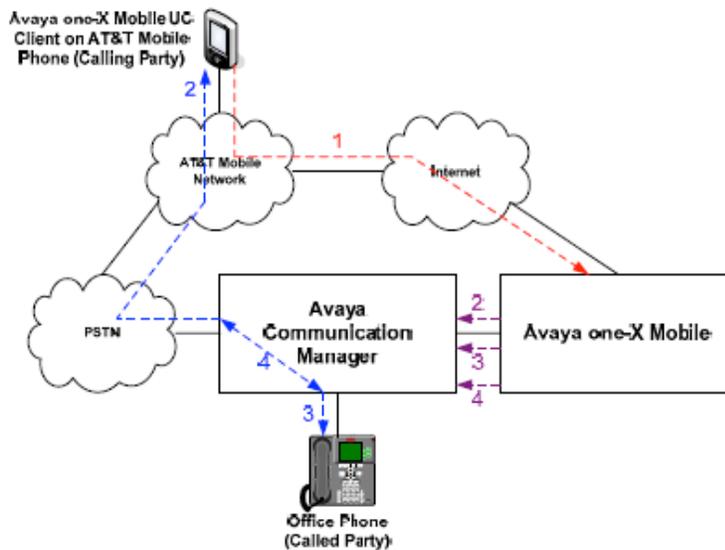


Figure 5: Outbound Internal Call From Mobile Phone Call Scenario

62

287. Defendant has been, and currently is, an active inducer of infringement of the '218 Patent under 35 U.S.C. § 271(b) and a contributory infringer of the '218 Patent under 35 U.S.C. § 271(c).

288. Defendant knew of the '218 Patent, or should have known of the '218 Patent but was willfully blind to its existence. Upon information and belief, Defendant has had actual knowledge of the '218 Patent since at least as early as the filing and/or service of this Complaint. Additionally, Defendant was made aware of its infringement of the '218 patent through a notice letter sent from BlackBerry on December 17, 2015. Defendant has provided the '218 Accused Products to its customers and, on information and belief, instructions to use the '218 Accused Products in an infringing manner while being on notice of or willfully blind to the '218 Patent and the Defendant's infringement. Therefore, on information and belief, Defendant knew or

⁶² Ex. W (Application Notes for Configuring Avaya one-X™ Mobile and Avaya Communication Manager with AT&T Mobile Extension and ISDN-PRI Trunks – Issue 1.0) at p. 10.

should have known of the '218 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts.

289. Defendant knowingly and intentionally encourages and aids at least its end-user customers to directly infringe the '218 Patent.

290. Upon information and belief, Defendant provides the '218 Accused Products and instructions to end-user customers so that such customers will use the '218 Accused Products in an infringing manner. For example, Defendant provides instructions to end-user customers on how to set up, configure, and deploy the '218 Accused Products, as well as to make calls using the '218 Accused Products.⁶³

291. Defendant's end-user customers directly infringe at least claim 1 of the '218 Patent by using the '218 Accused Products in their intended manner to infringe. Defendant induces such infringement by providing the '218 Accused Products and instructions to enable and facilitate infringement, knowing of, or being willfully blind to the existence of, the '218 Patent. Upon information and belief, Defendant specifically intends that its actions will result in infringement of at least claim 1 of the '218 Patent, or subjectively believes that its actions will result in infringement of the '218 Patent but took deliberate actions to avoid learning of those facts, as set forth above.

292. BlackBerry provided notice to Defendant of the '218 Patent and its infringement in a letter dated December 17, 2015, which identified the '218 Patent in particular and the '218 Accused Products' infringement thereof. Despite said notice, Defendant has willfully and deliberately continued infringing the claims of the '218 Patent to the present day.

⁶³ See, e.g., Avaya Application Notes for Configuring Avaya one-XTM Mobile and Avaya Communication Manager with AT&T Mobile Extension and ISDN-PRI Trunks – Issue 1.0 (Mar. 2009), <http://www.devconnectprogram.com/fileMedia/download/06a5f38a-6f7c-44e3-b161-75736acb17f1>, last visited July 16, 2016.

293. Additional allegations regarding Defendant's knowledge of the '218 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery.

294. Defendant's infringement of the '218 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

295. Defendant's infringement of the '218 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

296. BlackBerry has been damaged by Defendant's infringement of the '218 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

297. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '218 Patent, including without limitation lost profits and not less than a reasonable royalty.

EIGHTH CLAIM FOR RELIEF

(INFRINGEMENT OF UNITED STATES PATENT NO. 7,372,961)

298. BlackBerry realleges and incorporates by reference the allegations of paragraphs 1-297 of this Complaint.

The '961 Patent

299. The '961 Patent discloses, among other things, "key generation technique[s] for public key cryptosystems] in which any bias is eliminated during the selection of the key." '961 Patent at 3:1-3.

300. As the '961 Patent explains, public key cryptosystems are used to protect and provide security for data communication systems. Specifically, “[s]uch systems use a private key k and a corresponding public key α^k where α is a generator of the group. Thus one party may encrypt a message m with the intended recipients public key and the recipient may apply his private key to decrypt it.” *Id.* at 1:12-16.

301. More particularly, such public key cryptosystems can “be used to sign messages to authenticate the author and/or the contents. In this case the sender will sign a message using his private key and a recipient can verify the message by applying the public key of the sender. If the received message and the recovered message correspond then the authenticity is verified.” *Id.* at 26-32.

302. As the '961 Patent notes, “the security of such systems ... depend[s] on the private key remaining secret.” Thus, one prevalent set of protocols to provide for the secrecy of the private key “use a pair of private keys and corresponding public keys, referred to as long term and short term or ephemeral key pairs respectively. The ephemeral private key is generated at the start of each session between a pair of correspondents, usually by a random number generator. The corresponding, ephemeral public key is generated and the resultant key pair used in one of the possible operations described above. The long-term public key is utilized to authenticate the correspondent through an appropriate protocol. Once the session is terminated, the ephemeral key is securely discarded and a new ephemeral key generated for a new session.” *Id.* at 1:37-50.

303. However, the '961 Patent also explains the potential weakness in such public key based cryptosystems, even those which uses both ephemeral keys to help maintain the secrecy of the long term private key: “if an ephemeral key k and the associated message m and signature

(r,s) is obtained it may be used to yield the long term private key d and thereafter each of the ephemeral keys k can be obtained.” *Id.* at 2:24-27.

304. While the commonly used methods for generating and verifying digital signatures (Digital Signature Algorithm, or “DSA” and Elliptic Curve DSA, or “ECDSA”), did not “inherently disclose any information about the public key k,” the ’961 Patent noted that the “implementation of the DSA may be done in such a way as to inadvertently introduce a bias in to the selection of k. This small bias may be exploited to extract a value of the private key d and thereafter render the security of the system vulnerable.” *Id.* at 2:27-29, 33-37.

305. In particular, as the ’961 Patent notes, the prevailing government standard at the time governing the generation and verification of digital signatures, the FIPS 186-2 Standard (promulgated by the National Institute of Standards and Technology (“NIST”)), suffered from this very problem, i.e., using the algorithm specified in the FIPS 186-2 standard resulted in “more values [lying in the] first interval than the second and therefore there is a potential bias in the selection of k.” *Id.* at 2:36-55. This bias could be used by hackers to obtain the private key and therefore render the cryptographic system ineffective. Thus, the inventors of the ’961 Patent developed “a key generation technique in which any bias is eliminated during the selection of the key.” *Id.* at 3:1-3.

306. The ’961 Patent further describes the type of cryptographic systems that are used to generate such keys in a manner which eliminates bias during the selection of the key. AS explained therein, a pair of correspondents 12,14 are exchanging messages for which the parties wish to maintain security. The correspondents “may be computer terminals, point-of-sale devices, automated teller machines, constrained devices such as PDA's, cellphones, pagers or any other device enabled For communication over a link 16.” *Id.* at 3:28-32. The correspondents are connected by a communication link 16,” which “may be a dedicated link, a

multipurpose link such as a telephone connection or a wireless link depending on the particular applications.” *Id.* at 3:25-28.

307. To perform the key generation techniques disclosed in the '961 Patent, “[e]ach of the correspondents 12, 14 includes a secure cryptographic function 20 including a secure memory 22, an arithmetic processor 24 for performing finite field operations, a random number generator 26 and a cryptographic hash function 28 for performing a secure cryptographic hash. ... [E]ach of these functions is controlled by a processor executing instructions to provide functionality and inter-operability as is well known in the art.” *Id.* at 3:33-37. Further, the “secure memory 22 includes a register 30 for storing a long-term private key, d , and a register 32 for storing an ephemeral private key k .” *Id.* at 3:45-47.

308. The '961 Patent discloses several variation of the anti-bias key generation methods claimed therein. In a first such method, the “cryptographic function is performed over a group of order q , where q is a prime represented as a bit string of predetermined length L .” *Id.* at 4:1-2. In order to generate the ephemeral key, k , the system first “obtain[s] a seed value (SV) from the random number generator 26.” *Id.* at 3:64-66. Next the system applies a hash function 28 the seed value generated by the random number generator to generate an output of L bits. *See id.* at 4:6-10.

309. To confirm that the hashed seed value is acceptable to use in generating the ephemeral key (i.e., will not result in a potential bias), the hashed seed value “is tested against the value of q and a decision made based on the relative values. If $H(\text{seed}) < q$ then it is accepted for use as k . If not, the value is rejected and the random number generator is conditioned to generate a new value which is again hashed by the function 28 and tested. This loop continues until a satisfactory value is obtained.” *Id.* at 4:11-17.

310. The '961 Patent further discloses alternative embodiments which use different mechanisms for generating the seed value, which (i) also compare the seed value to the order q to determine if the seed value is satisfactory, or (ii) “use a low Hamming weight integer obtained by combining the output of the random number generator 26” (as disclosed in Canadian Patent No. 2,217,925). *See id.* at 4:18-5:25.

311. In view of the historical context and development of key generation methodologies for long term and ephemeral keys in the context of cryptographic systems, discussed below, a person of ordinary skill in the art would have understood that the inventions of the '961 Patent provide unconventional solutions to solve the problems they address.

Historical Context of the '961 Patent

312. Using a comparison of a hashed seed value (generated using a random number generator) or a low weight hamming function to determine if a seed value would not result in a bias in connection with the selection of an ephemeral key was not common or conventional at the time of invention of the '961 Patent.

313. As explained in the '961 Patent, public key cryptosystems were used to protect and maintain as secret data that parties wanted to share over electronic communication systems. Indeed, the importance of developing and standardizing the use of “advanced, dynamic, robust, and effective information security solutions ... for the protection of critical information infrastructures” was recognized by the federal government through the Federal Information Security Management Act of 2002 (44 U.S.C. § 3541 *et seq.*, “FISMA”).

314. In seeking to promote the protection of such FISMA provided for “a comprehensive framework for ensuring the effectiveness of information security controls over information resources that support Federal operations and assets, ... development and maintenance of minimum controls required to protect Federal information and information

systems; [and] a mechanism for improved oversight of Federal agency information security programs.” 44 U.S.C. § 3541.

315. Pursuant to FISMA, the federal government, in conjunction with the National Institute of Standards and Technology (NIST), the NSA, and leading cryptographic experts, developed a number of standards, referred to as Federal Information Processing Standards (FIPS) standards, in order to establish requirements for various purposes such as ensuring computer security and interoperability. Specifically, “NIST develops FIPS when there are compelling Federal government requirements such as for security and interoperability and there are no acceptable industry standards or solutions.”⁶⁴

316. In particular, the FIPS 186-2 standard was directed to digital signature generation and verification:

the Digital Signature Algorithm (DSA) is a Federal Information Processing Standard for digital signatures. It was proposed by the National Institute of Standards and Technology (NIST) in August 1991 for use in their Digital Signature Standard (DSS) and adopted as FIPS 186 in 1993. ... This standard specifies a suite of algorithms which can be used to generate a digital signature. Digital signatures are used to detect unauthorized modifications to data and to authenticate the identity of the signatory. In addition, the recipient of signed data can use a digital signature in proving to a third party that the signature was in fact generated by the signatory. This is known as nonrepudiation since the signatory cannot, at a later time, repudiate the signature.⁶⁵

Thus the FIPS 186-2 standard was the *de facto* method of implementing DSA in cryptographic systems used to communicate with the federal government, and was intended to provide sufficient security for confidential information exchanged with the government.

317. However, at the time of the '961 Patent inventions, cryptographer Daniel Bleichenbacher discovered a problem with this standard: the mechanisms specified in FIPS 186-

⁶⁴ NIST FIPS General Information, <http://www.nist.gov/itl/fipsinfo.cfm> (last visited July 14, 2016).

⁶⁵ FIPS PUB 186-2, Digital Signature Standard (DSS), (Jan. 27, 2000), at Foreward, Abstract (attached hereto as Ex. X).

2 to generate keys “introduce[d] sufficient bias in to the selection of k that an examination of 2^{22} signatures could yield the private key d in 2^{64} steps using 2^{40} memory units,” i.e., such that third parties could potentially discover the public key.” ’961 Patent at 2:56-59.

318. This issue was further brought to the attention of the IEEE P1363 Working Group, which was the key industry standard group for promulgating standard specifications for public-key cryptography. The Working Group “considered the attack to be significant enough to warrant including a security note on DL signatures indicating that it is desirable to eliminate any bias in the key generation method for one-time keys in order to prevent attacks such as the one proposed by Bleichenbacher.”⁶⁶

319. Thus, as of the time of the ’961 Patent inventions, the prevailing government standard for DSA suffered from a noted security risk. The inventors of the ’961 Patent provided innovative solutions to this problem by eliminating bias in the selection of the ephemeral key through the various methods described above.

320. As noted above, the ’961 Patent is drawn to address a specific, technical problem arising in the context of key generation in cryptographic communication between data communication systems. Consistent with the problem addressed being rooted in such computer-based data communication systems, the ’961 Patent’s solutions naturally are also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

321. Given the state of the art at the time of the invention of the ’961 Patent, including the deficiencies in prevailing cryptography standards of the time, the inventive concepts of the ’961 Patent cannot be considered to be conventional. The ’961 Patent discloses, among other

⁶⁶ November 2000 Meeting Minutes, IEEE 1363 Working Group, available at <http://grouper.ieee.org/groups/1363/WorkingGroup/minutes/Nov00.txt> (last visited July 16, 2016).

things, an unconventional solution to an issue arising in the context of cryptographic communication between data communication systems (such as computer terminals, point of sale devices, automated teller machines, PDAs, cellphones, and pagers), and offered a technological solution to that issue.

322. The '961 Patent claims cannot be performed in the human mind or by using pen and paper. As noted above, the '961 Patent expressly states that it is drawn to address a specific, technical problem arising in the context of in the context of cryptographic communication between data communication systems. *See id.* at 2:56-3:3.

323. Consistent with the problem addressed being rooted cryptographic communication between data communication systems, the '961 Patent's solutions naturally are also rooted in that same technology that cannot be performed with pen and paper or in the human mind.

324. This technical context is reflected in the '961 Patent's claims. For example, various claims of the '961 Patent require a random number generator to generate a seed value, as well as a cryptographic unit and an arithmetic processor.

325. A person having ordinary skill in the art at the time of the inventions of the '961 Patent would not have understood that the inventions could or would be performed solely in the human mind or using pen and paper. Using pen and paper would ignore the stated purpose of the '961 Patent and the problem it was specifically designed to address. Doing so would also run counter to the inventors' detailed description of the inventions and the language of the claims and be a practical impossibility.

'961 Patent Allegations

326. Defendant has infringed and is infringing, either literally or under the doctrine of equivalents, the '961 Patent in violation of 35 U.S.C. § 271 *et seq.*, directly and/or indirectly, by making, using, offering for sale/lease, selling or leasing in the United States, and/or importing into the United States without authority or license, Avaya products that include OpenSSL and the OpenSSL elliptic curve cryptography ("EC") library, including the Avaya CMS, Avaya Breeze™ Platform, Avaya Aura® Conferencing, Avaya Aura® Collaboration Environment, Avaya Aura® Experience Portal, Avaya IP Office Server Edition, Avaya IP Office Application Server, Avaya one-X® Client Enablement Services, Avaya Session Border Controller for Enterprise, Avaya Aura® Session Manager, Avaya WLAN 9100 Access Points, and Avaya Communicator (hereinafter "the '961 Accused Products") that infringes at least claims 15 and 23 of the '961 Patent.

327. On information and belief after reasonable investigation, the '961 Accused Products comprise a computer readable medium comprising computer executable instructions for generating a key k for use in a cryptographic function performed over a group of order q , said instructions including instructions for: generating a seed value SV from a random number generator:

OpenSSL: crypto/rand/md_rand.c

```
321 static int ssleay_rand_bytes(unsigned char *buf, int num)
322 {
323     static volatile int stirred_pool = 0;
324     int i,j,k,st_num,st_idx;
325     int num_ceil;
326     int ok;
327     long md_c[2];
328     unsigned char local_md[MD_DIGEST_LENGTH];
329     EVP_MD_CTX m;
330     #ifndef GETPID_IS_MEANINGLESS
331     pid_t curr_pid = getpid();
332     #endif
333     int do_stir_pool = 0;
```

```

353  /*
354  * (Based on the rand(3) manpage:)
355  *
356  * For each group of 10 bytes (or less), we do the following:
357  *
358  * Input into the hash function the local 'md' (which is initialized from
359  * the global 'md' before any bytes are generated), the bytes that are to
360  * be overwritten by the random bytes, and bytes from the 'state'
361  * (incrementing looping index). From this digest output (which is kept
362  * in 'md'), the top (up to) 10 bytes are returned to the caller and the
363  * bottom 10 bytes are xored into the 'state'.

```

```

480     for (i=0; i<MD_DIGEST_LENGTH/2; i++)
481     {
482         state[st_idx++]^=local_md[i]; /* may compete with other threads */
483         if (st_idx >= st_num)
484             st_idx=0;
485         if (i < j)
486             *(buf++)=local_md[i+MD_DIGEST_LENGTH/2];
487     }
488 }

```

performing a hash function $H()$ on said seed value SV to provide an output $H(SV)$

OpenSSL: crypto/rand/md_rand.c

```

490     MD_Init(&m);
491     MD_Update(&m, (unsigned char *)&(md_c[0]), sizeof(md_c));
492     MD_Update(&m, local_md, MD_DIGEST_LENGTH);
493     CRYPTO_w_lock(CRYPTO_LOCK_RAND);
494     MD_Update(&m, md, MD_DIGEST_LENGTH);
495     MD_Final(&m, md);

```

determining whether said output $H(SV)$ is less than said order q prior to reducing mod q ;

accepting said output $H(SV)$ for use as said key k if the value of said output $H(SV)$ is less than

said order q ; rejecting said output $H(SV)$ as said key if said value is not less than said order q ;

if said output $H(SV)$ is rejected, repeating said method:

OpenSSL: crypto/bn/bn_rand.c

```

248     else if (!BN_is_bit_set(range, n - 2) && !BN_is_bit_set(range, n - 3))
249     {
250         /* range = 100..._2,
251          * so 3*range (= 11..._2) is exactly one bit longer than range */
252         do
253         {
254             if (!bn_rand(r, n + 1, -1, 0)) return 0;
255             /* If r < 3*range, use r := r MOD range
256              * (which is either r, r - range, or r - 2*range).
257              * Otherwise, iterate once more.
258              * Since 3*range = 11..._2, each iteration succeeds with
259              * probability >= .75. */
260             if (BN_cmp(r, range) >= 0)
261             {
262                 if (!BN_sub(r, r, range)) return 0;
263                 if (BN_cmp(r, range) >= 0)
264                     if (!BN_sub(r, r, range)) return 0;
265             }
266
267             if (!--count)
268             {
269                 BNerr(BN_F_BN RAND_RANGE, BN_R_TOO_MANY_ITERATIONS);
270                 return 0;
271             }
272
273         }
274         while (BN_cmp(r, range) >= 0);
275     }

```

```

276     else
277     {
278         do
279         {
280             /* range = 11..._2 or range = 101..._2 */
281             if (!bn_rand(r, n, -1, 0)) return 0;
282
283             if (!--count)
284             {
285                 BNerr(BN_F_BN RAND_RANGE, BN_R_TOO_MANY_ITERATIONS);
286                 return 0;
287             }
288         }
289         while (BN_cmp(r, range) >= 0);
290     }
291

```

and if said output $H(SV)$ is accepted, providing said key k for use in performing said cryptographic function, wherein said key k is equal to said output $H(SV)$:

OpenSSL: crypto/bn/bn_rand.c

```

261     do
262         if (!BN_rand_range(priv_key, order))
263             goto err;

```

328. Upon information and belief, Defendant has had actual knowledge of the '961 Patent since at least as early as the filing and/or service of this Complaint. Additionally,

Defendant was made aware of their infringement through a notice letter sent from BlackBerry on December 17, 2015. Therefore, on information and belief, Defendant knew or should have known of the '961 Patent and of its own infringing acts, or deliberately took steps to avoid learning of those facts. Defendant furthermore has willfully and deliberately continued infringing the claims of the '961 Patent, despite this knowledge, to the present day.

329. Additional allegations regarding Defendant's knowledge of the '961 Patent and willful infringement will likely have evidentiary support after a reasonable opportunity for discovery

330. Defendant's infringement of the '961 Patent was willful and deliberate, entitling BlackBerry to enhanced damages and attorneys' fees.

331. Defendant's infringement of the '961 Patent is exceptional and entitles BlackBerry to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

332. BlackBerry has been damaged by Defendant's infringement of the '961 Patent and will continue to be damaged unless Defendant is enjoined by this Court. BlackBerry has suffered and continues to suffer irreparable injury for which there is no adequate remedy at law. The balance of hardships favors BlackBerry, and public interest is not disserved by an injunction.

333. BlackBerry is entitled to recover from Defendant all damages that BlackBerry has sustained as a result of Defendant's infringement of the '961 Patent, including without limitation lost profits and not less than a reasonable royalty.

PRAYER FOR RELIEF

WHEREFORE, BlackBerry prays for the following relief:

334. A judgment that Avaya has infringed one or more claims of each of the '801, '849, '739, '212, '439, '561, '218, and '961 Patents (collectively, the "BlackBerry Asserted Patents");

335. An order and judgment preliminarily and permanently enjoining Avaya and its officers, agents, affiliates, employees, and attorneys, and all those persons acting or attempting to act in concert or participation with them, from further acts of infringement of BlackBerry Asserted Patents;

336. A judgment awarding BlackBerry all damages adequate to compensate BlackBerry for Avaya's infringement of the BlackBerry Asserted Patents, including all pre-judgment and post-judgment interest at the maximum rate permitted by law;

337. A judgment awarding BlackBerry its reasonable attorneys' fees as provided for in 35 U.S.C. § 285 to the extent the Court finds this case exceptional;

338. Actual damages suffered by BlackBerry as a result of Avaya's unlawful conduct, in an amount to be proven at trial, as well as prejudgment interest as authorized by law;

339. An order directing Avaya to file with the Court and serve upon BlackBerry's counsel within thirty (30) days after entry of the order of injunction, a report setting forth the manner and form in which Avaya has complied with the injunction, including the provision relating to destruction and recall of infringing products and materials;

340. Costs of suit and reasonable attorneys' fees; and

341. Such other and further relief to which BlackBerry may show itself to be entitled.

JURY DEMAND

Pursuant to Federal Rule of Civil Procedure 38(B), BlackBerry Limited and BlackBerry Corporation hereby demand trial by jury of all triable issues.

DATED: July 27, 2016

Respectfully submitted,

/s/ E. Leon Carter

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