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BELL NORTHERN RESEARCH, LLC

IN THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA

BELL NORTHERN RESEARCH, LLC, Plaintiff, v. ZTE CORPORATION, ZTE (USA) INC. ZTE (TX), INC. Defendant.	C.A. No.3:18-cv-01786-CAB-BLM FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT **JURY TRIAL DEMANDED**

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT[1]

Plaintiff Bell Northern Research, LLC ("BNR") as and for its first amended complaint against ZTE Corporation, ZTE (USA) Inc., and ZTE (TX), Inc. (collectively, "ZTE" or "Defendant") alleges as follows:

PARTIES

1. Bell Northern Research, LLC is a Delaware limited liability company with a principal place of business of 401 N. Michigan Avenue, Chicago, IL 60611.

2. On information and belief, Defendant ZTE Corporation is a corporation organized under the laws of China, having a principal place of business at ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen Prefecture, Guangdong Province, People's Republic of China 518057. ZTE Corporation can be served with process in accordance with the California Long Arm Statute.

3. On information and belief, Defendant ZTE (USA) Inc. ("ZTE USA") is a wholly-owned subsidiary of ZTE Corporation. ZTE USA is a New Jersey Corporation with its principal place of business at 2425 North Central Expressway, Suite 323, Richardson, Texas, 75080. ZTE USA may be served through its registered agent, Incorp Services, Inc. at 5716 Corsa Ave., Suite 110, Westlake Village, California 91362.

4. On information and belief, Defendant ZTE (TX) Inc. ("ZTE TX") is a wholly-owned subsidiary of ZTE Corporation. ZTE TX is a corporation organized and existing under the laws of the State of Texas with its principal place of business in California at 1900 McCarthy Boulevard, #420, Milpitas, California 95035, and may be served through its registered agent, Incorp Services, Inc. at 5716 Corsa Ave., Suite 110, Westlake Village, California 91362.

[1] This First Amended Complaint is filed pursuant to Fed. R. Civ. P. 15(a)(1)(B).

JURISDICTION AND VENUE

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

6. This Court has personal jurisdiction over each Defendant. Each Defendant has conducted and does conduct business within the State of California. Each Defendant has purposefully and voluntarily availed itself of the privileges of conducting business in the United States, in the State of California, and in the Southern District of California by continuously and systematically placing goods into the stream of commerce through an established distribution channel with the expectation that they will be purchased by consumers in the Southern District of California. ZTE USA has a principal place of business in San Diego, California, and ZTE TX has one of its five main offices in San Diego, California.

7. Both ZTE TX and ZTE USA are registered to do business in California and maintain agents for service of process there, as well as having authorized retailers for the accused products in this judicial district. Plaintiff's cause of action arises directly from Defendant's business contacts and other activities in the State of California and the Southern District of California.

8. Defendant has derived substantial revenues from its infringing acts occurring within the State of California and within this District.

9. Venue is proper as to ZTE Corporation under 28 U.S.C. § 1391(c)(3) in that it is not a resident of the United States and may, therefore, be sued in any judicial district. *Brunette Mach. Works, Ltd. v. Kockum Indus., Inc*., 406 U.S. 706, 714 (1972).

10. Venue is proper as to ZTE USA under 28 U.S.C. § 1400(b) because ZTE USA has committed acts of infringement in this District and has a regular and established place of business within this District. *TC Heartland LLC v. Kraft Foods Grp. Brands LLC*, 137 S. Ct. 1514, 1521 (2017). Specifically, ZTE USA attested that

as part of its 2018 Statement of Information for its registration to do business in California that its Principal California Office is located at 6170 Cornerstone Court East, Ste. 270, San Diego, California 92121, which is within this District. ZTE USA has further filed a Complaint for Declaratory Judgment within this District and admitted in its Complaint that ZTE USA "has operations within this District, including at 9920 Pacific Heights Blvd, San Diego, CA 92121." *See* Complaint, Dkt. No. 1 at p.1, *ZTE (USA) Inc. v. Pragmatus Mobile, LLC*, Case No. 14-cv-0707AJB JMA.

11. Venue is proper as to ZTE TX under 28 U.S.C. § 1400(b) because ZTE TX has committed acts of infringement in this District and has a regular and established place of business within this District. *Id.* Specifically, on both the contact page and locations page of its website, ZTE TX list an office at 6170 Cornerstone Court East, Ste. 270, San Diego, California 92121, which is within this District, as one of its five offices in the U.S. See www.ztetx.com/about/zte_us_ltd/ (last accessed August 1, 2018); www.ztetx.com/others/contact/ (last August 1, 2018).

12. Defendant has committed acts of infringement in this District giving rise to this action and does business in this District, including making sales and/or providing service and support for its respective customers in this District. Defendant purposefully and voluntarily sold one or more of its infringing products with the expectation that they would be purchased by consumers in this District. These infringing products have been and continue to be purchased by consumers in this District. Defendant has committed acts of patent infringement within the United States, the State of California, and the Southern District of California.

THE BNR PORTFOLIO

A. Bell Northern Research

13. Bell Northern Research is the successor in interest to a key portfolio of telecommunications-related intellectual property developed at leading telecom innovators, such as Agere Systems Inc. ("Agere"), LSI Corporation ("LSI"), Renesas Electronics Corporation, and Broadcom Corporation ("Broadcom").

14. Key figures of BNR previously served in leadership roles within the intellectual property departments of Agere, LSI, and Nortel Networks (US and Canadian entities). They continued in similar roles with Rockstar Consortium, the entity created by the winning bidders of Nortel's bankruptcy patent auction, where they managed Nortel's former patent portfolio, a portfolio which many of them had spent years developing and monetizing for Nortel.

15. BNR was formed in 2017 to manage a portfolio of telecommunication - related intellectual property acquired from Broadcom.

B. The BNR Portfolio

16. The BNR portfolio comprises patents that reflect important developments in telecommunications that were invented and refined by leading technology research companies, including Agere, LSI, and Broadcom. These include U.S. Patent Nos. 7,319,889; 8,204,554; 7,990,842; 8,416,862; 7,957,450; 6,941,156; 8,792,432; and 7,039,435 (collectively, the "Asserted Patents").

17. In 2002, Lucent Technologies, Inc., having its roots with Bell Laboratories and AT&T Corporation, spun off Agere. Agere was merged into LSI in 2007, which was in turn acquired by Avago Technologies ("Avago") in 2014. In 2016, Avago purchased Broadcom and assumed its name to become the current Broadcom Inc.

18. Portions of the BNR portfolio are presently licensed and/or were previously licensed to leading technology companies.

PATENT PROSECUTION AND EXAMINATION

19. Examiners at the United States Patent and Trademark Office ("USPTO") review patent applications to determine whether a claimed invention should be granted a patent. In general, the most important task of a patent examiner is to review the technical information disclosed in a patent application and to compare it to the state of the art. This involves reading and understanding a patent application, and then searching the prior art to determine what technological contribution the application teaches the public. A patent is a reward for informing the public about specific

technical details of a new invention. The work of a patent examiner includes searching prior patents, scientific literature databases, and other resources for prior art. Then, an examiner reviews the claims of the patent application substantively to determine whether each complies with the legal requirements for granting of a patent. A claimed invention must meet patentability requirements including statutory subject matter, novelty, inventive step or non-obviousness, industrial application (or utility) and sufficiency of disclosure, and examiners must apply federal laws (Title 35 of the United States Code), rules, judicial precedents, and guidance from agency administrators.

20. All examiners must have a college degree in engineering or science. Examiners are assigned to "Art Units," typically groups of 8-15 Examiners in the same area of technology. Thus, by way of required background and work experience, Examiners have special knowledge and skill concerning the technologies examined by them and in their particular Art Unit.

21. The basic steps of the examination consist of:

- reviewing patent applications to determine if they comply with basic format, rules and legal requirements;
- determining the scope of the invention claimed by the inventor;
- searching for relevant technologies to compare similar prior inventions with the invention claimed in the patent application; and
- communicating findings as to the patentability of an applicant's invention via a written action to inventors/patent practitioners.

22. Communication of findings as to patentability are done by way of one or more Office Actions in which the Examiner accepts or rejects proposed claims filed by the applicant(s) and provides reasons for rejections. The applicant(s) are then permitted to file a Response to Office Action, in which claims may be amended to address issues raised by the Examiner, or the applicant states reasons why the Examiner's findings are incorrect. If an applicant disagrees with a Final Rejection by an Examiner, the

applicant may file an appeal with the Patent Trial and Appeal Board ("PTAB"). If, after this process, the USPTO determines that the application meets all requirements, a patent is duly allowed, and after an issue fee is paid, the patent is issued.

23. A patent duly allowed and issued by the USPTO is presumptively valid and becomes the property of the inventor(s) or assignee(s).

24. A "Continuation Application" is one where, typically after allowance but in any event prior to issuance, the inventor applies for a second, related patent. A Continuation employs substantially the same invention disclosure as the previous, allowed application, but seeks new or different claims.

ASSERTED PATENTS

A. The Goris Patents

25. BNR is the owner by assignment of U.S. Patent No. 7,319,889 (the "'889 patent"). The '889 Patent is entitled "System and Method for Conserving Battery Power in a Mobile Station." The '889 Patent issued on January 15, 2008. A true and correct copy of the '889 Patent is attached as **Exhibit A**.

26. BNR is also the owner by assignment of U.S. Patent No. 8,204,554 (the "'554 patent"). The '554 Patent is entitled "System and Method for Conserving Battery Power in a Mobile Station." The '554 Patent issued on June 19, 2012. A true and correct copy of the '554 Patent is attached as **Exhibit B**.

27. The inventors of the '889 Patent and the '554 Patent (collectively, the "Goris Patents") are Norman Goris and Wolfgang Scheit.

28. The '889 Patent is a continuation of U.S. Patent No. 7,113,811, filed on June 17, 2003. The '554 Patent is a continuation of the '889 Patent.

29. The Goris Patents generally relate to "mobile station[s]…having a reduced power consumption under certain operating conditions." Ex. A col. 1:14-17.

30. The claimed inventions in the Goris Patents are directed to methods and systems that allow a mobile station, such as a cellular phone, to conserve power – for example, to extend the amount of time for the station to operate on battery power.

31. The background sections of the Goris Patents describe the need for battery power conservation:

> Usually the stand-by time, as well as the talk-time, of a mobile station depend on the lifetime of a (rechargeable) battery inserted within the mobile station and hence, on the load and/or on the capacity of the battery…Increasing of the capacity of the battery would increase the lifetime of the mobile station, but batteries having increased capacities are often larger, heavier or more expensive, none of which are desirable attributes for a portable, affordable mobile station. Accordingly, what is needed in the art is a way to prolong the lifetime of a mobile station without having to use a battery with an increased capacity.

Ex. A col. 1:27-37; Ex. B col. 1:27-37.

32. The Goris Patents describe the reduced power consumption resulting from the invention. For example:

> Thus, by reducing the power consumption of the display of an activated telephone set in case the display is not needed, i.e., in particular during a telephone call, current is saved instead of needlessly consumed from the (rechargeable) battery. Accordingly, the spared available battery power may be significant, especially for color displays, resulting in an overall increasement of the stand-by and/or talk time of the telephone set.

Ex. A col. 1:47-54; Ex. B col. 1:48-55.

33. Reducing a device's power consumption is increasingly important and beneficial, as the devices on the market continue to grow in complexity and functionality, demanding more and more power to operate their various features, including audiovisual and connectivity tasks.

34. The preferred embodiments of the invention "are adapted to switch-off the display [of a telephone set] in response to a detection that the set…is attached near to an object, in particular to the ear." Ex. A col. 1:55-58; Ex. B. col. 1:56-69.

35. The '889 Patent contains two independent claims and thirteen total claims, covering various methods and systems. Claim 1 reads:

> A mobile station, comprising:

a display;

a proximity sensor adapted to generate a signal indicative of proximity of an external object; and

a microprocessor adapted to:

(a) determine whether a telephone call is active;

(b) receive the signal from the proximity sensor; and

(c) reduce power to the display if (i) the microprocessor determines that a telephone call is active and (ii) the signal indicates the proximity of the external object; wherein:

the telephone call is a wireless telephone call;

the microprocessor reduces power to the display while the signal indicates the proximity of the external object only if the microprocessor determines that the wireless telephone call is active; and

the proximity sensor begins detecting whether an external object is proximate substantially concurrently with the mobile station initiating an outgoing wireless telephone call or receiving an incoming wireless telephone call.

36. The ’554 Patent contains three independent claims and fourteen total claims, covering various methods and systems. Claim 1 reads:

A mobile station, comprising:

a display;

a proximity sensor adapted to generate a signal indicative of the existence of a first condition, the first condition being that an external object is proximate; and

a microprocessor adapted to:

(a) determine, without using the proximity sensor, the existence of a second condition independent and different from the first condition, the

second condition being that a user of the mobile station has performed an action to initiate an outgoing call or to answer an incoming call;

(b) in response to a determination in step (a) that the second condition exists, activate the proximity sensor;

(c) receive the signal from the activated proximity sensor; and

(d) reduce power to the display if the signal from the activated proximity sensor indicates that the first condition exists.

37. The above-disclosed claim limitations from the Goris Patents comprise various elements, including, e.g., a display, a proximity sensor, and a microprocessor adapted to determine whether a telephone call is active, receive signals from the proximity sensor, and reduce power to the display under certain conditions. These claims, as a whole, provide significant benefits and improvements to reduce a mobile station's power consumption, relative to the prior art.

38. The examination of the '889 Patent required over a year and a half, from the date of the filing of the patent application on September 6, 2006, through the issue date of January 15, 2008.

39. Two Patent Examiners were involved in examining the application that matured into the '889 Patent, namely, Examiner Kamran Afshar and Examiner George Eng.

40. Although the publicly available prosecution history of the '889 Patent does not contain a complete summary of various patent examiner searches, it indicates that Examiner Afshar conducted prior art and/or other searches using at least the patent examiner system Examiner Automated Search Tool ("EAST"), and performed searches on at least January 17, January 29, June 25, July 19, September 24, and October 11, 2007. The Patent Examiners formally cited at least five separate references during the prosecution of the '889 Patent.

41. Between the prior art references located by and cited by the Patent Examiners, and the references submitted by the applicants and considered by the

Patent Examiners during the prosecution of the '889 Patent, at least 24 patent references were formally considered by the Patent Examiners, as indicated on the front two pages of the issued '889 Patent.

42. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Patent Examiners is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

43. On October 11, 2007, the USPTO issued a Notice of Allowance as to all of claims 1-13 presently in the '889 Patent.

44. The issued claims from the '889 Patent are patentably distinct from the at least 24 references identified and/or discussed during prosecution. That is, each of the 14 claims, as a whole—which include, e.g., a display, a proximity sensor, and a microprocessor adapted to determine whether a telephone call is active, receive signals from the proximity sensor, and reduce power to the display under certain conditions — were found to be patentably distinct from at least the 24 formally identified references.

45. The references cited during the examination of the '889 Patent all represent patentably distinct and in some instances prior art means or methods to reduce power consumption by a device. By allowing the claims of the '889 Patent, each of the claims in the '889 Patent, as a whole was shown to be inventive, novel, and innovative over at least the 24 formally identified references.

46. As each claim as a whole from the '889 Patent is inventive, novel, and innovative as compared to several specific patents and other publications, each claim as a whole, constitutes more than the application of well-understood, routine, and conventional activities.

47. As of July 18, 2018, the '889 Patent or one of its family members has been cited as pertinent prior art by a USPTO examiner or an applicant during the

prosecution of at least 45 issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as Motorola, LGE, Qualcomm, Apple, Kyocera, Samsung, Lenovo, and Mediatek.

48. The ’889 patent claims priority to no later than June 17, 2003. The technology disclosed and claimed in the ’889 Patent was not then well-understood, routine or conventional because the prior art did not teach reducing battery usage for an electronic device by using a proximity sensor to reduce power consumption by the display during a phone call. To the contrary, the technology claimed in the ’889 Patent was well ahead of the state of the art at the time of the invention because it presented a way for device manufacturers and their contractors to prolong the life of a mobile station without having to use a battery with an increased capacity.

49. The examination of the ’554 Patent required over four and a half years, from the date of the filing of the patent application on November 27, 2007, through the issue date of June 19, 2012.

50. Two Patent Examiners were involved in examining the application that matured into the ’554 Patent, namely, Examiner Kamran Afshar and Examiner Kathy Wang-Hurst.

51. Although the publicly available prosecution history of the ’554 Patent does not contain a complete summary of various patent examiner searches, it indicates that Examiner Afshar conducted prior art and/or other searches using at least the patent examiner system Examiner Automated Search Tool (“EAST”), and performed searches on at least April 21 and December 21, 2010. It also shows that Examiner Wang-Hurst conducted prior art and/or other searches using at least the EAST system on at least July 28 and December 11, 2011; and February 16 and 17, 2012. The Patent Examiners formally cited at least 4 separate references during the prosecution of the ’554 Patent.

52. Between the prior art references located by and cited by the Patent Examiners, and the references submitted by the applicants and considered by the

Patent Examiners during the prosecution of the '554 Patent, at least 38 patent references and 9 non-patent references were formally considered by the Patent Examiners, as indicated on the front two pages of the issued '554 Patent.

53. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Patent Examiners is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

54. On February 23, 2012, the USPTO issued a Notice of Allowance as to all of claims 1-14 presently in the '554 Patent.

55. The issued claims from the '554 Patent are patentably distinct from the at least 47 references identified and/or discussed during prosecution. That is, each of the 14 claims, as a whole—which include, e.g., a display, a proximity sensor, and a microprocessor adapted to determine whether a telephone call is active, receive signals from the proximity sensor, and reduce power to the display under certain conditions — were found to be patentably distinct from at least the 47 formally identified references.

56. The references cited during the examination of the '554 Patent all represent patentably distinct and in some instances prior art means or methods to reduce power consumption by a device. By allowing the claims of the '554 Patent, each of the claims in the '554 Patent, as a whole was shown to be inventive, novel, and innovative over at least the 47 formally identified references.

57. As each claim as a whole from the '554 Patent is inventive, novel, and innovative as compared to several specific patents and other publications, each claim as a whole, constitutes more than the application of well-understood, routine, and conventional activities.

58. As of July 18, 2018, the '554 Patent or one of its family members has been cited as pertinent prior art by a USPTO examiner or an applicant during the

prosecution of at least 45 issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as Motorola, LGE, Qualcomm, Apple, Kyocera, Samsung, Lenovo, and Mediatek.

59. The '554 patent claims priority to no later than June 17, 2003. The technology disclosed and claimed in the '554 Patent was not then well-understood, routine or conventional because the prior art did not teach reducing battery usage for an electronic device by using a proximity sensor to reduce power consumption by the display during a phone call. To the contrary, the technology claimed in the '554 Patent was well ahead of the state of the art at the time of the invention because it presented a way for device manufacturers and their contractors to prolong the life of a mobile station without having to use a battery with an increased capacity.

B. The Wireless Computer Networking Patents

1) Overview of U.S. Patent No. 7,990,842

60. BNR is the owner by assignment of U.S. Patent No. 7,990,842 (the "'842 Patent"). The '842 Patent is entitled "Backward-Compatible Long Training Sequences for Wireless Communication Networks." The '842 Patent issued on August 2, 2011. A true and correct copy of the '842 Patent is attached as **Exhibit C**.

61. The inventors of the '842 Patent are Jason Trachewsky and Rajendra Moorti.

62. The '842 Patent is a continuation of U.S. Patent No. 7,646,703 filed on July 26, 2005.

63. The '842 Patent claims priority to at least Provisional Application Nos. 60/591,104 filed on July 27, 2004, and 60/634,102 filed on December 8, 2004.

64. The '842 Patent is generally related to wireless communication systems. In particular, the '842 Patent is concerned with the 802.11 standard and helping ensure backward compatibility with prior versions of that standard. The specification explains that:

> Different wireless devices in a wireless communication system may be compliant with different standards or different variations of the same standard. For example, 802.11a an extension of the 802.11 standard, provides up to 54 Mbps in the 5 GHz band. 802.11b, another extension of the 802.11 standard, provides 11 Mbps transmission (with a fallback to 5.5, 2 and 1 Mbps) in the 2.4 GHz band. 802.11g, another extension of the 802.11 standard, provides 20+ Mbps in the 2.4 GHz band. 802.11n, a new extension of 802.11, is being developed to address, among other [*sic*] thins, higher throughput and compatibility issues. An 802.11a compliant communications device may reside in the same WLAN as a device that is compliant with another 802.11 standard. When devices that are compliant with multiple versions of the 802.11 standard are in the same WLAN, the devices that are compliant with older versions are considered to be legacy devices. To ensure backward compatibility with legacy devices, specific mechanisms must be employed to insure that the legacy devices know when a device that is compliant with a newer version of the standard is using a wireless channel to avoid a collision.
>
> New implementations of wireless communication protocol enable higher speed throughput, while also enabling legacy devices which might be only compliant with 802.11a or 802.11g to communicate in Systems which are operating at higher speeds.

'842 Patent at Col. 1:50-2:7.

65. The 802.11a and 802.11g standard utilize what is known as the orthogonal frequency division multiplexing (OFDM) encoding scheme. "OFDM is a frequency division multiplexing modulation technique for transmitting large amounts of digital data over a radio wave" and works by spreading a single data stream over a band of Sub-carriers, each of which is transmitted in parallel." '842 Patent at Col. 2:10-15.

66. The 802.11 standard includes "training sequences" that synchronize data transfer between a wireless sender and a receiver.

67. The background section of the '842 Patent specifies the "need to create a long training sequence of minimum peak-to-average ratio that uses more Sub-carriers without interfering with adjacent channels." '842 Patent at Col. 2:37-39.

68. The '842 Patent teaches a long training sequence of minimum peak-to-average power ratio that is usable by "legacy devices in order to estimate channel

impulse response and to estimate carrier frequency offset between a transmitter and a receiver." '842 Patent at Col. 2:39-43.

69. One important technical advance and improvement offered by the inventive expanded long training sequence of minimum peak-to-average power ratio is "decrease[d] power back-off" ('842 Patent at Col. 4:4-6), which is the reduction of output power when reducing the input power. The invention may also "be used by 802.11a or 802.11g devices for estimating the channel impulse response and by a receiver for estimating the carrier frequency offset between the transmitter clock and receiver clock." '842 Patent at Col. 4:6-10. Further, the invention contributes to higher data throughput by carrying data on multiple subcarriers.

70. The '842 Patent contains one independent claim and 20 total claims, covering various apparatuses. Claim 1 reads:

> A wireless communications device, comprising:
>
> a signal generator that generates an extended long training sequence; and
>
> an Inverse Fourier Transformer operatively coupled to the signal generator,
>
> wherein the Inverse Fourier Transformer processes the extended long training sequence from the signal generator and provides an optimal extended long training sequence with a minimal peak-to-average ratio, and
>
> wherein at least the optimal extended long training sequence is carried by a greater number of Subcarriers than a standard wireless networking configuration for an Orthogonal Frequency Division Multiplexing scheme.

71. The above-disclosed claim limitations from the '842 Patent comprise various elements, including, e.g., a signal generator and an Inverse Fourier Transformer. This claim, as a whole, provides significant benefits and improvements discussed previously that directly impact and improve interoperability with devices operating on legacy versions of the 802.11 standard, relative to the prior art.

72. The examination of the ’842 Patent took nearly a year and a half, from the filing of the patent application on January 8, 2010, through the issue date of August 2, 2011.

73. The publicly available prosecution history for the ’842 Patent indicates that a single patent examiner was involved in examining the application that matured into the ’842 Patent, namely, Examiner Andrew Lee.

74. Between any prior art references located by the Patent Examiner, and the references submitted by the applicants and considered by the Patent Examiner during the prosecution of the ’842 Patent, at least 10 patent references were formally considered by the Patent Examiner, as indicated on the front page of the issued ’842 Patent.

75. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Applicants is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

76. On or about April 18, 2011, the USPTO issued a Notice of Allowance as to all of claims 1-20 presently in the ’842 Patent.

77. The issued claims from the ’842 Patent are patentably distinct from the references identified and/or discussed during prosecution. That is, each of the claims, as a whole were found to be patentably distinct from the formally identified references.

78. The references cited during the examination of the ’842 Patent all represent patentably distinct and in some instances may constitute prior art means or methods for synchronizing data transfer in wireless devices. By allowing the claims of the ’842 Patent, each of the claims in the ’842 Patent, as a whole, was shown to be inventive, novel, and innovative over at least the 10 formally identified references.

79. As each claim as a whole from the '842 Patent is inventive, novel, and innovative as compared to the specified patents and other publications, each claim, as a whole constitutes more than the application of well-understood, routine, and conventional activities.

80. As of July 23, 2018, the '842 Patent has been cited as pertinent prior art by a USPTO examiner or an applicant during the prosecution of at least 3 issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as Samsung.

81. The '842 patent claims priority to at least provisional applications filed on July 27, 2004 and December 8, 2004. The technology disclosed and claimed in the '842 Patent was not then well-understood, routine or conventional. The invention allows higher throughput by increasing data transmitted by a wireless device, which translates to faster file transfers for end users.

2) Overview of U.S. Patent No. 8,416, 862

82. BNR is the owner by assignment of U.S. Patent No. 8,416,862 (the "'862 patent"). The '862 Patent is entitled "Efficient Feedback of Channel Information in a Closed Loop Beamforming Wireless Communication System." The '862 Patent issued on April 9, 2013. A true and correct copy of the '862 Patent is attached as **Exhibit D.**

83. The inventors of the '862 patent are Carlos Aldana and Joonsuk Kim.

84. The '862 Patent is a continuation-in-part of U.S. Patent 7,738,583, filed on June 28, 2005. The '862 also claims priority to at least Provisional Application Nos. 60/673,451, filed on April 21, 2005 and 60/698,686, filed on July 13, 2005.

85. The '862 Patent is generally related to wireless communication systems and more particularly to wireless communications using beamforming. *See* '862 Patent at Col. 1:19–22.

86. The description of related art section of the patent identifies that, to properly implement beamforming, the transmitter must know the properties of the channel over which the wireless communication is conveyed. *See* '862 Patent at Col. 3:14–25.

Further, the size of the feedback information required to be sent back to the transmitting wireless device may be so large that the channel may change before the entire feedback information is received by the transmitter. *See* '862 Patent at Col. 3:14–25. One approach is to decompose the channel and send information only relating to a calculated value of the transmitter's beamforming matrix as the feedback information, but under this approach, even in a 2x2 MIMO wireless communication system, the data is still too large for practical application. *See* '862 Patent at Col. 3:27–47.

87. Thus, the '862 patent identifies a need "for a method and apparatus for reducing beamforming feedback information in wireless communications." *See* '862 Patent at Col. 3:49–51.

88. The claimed inventions in the '862 Patent are directed to improved efficiencies in transmitting feedback of transmitter beamforming information, particularly using polar coordinates. *See* '862 Patent, Col. 15:34–16:6. One of the important technical advantages and improvements offered by the inventive, improved feedback transmission is a decrease in the amount of data required to send the feedback information to the transmitting wireless transmitter. *See id*.

89. The '862 Patent contains three independent claims and twenty total claims, covering various methods and systems. Claim 1 reads:

> A method for feeding back transmitter beamforming information from a receiving wireless communication device to a transmitting wireless communication device, the method comprising:
>
> the receiving wireless communication device receiving a preamble sequence from the transmitting wireless device;
>
> the receiving wireless device estimating a channel response based upon the preamble sequence;
>
> the receiving wireless device determining an estimated transmitter beamforming unitary matrix (V) based upon the channel response and a receiver beamforming unitary matrix (U);

the receiving wireless device decomposing the estimated transmitter beamforming unitary matrix (V) to produce the transmitter beamforming information; and

the receiving wireless device wirelessly sending the transmitter beamforming information to the transmitting wireless device.

90. The above-disclosed claim limitations from the '862 Patent comprise various elements, including, e.g., a receiving wireless device capable of determining an estimated transmitter beamforming unitary matrix, decomposing an estimated transmitter beamforming unitary matrix to produce transmitter beamforming information, and the ability to send the transmitter beamforming information to the transmitting wireless device. This claim, as a whole, provides significant benefits and improvements discussed previously that directly impact the ability to efficiently transmit beamforming feedback information to the transmitting wireless device, relative to the prior art.

91. The examination of the '862 Patent required over seven and a half years, from the date of the filing of the patent application on September 28, 2005, through the issue date of April 9, 2013.

92. Two Patent Examiners were involved in examining the application that matured into the '862 Patent, namely, Examiner Shuwang Liu and Examiner Michael Neff.

93. Although the publicly available prosecution history of the '862 Patent does not contain a complete summary of various patent examiner searches, it indicates that Examiner Neff conducted prior art and/or other searches using at least the patent examiner system Examiner Automated Search Tool ("EAST"), and performed searches on at least July 24-25, 2008, June 1, 2009, October 9, 2009, and December 17, 2012. The Patent Examiners formally cited at least 5 separate references during the prosecution of the '862 Patent.

94. Between the prior art references located by and cited by the Patent Examiners, and the references submitted by the applicants and considered by the Patent Examiners during the prosecution of the ’862 Patent, at least 5 patent references and 1 non-patent reference were formally considered by the Patent Examiners, as indicated on the front page of the issued ’862 Patent.

95. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Patent Examiners is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

96. On December 28, 2012, the USPTO issued a Notice of Allowance as to all of claims 1-20 presently in the ’862 Patent.

97. The issued claims from the ’862 Patent are patentably distinct from the at least 6 references identified and/or discussed during prosecution. That is, each of the 20 claims, as a whole—which include, e.g., a receiving wireless device capable of determining an estimated transmitter beamforming unitary matrix, decomposing an estimated transmitter beamforming unitary matrix to produce transmitter beamforming information, and the ability to send the transmitter beamforming information to the transmitting wireless device—were found to be patentably distinct from at least the 6 formally identified references.

98. The references cited during the examination of the ’862 Patent all represent patentably distinct and in some instances prior art means or methods to create focused antenna beams by shifting a signal in time or phase to provide gain of the signal in a desired direction and to attenuate the signal in other directions. *See* ’862 Patent, Col. 2:66–3:13. By allowing the claims of the ’862 Patent, each of the claims in the ’862 Patent, as a whole was shown to be inventive, novel, and innovative over at least the 6 formally identified references.

99. As each claim as a whole from the '862 Patent is inventive, novel, and innovative as compared to several specific patents and other publications, each claim as a whole, constitutes more than the application of well-understood, routine, and conventional activities.

100. As of July 18, 2018, the '862 Patent or one of its family members has been cited as pertinent prior art by a USPTO examiner or an applicant during the prosecution of at least 10 issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as LGE, Samsung, Texas Instruments, and Nokia.

101. The '862 patent claims priority to no later than April 21, 2005. The technology disclosed and claimed in the '862 Patent was not then well-understood, routine or conventional. To the contrary, the technology claimed—namely, as discussed above, the ability to provide efficient (e.g. less data) feedback for a channel during beamforming--in the '862 Patent was well ahead of the state of the art at the time of the invention.

3) Overview of U.S. Patent No. 7,957,450

102. BNR is the owner by assignment of U.S. Patent No. 7,957,450 (the "'450 Patent"). The '450 Patent is entitled "Method and System for Frame Formats for MIMO Channel Measurement Exchange." The '450 Patent issued on August June 7, 2011. A true and correct copy of the '450 Patent is attached as **Exhibit G**.

103. The inventors of the '450 Patent are Christopher Hansen, Carlos Aldana, and Joonsuk Kim.

104. The '450 Patent is a continuation of U.S. Patent No. 7,564,914 filed on February 7, 2005.

105. The '450 Patent claims priority to Provisional Application No. 60/636,255 filed on December 14, 2004.

106. The '450 Patent is generally related to "multiple antenna multiple output (MIMO) systems… in which mobile terminals incorporate smart antenna systems

comprising multiple transmit antenna and multiple receive antenna. Col. 1:54-57. The specification explains that "[s]ignal fading is a significant problem in wireless communications systems, often leading to temporary loss of communications at mobile terminals." Col. 1:63-54.

107. The specification explains that "One of the most pervasive forms of fading is known as multipath fading, in which dispersion of transmitted signals due to incident reflections from buildings and other obstacles, results in multiple versions of the transmitted signals arriving at a receiving mobile terminal. The multiple versions of the transmitted signal may interfere with each other and may result in a reduced signal level detected at the receiving mobile terminal. When versions of the transmitted signal are 180º degree out of phase they may cancel each other such that a signal level of 0 is detected. Locations where this occurs may correspond to 'dead zones' in which communication to the wireless terminal is temporarily lost." Col. 1:65-2:9.

108. "Another important type of fading is related to motion. When a transmitting mobile terminal, or a receiving mobile terminal is in motion, the Doppler phenomenon may affect the frequency of the received signal. The frequency of the received signal may be changed by an amount which is a function of the velocity at which a mobile terminal is moving. Because of the Doppler effect, ISI may result when a mobile terminal is in motion, particularly when the mobile terminal is moving at a high velocity." Col. 2:34-37.

109. In order to improve signal reception and reduce interference, many certain wireless communication devices utilize beamforming technology, whose aim is to focus the transmission of wireless signals in a specific direction to improve reception. Instead of broadcasting wireless signals uniformly in all directions, beamforming devices attempt to direct wireless signals to specific devices to achieve a better signal to noise ratio. *See* Col. 1:35-53.

110. "One of the challenges in beamforming is that the multiplicative scale factors which are applied to transmitted and received signals may be dependent upon

the characteristics of the communications medium between the transmitting mobile terminal and the receiving mobile terminal. A communications medium, such as a radio frequency (RF) channel between a transmitting mobile terminal and a receiving mobile terminal, may be represented by a transfer system function, H. The relationship between a time varying transmitted signal, x(t), a time varying received signal, y(t), and the systems function may be represented as shown in equation [1]: y(t)=Hxx(t)+ n(t), where n(t) represents noise which may be introduced as the signal travels through the communications medium and the receiver itself. In MIMO systems, the elements in equation[1] may be represented as vectors and matrices. If a transmitting mobile terminal comprises M transmitting antenna, and a receiving mobile terminal comprises N receiving antenna, then y(t) may be represented by a vector of dimensions Nx1, x(t) may be represented by a vector of dimensions Mx1, n(t) by a vector of dimensions Nx1, and H may be represented by a matrix of dimensions NxM. In the case of fast fading, the transfer function, H, may itself become time varying and may thus also become a function of time, H(t). Therefore, individual coefficients, $h_{ij}(t)$, in the transfer function H(t) may become time varying in nature." Col. 3:49-4:9.

111. Beamforming is challenging because focusing the transmission of wireless signals must be adjusted as the relative positions of the transmitting and receiving wireless device positions change relative to one another. Thus, information about the RF channel used to transmit information must be adapted or else "information loss between the transmitting mobile terminal and the receiving mobile terminal may result." Col. 4:22-24.

112. Existing methods and techniques, such as channel reciprocity, for estimating RF channel characteristics were insufficient because "differences in the electronic circuitry between the respective transmitting mobile terminal and receiving mobile terminal such that, in some cases, there may not be channel reciprocity." Col. 5:16:25.

113. The '450 addresses the shortcomings in the prior art by disclosing "a method for communicating information in a communication system may comprise transmitting data via a plurality of radio frequency (RF) channels utilizing a plurality of transmitting antenna, receiving feedback information via at least one of the plurality of RF channels, and modifying a transmission mode based on the feedback information. Feedback information may be requested utilizing at least one of the plurality of transmitting antenna via at least one of the plurality of RF channels. The number of transmitting antenna utilized during the transmitting of data may be modified based on the feedback information. The transmission characteristics of data transmitted via at least one of the plurality of transmitting antenna may be modified based on the feedback information. Specific feedback information may be requested in request messages." Col. 5:56-6:3.

114. Furthermore, the specification discloses that "a receiving mobile terminal may perform a singular value decomposition (SVD) on the channel estimate matrix, and subsequently transmit SVD-derived feedback information to the transmitting mobile terminal. Utilizing SVD may increase the amount of computation required at the receiving mobile terminal but may reduce the quantity of information which is transmitted to the transmitting mobile terminal via the RF channel in comparison to transmitting the entire channel estimate matrix." Col. 8:1-10.

115. The '450 Patent contains four independent claims and 22 total claims, covering various methods and systems. Claim 1 reads:

> A method for communication, the method comprising:
>
> computing a plurality of channel estimate matrices based on signals received by a mobile terminal from a base station, via one or more downlink RF channels, wherein said plurality of channel estimate matrices comprise coefficients derived from performing a singular value matrix decomposition (SVD) on said received signals; and

transmitting said coefficients as feedback information to said base station, via one or more uplink RF channels.

116. The examination of the '450 Patent took nearly two years, from the filing of the patent application on July 20, 2009, through the issue date of June 7, 2011.

117. The publicly available prosecution history for the '450 Patent indicates that a single patent examiner was involved in examining the application that matured into the '450 Patent, namely, Examiner Khai Tran.

118. Between any prior art references located by the Patent Examiner, and the references submitted by the applicants and considered by the Patent Examiner during the prosecution of the '450 Patent, at least two patent references were formally considered by the Patent Examiner, as indicated on the front page of the issued '450 Patent. Furthermore, Patent Office procedure dictate that for continuations, such as the '450 Patent, the prior art of record from the examination of the parent patent is part of the record in a continuation application. *See* Manual of Patent Examining Procedure ("MPEP") at §609.02 (8th ed., Rev. 7, July 2008) ("The examiner of the continuing application will consider information which has been considered by the Office in the parent application."). Thus, the prior art considered in U.S. Patent No. 7,564,914 (the parent of the '450 Patent) was also considered by the Examiner.

119. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Applicants is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

120. On or about December 27, 2010, the USPTO issued a Notice of Allowance as to all of claims 1-22 presently in the '450 Patent.

121. The issued claims from the '450 Patent are patentably distinct from the references identified and/or discussed during prosecution. That is, each of the claims, as a whole were found to be patentably distinct from the formally identified references.

122. The references cited during the examination of the '450 Patent all represent patentably distinct and in some instances may constitute prior art means or methods for communicating information in wireless systems and devices. By allowing the claims of the '450 Patent, each of the claims in the '450 Patent, as a whole, was shown to be inventive, novel, and innovative over at least the formally identified references.

123. As each claim as a whole from the '450 Patent is inventive, novel, and innovative as compared to the specified patents and other publications, each claim, as a whole constitutes more than the application of well-understood, routine, and conventional activities.

124. As of September 25, 2018, the '450 Patent has been cited as pertinent prior art by a USPTO examiner or an applicant during the prosecution of at least two issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as Sharp.

125. The '450 patent claims priority to at least once provisional application filed on December 14, 2004.

126. The technology disclosed and claimed in the '450 Patent was not then well-understood, routine or conventional. The invention allows for improved beamforming in wireless communication devices, which translates to improved device performance and information transfer for end users.

C. The Wireless Switching Patent

127. BNR is the owner by assignment of U.S. Patent No. 6,941,156 (the "'156 Patent"). The '156 Patent is entitled "Automatic Handoff for Wireless Piconet Multimode Cell Phone." The '156 Patent issued on September 6, 2005. A true and correct copy of the '156 Patent is attached as **Exhibit E**.

128. The inventor of the ’156 patent is Philip D. Mooney.

129. The ’156 Patent is generally related to the use of multimode cellular phones and the ability to smoothly switch between two different modes of communication operable on the cellular phone. *See* ’156 Patent at Col. 1:5–61.

130. The description of related art section of the patent identifies that prior art multimode cellphones required manual switching and interruption in the signal when attempting to switch between the modes of the cellphone. *See* ’156 Patent at Col. 1:32–48.

131. Thus, the ’156 patent identifies a need for a cellular phone “which provides smooth switchover and interaction between separate modes of operation.” *See* ’156 Patent at Col. 1:46–48.

132. The claimed inventions in the ’156 Patent are directed to improved methods of switching between modes of operation in multimode cellular phones. *See* ’156 Patent at Col. 1:46–48. One of the important technical advantages and improvements offered by the inventive, improved switching is the automatic switching, including establishing a second communications link while the first communications link is still active whereas the prior art required the call to disconnect before switching modes. *See* ’156 Patent at Col. 1:50–2:5.

133. The ’156 Patent contains three independent claims and nineteen total claims, covering various methods and systems. Claim 1 reads:

A multimode cell phone, comprising:

a cell phone functionality; and

an RF communication functionality separate from said cell phone functionality; a module to establish simultaneous communication paths from said multimode cell phone using both said cell phone functionality and said RF communication functionality; and

an automatic switch over module, in communication with both said cell phone functionality and said RF communication functionality, operable to switch a

> communication path established on one of said cell phone functionality and said RF communication functionality, with another communication path later established on the other of said cell phone functionality and said RF communication functionality.

134. The above-disclosed claim limitations from the '156 Patent comprise various elements, including, e.g., a multimode cellphone with cell phone and RF communication functionality; a module to establish simultaneous communication paths with both modes, and an automatic switchover module in communication with both modes of communication functionality that can switch between the first established communication path to the other communication path that exists in parallel with the first. This claim, as a whole, provides significant benefits and improvements discussed previously that directly impact the ability to switch between two distinct RF communication paths of a cellphone device seamlessly and automatically, relative to the prior art.

135. The examination of the '156 Patent required over four years, from the date of the filing of the patent application on June 26, 2001, through the issue date of September 6, 2005.

136. The Patent Examiner involved in examining the application that matured into the '156 Patent was Examiner Bing Q. Bui.

137. Although the publicly available prosecution history of the '156 Patent does not contain a complete summary of various patent examiner searches, it indicates that Examiner Bui conducted prior art and/or other searches using at least the patent examiner system Examiner Automated Search Tool ("EAST"), and performed searches on at least December 6, 2004. The Patent Examiner formally cited at least 9 separate references during the prosecution of the '156 Patent.

138. Between the prior art references located by and cited by the Patent Examiner, and the references submitted by the applicants and considered by the Patent Examiners during the prosecution of the '156 Patent, at least 9 were formally

considered by the Patent Examiner, as indicated on the front page of the issued '156 Patent.

139. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Patent Examiners is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

140. On April 26, 2005, the USPTO issued a Notice of Allowance as to all of claims 1-19 presently in the '156 Patent.

141. The issued claims from the '156 Patent are patentably distinct from the at least 9 references identified and/or discussed during prosecution. That is, each of the 19 claims, as a whole—which include, e.g., a multimode cellphone with cell phone and RF communication functionality; a module to establish simultaneous communication paths with both modes, and an automatic switchover module in communication with both modes of communication functionality that can switch between the first established communication path to the other communication path that exists in parallel with the first—were found to be patentably distinct from at least the 9 formally identified references.

142. The references cited during the examination of the '156 Patent all represent patentably distinct and in some instances prior art means or methods to manually switching communication between two modes of a phone. *See* '156 Patent, Col. 1:13–45. By allowing the claims of the '156 Patent, each of the claims in the '156 Patent, as a whole was shown to be inventive, novel, and innovative over at least the 9 formally identified references.

143. As each claim as a whole from the '156 Patent is inventive, novel, and innovative as compared to several specific patents and other publications, each claim

as a whole, constitutes more than the application of well-understood, routine, and conventional activities.

144. As of July 18, 2018, the '156 Patent or one of its family members has been cited as pertinent prior art by a USPTO examiner or an applicant during the prosecution of at least 25 issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as Motorola, AT&T, Nokia, Sprint, and Garmin.

145. The '156 patent claims priority to no later than June 26, 2001. The technology disclosed and claimed in the '156 Patent was not then well-understood, routine or conventional. To the contrary, the technology claimed in the '156 Patent—namely, the automatic handoff of a call from one type of RF communication link to a different type of RF communication link without dropping the call —was well ahead of the state of the art at the time of the invention.

D. The RACH Message Prioritization Patent

146. BNR is the owner by assignment of U.S. Patent No. 8,792,432 (the "'432 Patent"). The '432 Patent is entitled "Prioritizing RACH Message Contents." The '432 Patent issued on July 29, 2014. A true and correct copy of the '432 Patent is attached as **Exhibit F**.

147. The inventors of the '432 patent are Brian Martin and Keiichi Kubota.

148. The '432 Patent is generally related to wireless communication systems. In particular, the '432 Patent is concerned with the portion of the 3GPP standard that addresses Random Access Channel ("RACH") procedures. RACH procedures are used by various radio technologies for User Equipment ("UE")—e.g., a mobile device—to gain contention-based access to a network. *See* '432 Patent at Col. 1:5–9, 31-44.

149. The '432 Patent particularly addresses the prioritization of information sent from a mobile device, e.g., a cellular phone, to a base station, e.g., a cell tower, regarding the RACH characteristics of neighboring base stations. *See* '432 Patent at Col. 1:58–2:44.

150. The background section of the patent identifies that prior art RACH signaling did not generally allow for sufficient message space to include neighbor cell measurements for both inter-frequency and intra-frequency cell neighbors, within the constraints of a Radio Resource Control ("RRC") connection request message. If sufficient space were lacking, the default was to transmit only the inter-frequency neighbor cell measurements, and to drop the information about intra-frequency neighbor cell measurements, and other RACH message information, which otherwise would have been included. This resulted in the cell network station not receiving intra-frequency neighbor measurements or other information, even if that information was more necessary and relevant for the cell station to receive. The patent specifically identifies as deficient the current 3GPP standards in effect at the time. *See* '432 Patent at Col. 2:7–44.

151. Thus, the '432 patent identifies a need to "allow the [mobile device] to include neighbor cell measurements for both inter-frequency and intra-frequency neighbors in its UL RACH message." *See* '432 Patent at Col. 2:36–38.

152. The claimed inventions in the '432 Patent are directed to prioritization of information transmitted from a user device to a base station in a RACH RRC connection message, within the space constraints of that message. *See* '432 Patent at Col. 1:58–2:44. One of the important technical advantages and improvements offered by the inventive, improved prioritization is that the mobile device is enabled to prioritize the content of the RRC connection request message more efficiently. The invention also avoids network features being redundant, unusable, or unreliable, and permits the RRC connection request to be used in future implementations of the 3GPP standards. *See* '432 Patent at Col. 1:50–2:5.

153. The '432 Patent contains four independent claims and fourteen total claims, covering various methods and systems. Claim 12 reads:

A method comprising:

receiving, by a user equipment, a broadcast indication indicating whether to prioritize inter-frequency or intra-frequency neighbor cell measurements for inclusion in an uplink connection request message to be sent on a random access channel; and

constructing the uplink connection request message which includes measurements that are prioritized in accordance with the broadcast indication so as not to exceed a maximum size of the uplink connection request message;

in which one value of the indication directs that the inter-frequency neighbor cell measurements are prioritized over the intra-frequency neighbor cell measurement results for inclusion in the uplink connection request message; and a different value of the indication or omission of the indication directs that the intra-frequency neighbor cell measurements are prioritized over the inter-frequency neighbor cell measurements for inclusion in the uplink connection request message, and

in which the indication is within an information element of system information received on a broadcast channel from an access node of a UTRAN or an E-UTRAN wireless system, and the uplink connection request message is a Radio Resource Control Connection Request message.

154. The above-disclosed claim limitations from the ’432 Patent comprise various elements, including, e.g., receiving on a mobile device (“user equipment”) a broadcast indication indicating prioritization of neighbor cell measurements to be sent on a RACH uplink message, and constructing the uplink connection message in accordance with that prioritization. This claim, as a whole, provides significant benefits and improvements discussed previously that directly impact the ability to transmit neighbor cell measurements to a base station in accordance with network priorities, while staying within the confines of the Radio Resource Control Connection Request message.

155. The examination of the ’432 Patent required over three years, from the filing of the patent application on February 14, 2011, through the issue date of July 29, 2014.

156. Two Patent Examiners were involved in examining the application that matured into the '432 Patent, namely, Examiner Andrew Lai and Assistant Examiner Sumitra Ganguly.

157. Although the publicly available prosecution history of the '432 Patent does not contain a complete summary of various patent examiner searches, it indicates that the examiners conducted prior art and/or other searches using at least the patent examiner system Examiner Automated Search Tool ("EAST"), and performed searches on at least March 9, 2013, and October 2, 2013. The Patent Examiners formally cited at least 13 separate references during the prosecution of the '432 Patent.

158. Between the prior art references located by and cited by the Patent Examiner, and the references submitted by the applicants and considered by the Patent Examiners during the prosecution of the '432 Patent, at least 13 were formally considered by the Patent Examiner, including five U.S. patents, two foreign patents, and six other publications, as indicated on the front page of the issued '432 Patent.

159. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Patent Examiners is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

160. During the prosecution process, the USPTO rejected the application as being anticipated by U.S. Patent No. 6,845,238 (Mueller), as well as being obvious over Mueller in view of U.S. Patent Application 2008/0045213 (Norris).

161. On April 4, 2014, the USPTO issued a Notice of Allowance as to all of claims 1-14 presently in the '432 Patent.

162. The issued claims from the '432 Patent are patentably distinct from the at least 13 references identified and/or discussed during prosecution. That is, each of the 14 claims, as a whole—which include, e.g., receiving on a mobile device a broadcast

indication indicating prioritization of neighbor cell measurements to be sent on a RACH uplink message, and constructing the uplink connection message in accordance with that prioritization—were found to be patentably distinct from at least the 13 formally identified references.

163. The references cited during the examination of the ’432 Patent all represent patentably distinct and in some instances prior art means or methods to communicate neighboring cell information. By allowing the claims of the ’432 Patent, each of the claims in the ’432 Patent, as a whole was shown to be inventive, novel, and innovative over at least the 13 formally identified references.

164. As each claim as a whole from the ’432 Patent is inventive, novel, and innovative as compared to several specific patents and other publications, each claim as a whole, constitutes more than the application of well-understood, routine, and conventional activities.

165. As of July 25, 2018, the ’432 Patent, or one of its family members, has been cited as pertinent prior art by a USPTO examiner or an applicant during the prosecution of at least five issued patents or published applications, including during the prosecution of patent applications filed by leading technology companies such as Qualcomm, Ericsson, and Huawei.

166. The ’432 patent claims priority to no later than February 14, 2011. The technology disclosed and claimed in the ’432 Patent was not then well-understood, routine or conventional. To the contrary, the technology claimed in the ’432 Patent was well ahead of the state of the art at the time of the invention. As described above, the prior technology regarding sharing of neighboring cell information prioritized inter-frequency information above intra-frequency information in all cases, and did not allow for prioritizing intra-frequency or other RACH message information if the RRC connection request message were space-constrained. The ’432 Patent resolves that problem.

E. The Proximity-Based Power Regulation Patent

167. BNR is the owner by assignment of U.S. Patent No. 7,039,435 (the "'435 Patent"). The '435 Patent is entitled "Proximity Regulation System for Use with a Portable Cell Phone and a Method of Operation Thereof." The '435 Patent issued on May 2, 2006. A true and correct copy of the '435 Patent is attached as **Exhibit H**.

168. The inventors of the '435 Patent are Richard McDowell and Philip Mooney.

169. The application that resulted in the issuance of the '435 Patent was filed on September 28, 2001.

170. The '435 Patent is generally related to a proximity regulation system and associated methods that adjust transmit power under certain conditions, for use with a portable cell phone. The specification explains that:

> To address the [] deficiencies of the prior art, the present invention provides a proximity regulation system for use with a portable cell phone. In one embodiment, the proximity regulation system includes a location sensing subsystem that is configured to determine a location of the portable cell phone proximate a user. A power governing subsystem is coupled to the location sensing subsystem and configured to determine a proximity transmit power level of the portable cell phone based on the location.

'435 Patent at Col. 2:1-11.

171. The background section of the '435 Patent describes the shortcomings of the prior art:

> Typically, the quality of service of a cell phone is proportional to the transmit power level of the cell phone. Though no definite proof has been determined, health concerns have arisen due to the power used to transmit the radio frequency of cell phones when operated close to the body of a cell phone user. …Cell phone users still want the best possible quality of service from their cell phone. However, health concerns regarding the transmit power of cell phones are now beginning to affect some users. Manufacturers have tried several options to relieve the fears of consumers. One such option involves permanently reducing the power of the transmitter in cellphones. Though this may be perceived as a safety advantage to some customers, unfortunately, this also reduces the quality of service of the cell phone. Another option for consumers is the use of cell phones with a base that typically allows a higher transmit power

> level of up to three watts….These type of cell phones, however, do not allow the flexibility demanded by consumers that is found in the use of a portable cell phone.

'435 Patent at Col. 1:33-62.

172. The '435 Patent identifies the need "in the art [for] a system and method to automatically reduce the transmit power level of a portable cell phone when located near a human body thereby decreasing the perception of health risks associated with the use thereof." '435 Patent at Col. 1:62-67.

173. The '435 Patent addresses that need by allowing for adjustment of a power governing subsystem based on a location sensing subsystem, to determine a proximity transmit power level of a cell phone based on location. *See*, *e.g.*, '435 Patent at Col. 2:1-39.

174. The '435 Patent contains one independent claim and nine total claims, covering portable cell phone apparatuses. Claim 1 reads:

> A portable cell phone, comprising:
>
> a power circuit that provides a network adjusted transmit power level as a function of a position to a communications tower, and
>
> a proximity regulation system, including:
>
> > a location sensing subsystem that determines a location of said portable cell phone proximate a user; and
> >
> > a power governing subsystem, coupled to said location sensing subsystem, that determines a proximity transmit power level of said portable cell phone based on said location and determines a transmit power level for said portable cell phone based on said network adjusted transmit power level and said proximity transmit power level.

175. The above-disclosed claim limitations from the '435 Patent comprise various elements, including, e.g., a proximity regulation system that contains both a location sensing subsystem to determine location proximate a user and a power

governing subsystem that adjusts transmit power level of a cell phone based on location. This claim, as a whole, provides significant benefits and improvements discussed previously that directly adjusts power levels to address certain health concerns based on cell phone usage.

176. The examination of the ’435 Patent took over four years, from the filing of the patent application on September 28, 2001, through the issue date of May 2, 2006.

177. The publicly available prosecution history for the ’435 Patent indicates that a single patent examiner was involved in examining the application that matured into the ’435 Patent, namely, Examiner Sonny Trinh.

178. Between any prior art references located by the Patent Examiner, and the references submitted by the applicants and considered by the Patent Examiner during the prosecution of the ’435 Patent, at least 16 U.S. and foreign patent references were formally considered by the Examiner, as indicated on the front page of the issued ’435 Patent.

179. On information and belief, it is the practice of the USPTO not to cite excessive cumulative art, in other words, in this instance, the art cited by the Applicants is representative of considerable other art located by the USPTO and not cited. Further on information and belief, it is the practice of the USPTO to discuss in its Office Actions those references of which the Patent Examiners are aware that most closely resemble the claimed inventions.

180. On or about November 18, 2005, the USPTO issued a Notice of Allowance as to all of claims 1-9 presently in the ’435 Patent.

181. The issued claims from the ’435 Patent are patentably distinct from the references identified and/or discussed during prosecution. That is, each of the claims, as a whole were found to be patentably distinct from the formally identified references.

182. The references cited during the examination of the ’435 Patent all represent patentably distinct and in some instances may constitute prior art means or methods for manipulating power levels of a cell phone. By allowing the claims of the ’435 Patent,

each of the claims in the '435 Patent, as a whole, was shown to be inventive, novel, and innovative over at least the 16 formally identified references.

183. As each claim as a whole from the '435 Patent is inventive, novel, and innovative as compared to the specified patents and other publications, each claim, as a whole constitutes more than the application of well-understood, routine, and conventional activities.

184. As of October 1, 2018, the '435 Patent or a family member has been cited as pertinent prior art by a USPTO examiner or an applicant during the prosecution of at least 110 issued patents and published applications—including during the prosecution of patent applications filed by leading technology companies such as Apple, Google, Samsung, and Qualcomm.

185. The '435 patent claims priority to no later than September 28, 2001, its filing date. The technology disclosed and claimed in the '435 Patent was not then well-understood, routine or conventional. The invention allows an automatic way to regulate transmit power levels in a cell phone depending on the cell phone's location and/or proximity in order to avoid harmful health effects.

OVERVIEW OF ACCUSED TECHNOLOGY

A. ZTE'S CELLULAR PHONE PRODUCTS

186. ZTE makes and sells cellular phones in the United States. These offerings use trade names such as Axon, Maven, Blade, Grand, ZMAX, among others. ZTE markets each of these phones as compliant with the 3GPP standards promulgated by standard setting body the European Telecommunications Standards Institute ("ETSI"), and markets some as compliant with either or both the 802.11ac and 802.11n standards promulgated by standard setting body the Institute of Electronics and Electrical Engineers ("IEEE"). These phones also include features that offer service and device-related benefits to users, such as seamlessly switching from a cellular network call to a WiFi network call, and proximity sensors to manipulate displays under certain call conditions to reduce battery consumption and to regulate transmit power levels.

B. ZTE'S TABLET PRODUCTS

187. ZTE makes and sells tablet devices in the United States. These offerings use trade names such as Primetime, Zpad and Trek. ZTE markets each of these tablets as compliant with either or both the 802.11ac and 802.11n standards promulgated by IEEE; it markets some as compliant with the 3GPP standards promulgated by ETSI. ZTE or its agents also submit test data to the Federal Communications Commission showing that the devices regulate transmit power based on proximity information.

COUNT I

(Infringement of U.S. Patent No. 7,319,889)

188. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

189. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 1) of the '889 Patent, in violation of 35 U.S.C. § 271(a).

190. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to Axon M, Axon 7, Axon 7 mini, Axon Pro, Maven 3, Maven 2, Blade Spark, Blade Z Max, Blade X, Blade Vantage, Blade V8 Pro, Blade Max 3, Grand X 4, Max XL, Max Blue, Prelude+, Tempo X, ZMAX 2, ZMAX Champ LTE, ZMAX One, ZMAX Pro, ZFIVE G, Fanfare 3, Majesty Pro Plus, Avid 4, Avid Trio, Blade X Max, Majesty Pro, and Jasper LTE (collectively, the "'889 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '889 Patent, including claim 1.

191. By way of example only, Defendant's Axon M product is a mobile station (cellular phone) comprising a display, a proximity sensor (located at the top of the device) adapted to generate a signal indicative of proximity of an external object (e.g.,

a person's ear), a microprocessor adapted to (1) determine whether a wireless telephone call is active, (2) receive a signal from the proximity sensor, and (3) reduce power to the phone's display if a call is active and the signal indicates the proximity of the external object (e.g., ear). The microprocessor in the Axon M product reduces power to the display while the signal indicates the proximity of the external object (e.g., ear) only if it determines that the call is active, and the proximity sensor of the device begins detecting proximity substantially concurrently with the initiation of an outgoing call or receiving an incoming call.

ZTE Axon M User Guide.[2]

192. The Axon M's display is backlit at a normal level when a user is browsing the web or sending text messages. However, when a call is active and the user brings the phone proximate to the ear, the display dims, conserving battery power.

193. By way of example only, the remainder of the '889 Accused Products include each of the limitations described in the previous paragraph with respect to the

[2] Available at https://d28dq596ebml6z.cloudfront.net/media/wysiwyg/axon-m/ZTE_Axon_M_User_Guide_English_-_PDF_-_6.07MB_.pdf (last accessed Aug. 1, 2018).

Defendant's Axon M product. For example, ZTE advertises the proximity sensor feature for each product.

194. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '889 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation, including but not limited to limitations of claim 1.[3]

195. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '889 Patent no later than December 1, 2017 in a letter from Mr. Dean, President of Bell Northern Research, to Mr. Zhao, President and Executive Director of ZTE Corporation. Mr. Dean's letter identified the '889 Patent and notified Defendant that Defendant's products infringe the patent. Mr. Dean identified exemplary products by name. BNR offered to meet and present a detailed presentation to Defendant, describing the infringement. On January 18, 2018 and March 8, 2018, BNR followed up by sending additional letters. On September 12, 2018, ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '889 Patent. Despite these efforts, and knowing that it was infringing the '889 Patent, Defendant continued to infringe the '889 Patent by continuing to make, use, sell, and/or offer to sell the '889 Accused Products in the United States.

196. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '889 Patent.

197. As a result of Defendant's infringement of the '889 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for

[3] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 1 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '889 patent.

Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

198. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '889 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 2

(Infringement of U.S. Patent No. 8,204,554)

199. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

200. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 1) of the '554 Patent, in violation of 35 U.S.C. § 271(a).

201. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to Axon M, Axon 7, Axon 7 mini, Axon Pro, Maven 3, Maven 2, Blade Spark, Blade Z Max, Blade X, Blade Vantage, Blade V8 Pro, Blade Max 3, Grand X 4, Max XL, Max Blue, Prelude+, Tempo X, ZMAX 2, ZMAX Champ LTE, ZMAX One, ZMAX Pro, ZFIVE G, Fanfare 3, Majesty Pro Plus, Avid 4, Avid Trio, Blade X Max, Majesty Pro, and Jasper LTE (collectively, the "'554 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '554 Patent, including claim 1.

202. By way of example only, Defendant's Axon M product is a mobile station (cellular phone) comprising a display, a proximity sensor (located at the top of the

device) adapted to generate a signal indicative of the existence of a first condition, the first condition being that an external object (e.g., a person's ear) is proximate, and a microprocessor adapted to (1) determine, without using the proximity sensor, the existence of the second condition that a user has performed an action to initiate an outgoing call or to answer an incoming call, (2) activate the proximity sensor if the second condition exists, and (3) reduce power to the phone's display if the signal from the activated proximity sensor indicates that the first condition (e.g., ear is proximate to the sensor) exists.

ZTE Axon M User Guide.[4]

203. The Axon M's display is backlit at a normal level when a user is browsing the web or sending text messages. However, when a call is active and the user brings the phone proximate to the ear, the display dims, conserving battery power.

204. By way of example only, the remainder of the '554 Accused Products include each of the limitations described in the previous paragraph with respect to the

[4] Available at https://d28dq596ebml6z.cloudfront.net/media/wysiwyg/axon-m/ZTE_Axon_M_User_Guide_English_-_PDF_-_6.07MB_.pdf (last accessed Aug. 1, 2018).

Defendant's Axon M product. For example, ZTE advertises the proximity sensor feature for each product.

205. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '554 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation, including but not limited to limitations of claim 1.[5]

206. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '554 Patent no later than December 1, 2017 in a letter from Mr. Dean, President of Bell Northern Research, to Mr. Zhao, President and Executive Director of ZTE Corporation. Mr. Dean's letter identified the '554 Patent and notified Defendant that Defendant's products infringe the patent. Mr. Dean identified exemplary products by name. BNR offered to meet and present a detailed presentation to Defendant, describing the infringement. On January 18, 2018 and March 8, 2018, BNR followed up by sending additional letters. On September 12, 2018, ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '554 Patent. Despite these efforts, and knowing that it was infringing the '554 Patent, Defendant continued to infringe the '554 Patent by continuing to make, use, sell, and/or offer to sell the '554 Accused Products in the United States.

207. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '554 Patent.

208. As a result of Defendant's infringement of the '554 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for

[5] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 1 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '554 patent.

Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

209. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '554 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 3

(Infringement of U.S. Patent No. 7,990,842)

210. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

211. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 1) of the '842 Patent, in violation of 35 U.S.C. § 271(a).

212. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to Avid 4, Avid Trio, Axon, Axon 7, Axon 7 Mini, Axon M, Axon Pro, Blade Force, Blade Max 3, Blade Spark, Blade V8 Pro, Blade Vantage, Blade X, Blade X Max, Blade Z Max, Fanfare 3, Jasper, Majesty Pro, Majesty Pro Plus LTE, Maven 2, Maven 3, Max Blue, Max XL, Overture, Prestige 2, Primetime, Tempo X, Trek 2 Tablet, ZFive 2, ZFive G, ZMAX 2, ZMAX Champ, ZMAX Grand, ZMAX One, ZMAX Pro, and ZPad 8 Tablet (collectively, the "'842 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '842 Patent, including claim 1.

213. The ’842 Accused Products, including but not limited to those identified in the preceding paragraph, comply with the 802.11n Standard per Defendant’s product literature and/or publicly available information.

214. The 802.11n Standard was introduced on or about October 2009.

215. The 802.11n Standard provides a definition for a High Throughput Long Training Field (“HT-LTF”). The first part of the HT-LTF “consists of one, two, or four HT-LTFs that are necessary for demodulation of the HT-Data portion of the PPDU” (*i.e.*, Protocol Data Unit). The 802.11n Standard provides a specific HT-LTF sequence that is transmitted in the case of 20 MHz operation, which corresponds to the long training sequence with minimum peak-to-average power ratio described in the ‘842 Patent. *See* 802.11-2016 at 19.3.9.4.6 or 802.11-2009 at 20.3.9.4.6.

216. Devices operating in accordance with the 802.11n Standard (known as “wireless stations” or “STAs”) must be able to generate the HT-LTF described. Thus, all 802.11n compliant devices include a signal generator that generates the HT-LTF described above.

217. When data is transmitted by an STA, it is encoded in a PPDU. The encoding process set forth in the 802.11n Standard requires a reverse Fourier transformer. *See* 802.11-2016 at 19.3.4(b) or 802.11-20009 at 20.3.4(b). Thus, all 802.11n Standard compliant devices, including the ’842 Accused Products, include an Inverse Fourier Transformer.

218. By way of example only, Defendant’s Axon M product is a mobile station (cellular phone) that is advertised as complying with the 802.11n Standard.

Wi-Fi	802.11 a/b/g/n/ac
Mobile Hotspot	Yes
GPS	Yes
USB	Type-C with Qualcomm® Quick Charge™ 3.0
Headset Jack	3.5mm

https://www.zteusa.com/axon-m

ZTE Axon M Technical Specifications.[6]

219. Because of its compliance with 802.11n, Defendant's Axon M contains a signal generator capable of generating training sequences and an inverse Fourier transformer that are capable of providing an extended long training sequence with a minimal peak-to-power ratio which is capable of being transmitted on subcarriers in using the Orthogonal Frequency Division Multiplexing scheme.

220. The remainder of the '842 Accused Products include each of the limitations described in the previous paragraph with respect to the Defendant's Axon M product.

221. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '842 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation, including but not limited to limitations of claim 1.[7]

222. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '842 Patent no later than December 1, 2017 in a letter from Mr. Dean, President of Bell Northern Research, to

[6] Available at https://www.zteusa.com/axon-m (last accessed on August 1, 2018).

[7] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 1 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '842 patent.

Mr. Zhao, President and Executive Director of ZTE Corporation. Mr. Dean's letter identified the '842 Patent and notified Defendant that Defendant's products infringe the patent. Mr. Dean identified exemplary products by name. BNR offered to meet and present a detailed presentation to Defendant, describing the infringement. On January 18, 2018 and March 8, 2018, BNR followed up by sending additional letters. On September 12, 2018, ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '842 Patent. Despite these efforts, and knowing that it was infringing the '842 Patent, Defendant continued to infringe the '842 Patent by continuing to make, use, sell, and/or offer to sell the '842 Accused Products in the United States.

223. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '842 Patent.

224. As a result of Defendant's infringement of the '842 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court. BNR is willing to abide by any applicable FRAND obligations.

225. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '842 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 4

(Infringement of U.S. Patent No. 8,416,862)

226. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

227. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 9) of the '862 Patent, in violation of 35 U.S.C. § 271(a).

228. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to Axon M, Axon 7, Axon 7 mini, Axon, Blade V8 Pro, Blade Max 3, Primetime, and Trek 2 Tablet (collectively, the "'862 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '862 Patent, including claim 9.

229. The '862 Accused Products, including but not limited to those identified in the preceding paragraph, comply with the 802.11ac Standard.

230. The 802.11ac Standard was introduced on or about December 2013.

231. The 802.11ac Standard provides a definition and standardization for channel sounding for beamforming for Multiple Input Multiple Output ("MIMO") RF radio links, including how a receiving wireless device communicates channel sounding to a base station. Beamforming requires the use of a steering matrix that improves the reception to the beamformee. The 802.11ac Standard provides a specific way to compress the beamforming feedback matrix by the beamformee, and how to determine and decompose the estimated transmitter beamforming unitary matrix and compressed into angles for efficient transmission to the beamformer, which generates a next steering matrix. *See* 802.11-2016 at 19.3.12.

232. Devices operating in accordance with the 802.11ac Standard must be able to generate the channel feedback information to a beamformer to generate a steering matrix, as described. Thus, all 802.11ac compliant devices include a module operable to transmit feedback beamforming information to a beamformer by determining and then decomposing an estimated transmitter beamforming unitary matrix, at least by

using information from the transmitted HT-LTF's which are part of the PHY preamble. All 802.11ac compliant devices must then be able to determine beamforming feedback matrices and compress those into the form of angles, to be sent to the beamformer.

233. The beamformee calculates a beamforming unitary matrix based upon the channel response and a receiver beamforming unitary matrix. *See* 802.11-2016 at 19.3.12.3.6. Thus, all 802.11ac Standard compliant devices, including the '862 Accused Products are operable to feedback channel information to a beamformer based on information in a preamble sequence from the transmitting wireless device, to calculate transmitter beamforming information and compressing that information in the form of angles and sending this information to the beamforming transmitting wireless device.

234. By way of example only, Defendant's Axon M product is a receiving wireless device (cellular phone) that is advertised as complying with the 802.11ac Standard.

Wi-Fi	802.11 a/b/g/n/ac
Mobile Hotspot	Yes
GPS	Yes
USB	Type-C with Qualcomm® Quick Charge™ 3.0
Headset Jack	3.5mm

https://www.zteusa.com/axon-m

ZTE Axon M Technical Specifications.[8]

Because of its compliance with 802.11ac, Defendant's Axon M contains modules operable to feedback channel information to a beamformer based on information in a

[8] Available at https://www.zteusa.com/axon-m (last accessed on August 1, 2018).

preamble sequence from the transmitting wireless device, to calculate transmitter beamforming information and compressing that information in the form of angles and sending this information to the beamforming transmitting wireless device.

235. The remainder of the '862 Accused Products include each of the limitations described in the previous paragraph with respect to the Defendant's Axon M product.

236. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '862 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation, including but not limited to limitations of claim 9.[9]

237. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '862 Patent no later than December 1, 2017 in a letter from Mr. Dean, President of Bell Northern Research, to Mr. Zhao, President and Executive Director of ZTE Corporation. Mr. Dean's letter identified the '862 Patent and notified Defendant that Defendant's products infringe the patent. Mr. Dean identified exemplary products by name. BNR offered to meet and present a detailed presentation to Defendant, describing the infringement. On January 18, 2018 and March 8, 2018, BNR followed up by sending additional letters. On September 12, 2018, ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '862 Patent. Despite these efforts, and knowing that it was infringing the '862 Patent, Defendant continued to infringe the '862 Patent by continuing to make, use, sell, and/or offer to sell the '862 Accused Products in the United States.

238. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '862 Patent.

[9] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 9 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '862 patent.

239. As a result of Defendant's infringement of the '862 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court. BNR is willing to abide by any applicable FRAND obligations.

240. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '862 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 5

(Infringement of U.S. Patent No. 7,957,450)

241. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

242. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 11) of the '450 Patent, in violation of 35 U.S.C. § 271(a).

243. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to Axon M, Axon 7, Axon 7 mini, Axon, Blade V8 Pro, Blade Max 3, Primetime, and Trek 2 Tablet (collectively, the "'450 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '450 Patent, including claim 1.

244. The ’450 Accused Products, including but not limited to those identified in the preceding paragraph, comply with the 802.11ac Standard per Defendant’s product literature and/or publicly available information.

245. The 802.11ac Standard was introduced on or about December 2013.

246. The 802.11ac Standard provides for a “compressed beamforming feedback matrix” and specifies that “[i]n compressed beamforming feedback matrix, the beamformee shall remove the specie-time stream CSD in Table 19-10 from the measured channel before computing a set of matrices for feedback to the beamformer.” *See* 802.11-2016 at 19.3.12.3.6. Furthermore, “[t]he beamforming feedback matrices, *V(k)*, found by the beamformee are compressed in the form of angles, which are sent to the beamformer.” *See* 802.11-2016 at 19.3.12.3.6. Any device that complies with the 802.11ac Standard must be capable of providing compressed beamforming feedback matrices as set forth above.

247. Upon information and belief, singular value decomposition (SVD) is the most common approach to calculate transmitter weights for beamforming matrices. Furthermore, using the matrix *V* calculated by SVD results in maximum likelihood performance with a linear receiver, which greatly simplifies receiver design.

248. By way of example only, Defendant’s Axon M product is a mobile station (cellular phone) that is advertised as complying with the 802.11ac Standard.

Wi-Fi	802.11 a/b/g/n/ac
Mobile Hotspot	Yes
GPS	Yes
USB	Type-C with Qualcomm® Quick Charge™ 3.0
Headset Jack	3.5mm

https://www.zteusa.com/axon-m

ZTE Axon M Technical Specifications.[10]

249. The remainder of the '450 Accused Products include each of the limitations described in the previous paragraph with respect to the Defendant's Axon M product.

250. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '450 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation, including but not limited to limitations of claim 1.[11]

251. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant became aware of its infringement of the '450 Patent no later than the filing of this Complaint; yet it continues to infringe the '450 Patent by continuing to make, use, sell, and/or offer to sell the '450 Accused Products in the United States.

252. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '450 Patent.

[10] Available at https://www.zteusa.com/axon-m (last accessed on October 11, 2018).
[11] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 1 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '450 patent.

253. As a result of Defendant's infringement of the '450 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court. BNR is willing to abide by any applicable FRAND obligations.

254. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '450 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 6

(Infringement of U.S. Patent No. 6,941,156)

255. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

256. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 1) of the '156 Patent, in violation of 35 U.S.C. § 271(a).

257. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to Axon M, Axon 7 Mini, Blade Spark, Blade Z Max, Blade X, Blade X Max, Blade Vantage, Blade Force, Max Blue, ZMAX Pro, ZMAX One, Z FIVE G, Maven 3, Max XL, Prelude+, Tempo X, Tempo GO, Overture 3, Fanfare 3, Majesty Pro Plus LTE, Avid 4, and Maven 3 (collectively, the "'156 Accused Products") and related products

and/or processes falling within the scope of one or more claims of the '156 Patent, including claim 1.

258. The '156 Accused Products, including but not limited to those identified in the preceding paragraph, include both an RF radio for cellular communications and a separate RF radio for connection to WiFi networks. Further, those radios are designed and able to operate simultaneous communication paths at different frequencies and automatically switch over communication from either the cellular communication or the WiFi functionality to the other.

259. By way of example only, Defendant's ZMAX Pro product is a multimode cellular phone that includes cellular RF communication functionality, and RF communication functionality separate and different from the cellular RF phone functionality (namely WiFi), a module operable to establish simultaneous communication paths from the multimode cellular phone using both the cellular functionality and the WiFi functionality, and an automatic switchover module, as shown by the device's capability to maintain a voice call while switching between a cellular connection and a WiFi connection.

260. More specifically, when a user of a ZMAX Pro is in an existing call on a first RF connection type, either a WiFi or cellular connection, and then moves to an area where a different and distinct second RF connection type is available, either cellular or WiFi connection, the ZMAX Pro then switches modes from the first RF connection type to the second, different RF connection type automatically and without dropping the call and having to reconnect.

261. By way of example only, the remainder of the '156 Accused Products include each of the limitations described in the previous paragraph with respect to the Defendant's ZMAX Pro product.

262. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '156 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of

equivalents, each and every claim limitation, including but not limited to limitations of claim 1.[12]

263. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '156 Patent no later than December 1, 2017 in a letter from Mr. Dean, President of Bell Northern Research, to Mr. Zhao, President and Executive Director of ZTE Corporation. Mr. Dean's letter identified the '156 Patent and notified Defendant that Defendant's products infringe the patent. Mr. Dean identified exemplary products by name. BNR offered to meet and present a detailed presentation to Defendant, describing the infringement. On January 18, 2018 and March 8, 2018, BNR followed up by sending additional letters. On September 12, 2018, ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '156 Patent. Despite these efforts, and knowing that it was infringing the '156 Patent, Defendant continued to infringe the '156 Patent by continuing to make, use, sell, and/or offer to sell the '156 Accused Products in the United States.

264. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '156 Patent.

265. As a result of Defendant's infringement of the '156 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

[12] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 1 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '156 patent.

266. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '156 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 7

(Infringement of U.S. Patent No. 8,792,432)

267. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

268. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (*e.g.*, claim 12) of the '432 Patent, in violation of 35 U.S.C. § 271(a).

269. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to the Axon M, Maven 3, Blade Spark, Grand X 4, Max XL, Cymbal Z-320, Cymbal-C LTE, Prelude+, Tempo X, Axon 7, Axon 7 mini, Blade V8 Pro, ZMAX 2, ZFIVE G, Blade Z Max, Blade X, Overture 3, Fanfare 3, Blade Force, Blade Max 3, Majesty Pro Plus LTE, Tempo GO, Avid 4, Max Blue LTE, Avid Trio, ZMAX Grand LTE, Blade X Max, Zfive 2, Majesty Pro LTE, Jasper LTE, ZMAX Pro, Maven 2, Maven 3, Trek 2 Tablet, Zpad 8 Tablet, Primetime, Axon Pro, ZMAX One, and Prestige 2 (collectively, the "'432 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '432 Patent, including claim 12.

270. The '432 Accused Products, including but not limited to those identified in the preceding paragraph, comply with the 3GPP TS 25.331 standard, Version 11.4.0 Release 11 (the "TS 25.331 v.11.4.0 Standard") or later, per Defendant's product literature.

271. The TS 25.331 v.11.4.0 Standard was introduced on or about February 2013.

272. The TS 25.331 v.11.4.0 Standard provides a protocol specification for Universal Mobile Telecommunications System ("UTMS") Radio Resource Control ("RRC") standards. This includes the function of and informational elements to be included in RRC Connection Request messages.

273. The TS 25.331 v.11.4.0 Standard requires that compliant devices be capable of receiving the network's RACH reporting priority, indicating the order of limiting intra/inter neighbor cell measurements and other information. *See* TS 25.331 v.11.4.0 at 10.3.7.136. This means that compliant devices, including the '432 Accused Products, can receive a broadcast indication indicating whether to prioritize inter-frequency or intra-frequency neighbor cell measurements for inclusion in an uplink connection request message to be sent on a random-access channel.

274. Devices operating in accordance with the TS 25.331 v.11.4.0 Standard transmit an uplink RRC message, which includes the measured RACH characteristics, including neighbor cell characteristics in accordance with the prioritization noted above, and does not exceed the maximum allowed message size. *See* TS 25.331 v.11.4.0 at 8.5.23. Therefore, any compliant devices, including the '432 Accused Products, construct the uplink connection request message, which includes measurements that are prioritized in accordance with the broadcast indication so as not to exceed a maximum size of the uplink connection request message.

275. The TS 25.331 v.11.4.0 Standard sets forth protocols for transmitting the uplink RRC message and limiting the number of included neighboring cells according to the priority indicated by the network—e.g., an "InterEUTRAIntra," indication limits the number of intra-frequency cells reported first, and an "IntraEUTRAInter" indication limits the number of inter-frequency cells reported first. *See* TS 25.331 v.11.4.0 at 8.5.23. Therefore, the broadcast indication discussed above is one in which one value of the indication directs that the inter-frequency neighbor cell measurements are prioritized over the intra-frequency neighbor cell measurement results for inclusion in the uplink connection request message; and a different value of the indication or

omission of the indication directs that the intra-frequency neighbor cell measurements are prioritized over the inter-frequency neighbor cell measurements for inclusion in the uplink connection request message.

276. The TS 25.331 v.11.4.0 Standard requires the broadcast indication discussed above to be an information element of system information received on a broadcast channel from an access node of a Universal Terrestrial Radio Access Network or an Evolved Universal Terrestrial Radio Access Network (e.g., a cell network), and, as discussed above, the uplink connection request message is a Radio Resource Control Connection Request Message. *See* TS 25.331 v.11.4.0 at 8.5.23, 10.2.39, 10.2.48, 10.2.48.8.22.

277. By way of example only, Defendant's Axon M product is a receiving wireless device (cellular phone) that is advertised as containing features that comply with the TS 25.331 v.11.4.0 Standard or later, including carrier aggregation.

278. Because it complies with that standard, it therefore implements the mandatory portions of that standard described above.

279. Because of its compliance with the TS 25.331 v.11.4.0 Standard or later, Defendant's Axon M receives a broadcast indication indicating whether to prioritize inter-frequency or intra-frequency neighbor cell measurements for inclusion in an uplink connection request message to be sent on a random access channel, and constructs the uplink connection request message which includes measurements that are prioritized in accordance with the broadcast indication so as not to exceed a maximum size of the uplink connection request message, in which one value of the indication directs that the inter-frequency neighbor cell measurements are prioritized over the intra-frequency neighbor cell measurement results for inclusion in the uplink connection request message, and a different value of the indication or omission of the indication directs that the intra-frequency neighbor cell measurements are prioritized over the inter-frequency neighbor cell measurements for inclusion in the uplink connection request message, and in which the indication is within an information

element of system information received on a broadcast channel from an access node of a UTRAN or an E-UTRAN wireless system, and the uplink connection request message is a Radio Resource Control Connection Request message.

280. By way of example only, the remainder of the '432 Accused Products include each of the limitations described in the previous paragraph with respect to the Defendant's Axon M product.

281. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '432 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of equivalents, each and every claim limitation, including but not limited to limitations of claim 12.[13]

282. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '432 Patent no later than December 1, 2017 in a letter from Mr. Dean, President of Bell Northern Research, to Mr. Zhao, President and Executive Director of ZTE Corporation. Mr. Dean's letter identified the '432 Patent and notified Defendant that Defendant's products infringe the patent. Mr. Dean identified exemplary products by name. BNR offered to meet and present a detailed presentation to Defendant, describing the infringement. On January 18, 2018 and March 8, 2018, BNR followed up by sending additional letters. On September 12, 2018, ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '432 Patent. Despite these efforts, and knowing that it was infringing the '432 Patent, Defendant continued to infringe the '432 Patent by continuing to make, use, sell, and/or offer to sell the '432 Accused Products in the United States.

[13] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 12 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '432 patent.

283. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '432 Patent.

284. As a result of Defendant's infringement of the '432 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court. BNR is willing to abide by any applicable FRAND obligations.

285. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '432 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

COUNT 8

(Infringement of U.S. Patent No. 7,039,435)

286. Plaintiff re-alleges and incorporates by reference the allegations in the foregoing paragraphs as if fully set forth herein.

287. Plaintiff is informed and believes, and on that basis alleges, that Defendant has infringed and is currently infringing one or more claims (e.g., claim 1) of the '435 Patent, in violation of 35 U.S.C. § 271(a).

288. Defendant has infringed and is currently infringing literally and/or under the doctrine of equivalents, by, among other things, making, using, offering for sale, selling, and/or importing within this judicial district and elsewhere in the United States, without license or authority, infringing products, including but not limited to the Primetime, Trek 2, and Zpad8 (the "'435 Accused Products") and related products and/or processes falling within the scope of one or more claims of the '435 Patent, including claim 1.

289. By way of example only, Defendant's Primetime product is a portable cell phone with (1) a power circuit that provides a network adjusted transmit power level as a function of a position to a communications tower (e.g., the circuitry coupled to the antenna, pictured below) and (2) a proximity regulation system that includes both a location sensing subsystem and a power governing subsystem, the latter of which determines a transmit power level based on a proximity transmit power level determined by the location of the cell phone proximate a user and the network adjusted transmit power level.

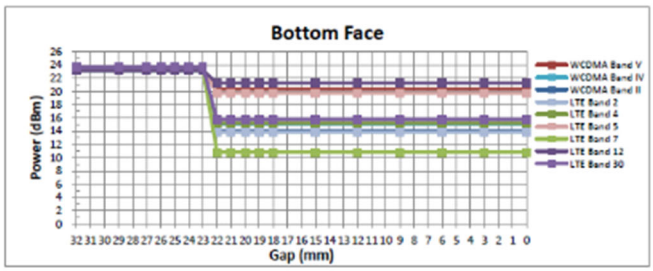
ZTE Corporation FCC SAR Test Report for FCC ID SRQ-K92, available at <https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm> (Grantee Code: SRQ, Product Code: -K92), Report No. EP731003 at 15.

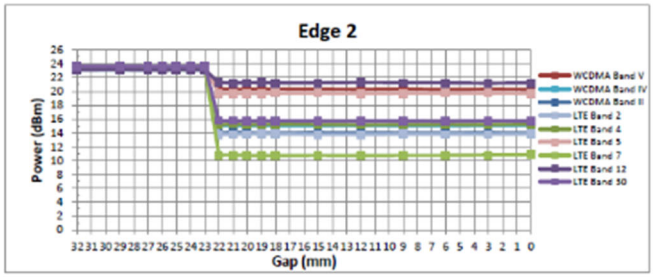
290. Specifically, as part of its submissions to the Federal Communications Commission ("FCC"), ZTE or one of its agents discloses test results from Specific Absorption Rate ("SAR") Testing that shows power regulation based on information received from the device's proximity sensor, whereby transmit power levels are adjusted based on proximity data. For instance, the test report submitted to the FCC for the Primetime product includes these tables and graphs:

FCC SAR Test Report Report No. : FA731003

Power Measurement during Sensor Trigger distance testing

Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
WCDMA Band V (RMC 12.2Kbps)	4182	23.35	20.38	2.97
WCDMA Band IV (RMC 12.2Kbps)	1413	23.19	15.04	8.15
WCDMA Band II (RMC 12.2Kbps)	9400	23.28	14.03	9.25
LTE Band 2 (20MHz 1RB 49offset)	18900	23.03	13.65	9.38
LTE Band 4 (20MHz 1RB 49offset)	20175	23.32	15.23	8.09
LTE Band 5 (10MHz 1RB 0offset)	20525	23.17	19.98	3.19
LTE Band 7 (20MHz 1RB 49offset)	21100	23.23	10.79	12.44
LTE Band 12 (10MHz 1RB 25offset)	23095	22.83	21.33	1.50
LTE Band 30 (20MHz 1RB 25offset)	27710	23.67	15.79	7.88





ZTE Corporation FCC SAR Test Report for FCC ID SRQ-K92, available at <https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm> (Grantee Code: SRQ, Product Code: -K92), Report No. FA731003 at 13.

291. By way of example only, the remainder of the '435 Accused Products include each of the limitations described in the previous paragraph with respect to the Defendant's Primetime product. For example, ZTE submits data to the FCC relating to the transmit power level variations on each of those other products.

292. Defendant's acts of making, using, offering for sale, selling, and/or importing infringing products, including but not limited to the '435 Accused Products, and related products and/or processes satisfy, literally or under the doctrine of

equivalents, each and every claim limitation, including but not limited to limitations of claim 1.[14]

293. Defendant's infringement is knowing, egregious, consciously wrongful, and willful. Defendant learned of its infringement of the '435 Patent no later than September 12, 2018, the date on which ZTE executives met with BNR executives in person and discussed, *inter alia*, ZTE's infringement of the '435 Patent. Despite these efforts, and knowing that it was infringing the '435 Patent, Defendant continued to infringe the '435 Patent by continuing to make, use, sell, and/or offer to sell the '435 Accused Products in the United States.

294. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '435 Patent.

295. As a result of Defendant's infringement of the '435 Patent, Plaintiff has been injured by Defendant's unauthorized use of Plaintiff's intellectual property. Plaintiff seeks monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and Plaintiff will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

296. Unless a permanent injunction is issued enjoining Defendant and its agents, servants, employees, representatives, affiliates, and all others acting or in active concert therewith from infringing the '435 Patent, Plaintiff and its licensees will be greatly and irreparably harmed.

PRAYER FOR RELIEF

Plaintiff prays for the following relief:

A. A judgment that Defendant has infringed one or more claims of the

[14] Plaintiff expressly reserves the right to identify additional asserted claims and products in its infringement contentions in accordance with the local patent rules. Claim 1 is provided for notice pleading only and is not presented as an "exemplary" claim of all other claims in the '435 patent.

Asserted Patents;

B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert or participation with Defendant, from infringing the Asserted Patents;

C. An award of damages resulting from Defendant's acts of infringement in accordance with 35 U.S.C. § 284;

D. A judgment and order finding that Defendant's acts of infringement were egregious and willful and trebling damages under 35 U.S.C. § 284;

E. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees against Defendant.

F. A judgment and order requiring Defendant to provide accountings and to pay supplemental damages to Plaintiff, including, without limitation, prejudgment and post-judgment interest; and

G. Any and all other relief to which Plaintiff may show itself to be entitled.

JURY TRIAL DEMANDED

Plaintiff hereby demands a trial by jury of all issues so triable.

Dated: October 15, 2018

/s/ *Sadaf R. Abdullah*
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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the above and foregoing document has been served on October 15, 2018 to all counsel of record who are deemed to have consented to electronic service via the Court's CM/ECF system. Pursuant to Local Rule 5.4(c), any other counsel of record will be served by electronic mail, facsimile, or overnight delivery.

/s/ *Sadaf R. Abdullah*
Sadaf R. Abdullah