IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
SHERMAN DIVISION

BELL NORTHERN RESEARCH, LLC, *Plaintiff,* v. T-MOBILE USA, INC. and T-MOBILE US, INC., *Defendants.*	**Civil Action No. 4:23-cv-910** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Bell Northern Research, LLC ("BNR" or "Plaintiff"), for its Complaint against Defendant T-Mobile USA, Inc. and Defendant T-Mobile US, Inc. (collectively "T-Mobile" or "Defendants"), for infringement of U.S. Patent Nos. 8,204,554, 7,319,889, RE 48,629, 8,416,862, 7,564,914, 7,957,450, 6,941,156, 6,696,941, 7,039,435, 8,396,072, and 8,792,432 (the "Asserted Patents") alleges the following:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq*.

THE PARTIES

2. Plaintiff BNR is a limited liability company organized under the laws of the State of Delaware with a place of business at 401 N. Michigan Ave., Suite 1630, Chicago, IL 60611.

3. On information and belief, Defendant T-Mobile USA, Inc. is a Delaware corporation with its principal place of business at 12920 SE 38th St., Bellevue, WA 98006, US. T-Mobile USA Inc.'s registered agent for service is Corporation Service Company, 251 Little

Falls Drive, Wilmington, DE 19808. Upon information and belief, T-Mobile USA, Inc. sells and offers to sell products and services throughout the United States, including in this judicial district, and introduces products and services that into the stream of commerce and that incorporate infringing technology knowing that they would be sold in this judicial district and elsewhere in the United States.

4. Upon information and belief, Defendant T-Mobile US, Inc. is a corporation organized under the laws of the State of Delaware, with its principal place of business at 12920 SE 38th St., Bellevue, Washington 98006. Upon information and belief, T-Mobile US, Inc. sells, offers to sell, and/or uses products and services throughout the United States, including in this judicial district, and has introduced infringing products and services into the stream of commerce knowing that they would be sold and/or used in this judicial district and elsewhere in the United States.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code.

6. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

7. Venue is proper in this judicial district under 28 U.S.C. §1400(b).

8. On information and belief, each T-Mobile Defendant has committed acts of infringement in this District and has a regular and established places of business within this District at 7668 Warren Parkway, Frisco, Texas, as well as at multitude of retail stores. *See e.g.*, https://careers.t-mobile.com/job-search/?primary_category[]=Finance (showing a multitude of open positions in T-Mobile's Frisco office located at 7668 Warren Pkwy Frisco, TX 75034); *see also* https://www.t-

mobile.com/stores/locator/?loc=Plano,%20Texas,%20United%20States&lat=33.013676&lon=-96.69251&showall=false (showing 2 T-Mobile stores located in Plano, Texas).

9. On information and belief, each T-Mobile Defendant is subject to this Court's general and specific personal jurisdiction because each Defendant has sufficient minimum contacts within the State of Texas and this District, pursuant to due process and/or the Texas Long Arm Statute because each Defendant purposefully availed itself of the privileges of conducting business in the State of Texas and in this District, because each Defendant regularly conducts and solicits business within the State of Texas and within this District, and because Plaintiff's causes of action arise directly from each of Defendant's business contacts and other activities in the State of Texas and this District.

10. This Court has personal jurisdiction over each T-Mobile Defendant in this action because each T-Mobile Defendant has committed acts of infringement within this District giving rise to this action, has a regular and established place of business in this District, and has established minimum contacts with this forum such that the exercise of jurisdiction over each T-Mobile Defendant would not offend traditional notions of fair play and substantial justice. Each T-Mobile Defendant, directly and/or through subsidiaries or intermediaries, conducts its business extensively throughout Texas, by shipping, distributing, offering for sale, selling, and advertising its products and/or services in the State of Texas and the Eastern District of Texas, regularly does business or solicits business, engages in other persistent courses of conduct, and/or derives substantial revenue from products and/or services provided to individuals in the State of Texas, and commits acts of infringement of Plaintiff's patents in this District by, among other things, making, using, importing, offering to sell, and selling products and/or services that infringe the

asserted patents, including without limitation the mobile device products accused of infringement in this case.

11. Each T-Mobile Defendant, directly and/or through subsidiaries or intermediaries, has purposefully and voluntarily placed one or more products and/or services in the stream of commerce that practice the Asserted Patents with the intention and expectation that they will be purchased and used by consumers in the Eastern District of Texas. These products and/or services have been and continue to be purchased and used by consumers in the Eastern District of Texas. *See e.g.*, https://www.t-mobile.com/stores/locator/?loc=Plano,%20Texas,%20United%20States&lat=33.013676&lon=-96.69251&showall=false (showing 2 T-Mobile stores located in Plano, Texas).

BACKGROUND

12. The Asserted Patents come from a rich pedigree dating back to the late 19th century. This is when Bell Labs sprang to life from the combined efforts of AT&T and Western Electric. Bell Labs is one of America's greatest technology incubators, and paved the way for many technological advances we know and use today, including the transistor, several kinds of lasers, the UNIX operating system, and computer languages such as C++. In total, Bell Labs received nine Nobel Prizes for its work over the years.

13. Eventually the Bell system broke up and spawned several new companies. They included telecommunications powerhouses Lucent and Agere Systems. Lucent was absorbed by Nokia, while Agere Systems was acquired by LSI, then Avago, and ultimately renamed Broadcom. The Bell system also spun off Northern Electric which led to the creation of a research lab known as BNR. This lab grew to host thousands of engineers in offices around the globe. One of those was an 800,000-square-foot campus in Richardson, Texas.

14. Collectively, these companies spurred a digital revolution in telecommunications, starting with the first digital telephone switch in 1975. They continued to push the industry to new heights in the late-80s, when BNR announced the desire to create a global fiber optic network (called "FiberWorld"). Its goal was to give users easy, reliable, and fast access to a variety of multimedia services. To realize this vision, Bell Labs and subsequent innovators made numerous breakthroughs in laser, integrated circuit, photodetector, amplifier, and waveguide designs. These advancements led to the modern fiber optic systems we use today.

15. This work naturally evolved to include cellular telecommunications as well. On May 6, 1992, BNR VP George Brody—along with executives from Bell Cellular and Northern Electric—made the first Canada-US digital cellular call. It stretched from Toronto, Ontario to Fort Worth, Texas.

16. Eventually, Nortel Networks absorbed BNR. Although Nortel was ultimately unsuccessful in its bid to supply digital telecommunications and networking solutions to the market, some Bell Labs and Nortel alumni decided to reenergize BNR in 2017. Today it is the successor in interest to many of the key telecommunications technologies.

17. The BNR Patent portfolio reflects 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. 8,204,554, 7,319,889, RE 48,629, 8,416,862, 7,564,914, 7,957,450, 6,941,156, 6,696,941, 7,039,435, 8,396,072, and 8,792,432 (collectively, these patents comprise the "Asserted Patents").

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

19. BNR brings this action to put a stop to Defendant' unauthorized and unlicensed use of the Asserted Patents.

U.S. Patent No. 8,204,554

20. Norman Goris and Wolfgang Scheit are the inventors of U.S. Patent No. 8,204,554 ("the '554 patent"). A true and correct copy of the '554 patent is attached as Exhibit A.

21. The '554 patent resulted from the pioneering efforts of Messrs. Goris and Scheit (hereinafter "the Inventors") in the area of mobile devices. These efforts resulted in the development of a system of power reducer controls to control the power consumption of a mobile station display use with a mobile device and a method of operation thereof in the early 2000s. At the time of these pioneering efforts, the most widely implemented technology used to increase stand-by time as well as the talk-time of a mobile device was to increase the capacity of the battery. The drawback of increasing the capacity of the battery is that as the capacity of the battery increases, so too does its size, weight, and cost. The Inventors conceived of the invention claimed in the '554 patent as a way of prolonging the use of a mobile device without increasing the capacity of the battery.

22. For example, the Inventors developed 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.

23. One advantage of the claimed '554 invention over the prior art is to reduce the power consumption of a cell phone display when the display is not needed. (*See* '554 patent at 1:40-52.) This increases available battery power that results in increased stand-by and/or talk time. (*See* '554 patent at 1:50-55.)

U.S. Patent No. 7,319,889

24. Norman Goris and Wolfgang Scheit are the inventors of U.S. Patent No. 7,319,889 ("the '889 patent"). A true and correct copy of the '889 patent is attached as Exhibit B.

25. The '889 patent resulted from the pioneering efforts of Messrs. Goris and Scheit (hereinafter "the Inventors") in the area of mobile devices. These efforts resulted in the development of a system of power reducer controls to control the power consumption of a mobile station display use with a mobile device and a method of operation thereof in the early 2000s. At the time of these pioneering efforts, the most widely implemented technology used to increase stand-by time as well as the talk-time of a mobile device was to increase the capacity of the battery. The drawback of increasing the capacity of the battery is that as the capacity of the battery increases, so too does its size, weight, and cost. The Inventors conceived of the invention claimed in the '889 patent as a way of prolonging the use of a mobile device without increasing the capacity of the battery.

26. For example, the Inventors developed 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.

27. One advantage of the claimed '889 invention over the prior art is to reduce the power consumption of the display of a cell phone when the display is not needed. (*See* '889 patent at 1:40-52.)

U.S. Patent No. RE 48,629

28. Jason Alexander Trachewsky and Rajendra T. Moorti are the inventors of U.S. Patent No. RE 48,629 (the '629 patent). A true and correct copy of the '629 patent is attached as Exhibit C.

29. The '629 patent resulted from the pioneering efforts of Messrs. Trachewsky and Moorti (hereinafter "the Inventors") in the general area of wireless communication systems and more particularly to long training sequences of minimum peak-to-average power ratio which may be used in legacy systems. At the time of these pioneering efforts, conventionally implemented technology did not sufficiently address the problem of different wireless devices compliant with different standards or different versions of the same standard while enabling backward compatibility with legacy devices that avoids collisions. For example, in the 802.11a

and 802.11g standards, each data packet starts with a preamble which includes a short training sequence followed by a long training sequence. The short and long training sequences are used for synchronization between the sender and the receiver. The long training sequence of 802.11a and 802.11g is defined such that each of sub-carriers -26 to +26, except for the subcarrier 0 which is set to 0, has one binary phase shift keying constellation point, either +1 or -1.

30. There existed a need to create a long training sequence of minimum peak-to-average ratio that uses more sub-carriers without interfering with adjacent channels.

31. For example, the Inventors developed 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, wherein the optimal extended long training sequence is carried by exactly 56 active sub-carriers, and wherein the optimal extended long training sequence is represented by encodings for indexed sub-carriers -28 to +28, excluding indexed sub-carrier 0 which is set to zero, as follows:

Sub-carrier	*−28*	*−27*	*−26*	*−25*	*−24*	*−23*	*−22*
Encoding	*+1*	*+1*	*+1*	*+1*	*−1*	*−1*	*+1*
Sub-carrier	*−14*	*−13*	*−12*	*−11*	*−10*	*−9*	*−8*
Encoding	*+1*	*+1*	*+1*	*−1*	*−1*	*+1*	*+1*
Sub-carrier	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Encoding	*+1*	*−1*	*−1*	*+1*	*+1*	*−1*	*+1*
Sub-carrier	*15*	*16*	*17*	*18*	*19*	*20*	*21*
Encoding	*+1*	*+1*	*−1*	*−1*	*+1*	*−1*	*+1*
Sub-carrier	*−21*	*−20*	*−19*	*−18*	*−17*	*−16*	*−15*
Encoding	*+1*	*−1*	*+1*	*−1*	*+1*	*+1*	*+1*
Sub-carrier	*−7*	*−6*	*−5*	*−4*	*−3*	*−2*	*−1*
Encoding	*−1*	*+1*	*−1*	*+1*	*+1*	*+1*	*+1*
Sub-carrier	*8*	*9*	*10*	*11*	*12*	*13*	*14*
Encoding	*−1*	*+1*	*−1*	*−1*	*−1*	*−1*	*−1*
Sub-carrier	*22*	*23*	*24*	*25*	*26*	*27*	*28*
Encoding	*−1*	*+1*	*+1*	*+1*	*+1*	*−1*	*−1.*

32. One advantage of the patented invention is that it provides an expanded long training sequence of minimum peak-to-average power ratio thereby decreasing power back-off. (*See* ’629 patent at 4:15-17.)

33. Another advantage of the invention is that expanded long training sequence may be used by 802.11a and 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. (*See* ’629 patent at 4:17-21.)

U.S. Patent No. 8,416,862

34. Carlos Aldana and Joonsuk Kim are the inventors of U.S. Patent No 8,416,862 (“the ’862 patent”). A true and correct copy of the ’862 patent is attached as Exhibit D.

35. The ’862 patent resulted from the pioneering efforts of Messrs. Aldana and Kim (hereinafter “the Inventors”) in the area of wireless communications systems using beamforming. These efforts resulted in the development of a method and system for the efficient feedback of channel information in a closed loop beamforming wireless communication system.

36. At the time of these pioneering efforts, the most widely implemented technology used to address reduced beam forming feedback information for wireless communications was to

reduce the size of the feedback. For instance, in a 2x2 MIMO wireless communication, the feedback needs four elements that are all complex Cartesian coordinate values V11 V12;V21 V22. In general, Vik=aik+j*bik, where aik and bik are values between -1, 1. Thus, with 1 bit express per each element for each of the real and imaginary components, aik and bik can be either -1/2 or +1/2, which requires 4x2x1=8 bits per tone. With 4 bit expressions per each element of V(f) in an orthogonal frequency division multiplexing (OFDM) 2x2 MIMO wireless communication, the number of bits required is 1728 per tone (e.g., 42*54*4=1728, 4 elements per tone, 2 bits for real and imaginary components per tone, 54 data tones per frame, and 4 bits per element), which requires overhead for a packet exchange that is too large for practical applications.

37. The Inventors conceived of the invention claimed in the ’862 patent as a way to reduce beam forming feedback information for wireless communications.

38. For example, the Inventors developed 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.

39. One advantage of the patented invention is a reduction of beamforming feedback information for wireless communications. (*See* '862 patent at 3:49-51.)

U.S. Patent No. 7,564,914

40. Christopher J. Hansen, Carlos H. Aldana, and Joonsuk Kim are the inventors of U.S. Patent No. 7,564,914 ("the '914 patent"). A true and correct copy of the '914 patent is attached as Exhibit E.

41. The '914 patent resulted from the pioneering efforts of Messrs. Hansen, Aldana, and Kim (hereinafter "the Inventors") in the general area of wireless networking.

42. For example, the Inventors developed a method for communicating information in a communication system, the method comprising: transmitting data via a plurality of radio frequency (RF) channels utilizing a plurality of transmitting antennas; receiving feedback information via at least one of said plurality of RF channels; modifying a transmission mode based on said feedback information; receiving said feedback information comprising channel estimates based on transmission characteristics of said transmitted data via at least one of said plurality of transmitting antennas; and deriving said feedback information from mathematical matrix decomposition of said channel estimates.

43. One advantage of the '914 patent is the more precise estimation of channel characteristics. (*See* '914 patent at 18:12-15.)

44. Another advantage of the patented invention is that it minimizes the quantity of feedback information and in turn reduces overhead. (*See* '914 patent at 18:35-39.)

45. Further advantages include higher information transfer rates, and more effective beamforming on transmitted signals. (*See* '914 patent at 18:40-45.)

U.S. Patent No. 7,957,450

46. Christopher J. Hansen, Carlos H. Aldana, and Joonsuk Kim are the inventors of U.S. Patent No. 7,957,450 ("the '450 patent"). A true and correct copy of the '450 patent is attached as Exhibit F.

47. The '450 patent resulted from the pioneering efforts of Messrs. Hansen, Aldana, and Kim (hereinafter "the Inventors") in the general area of wireless networking.

48. For example, the Inventors developed 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.

49. As another example, the Inventors developed a system for communication, the system comprising: one or more circuits of a mobile terminal that are operable to compute a plurality of channel estimate matrices based on signals received by said 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 said one or more circuits are operable to transmit said coefficients as feedback information to said base station, via one or more uplink RF channels.

50. One advantage of the '450 patent is the more precise estimation of channel characteristics. (*See* '450 patent at 18:1-5.)

51. Another advantage of the patented invention is that it minimizes the quantity of feedback information and in turn reduces overhead. (*See* '450 patent at 18:25-30.)

52. Further advantages include higher information transfer rates, and more effective beamforming on transmitted signals. (*See* '450 patent at 18:30-35.)

U.S. Patent No. 6,941,156

53. Philip D. Mooney is the inventor of U.S. Patent No. 6,941,156 ("the '156 patent"). A true and correct copy of the '156 patent is attached as Exhibit G.

54. The '156 patent resulted from the pioneering efforts of Mr. Mooney (hereinafter "the Inventor") in the area of cell phone communication. These efforts resulted in the development of a method and apparatus for the automatic handoff for wireless piconet multimode cell phones. At the time of these pioneering efforts, the most widely implemented technology used to address the problem of switching between a first type RF communication mode and a second type RF communication mode at a multimode cell phone required manual switching between the two modes. In that type of system, the user must first terminate any existing telephone call, and then manually switch the mode of the multimode cell phone.

55. The Inventor conceived of the invention claimed in the '156 patent as a way to improve multimode cell phones.

56. For example, the Inventor developed 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.

57. One advantage of the '156 patented invention is that it provides an automatic switch over between two modes of a multimode cell phone. (*See* '156 patent at 1:51-2:4.)

58. Another advantage of the patented invention is that it provides a smooth switch over between two modes of a multimode cell phone. (*See* '156 patent at Abstract; 1:46-49.) Another advantage of the patented invention is that it provides interaction between separate modes of operation of a multimode cell phone. (*See* '156 patent at 1:46-49.)

U.S. Patent No. 6,696,941

59. Thomas W. Baker is the inventor of U.S. Patent No. 6,696,941 ("the '941 patent"). A true and correct copy of the '941 patent is attached as Exhibit H.

60. The '941 patent resulted from the pioneering efforts of Mr. Baker (hereinafter "the Inventor") in the area of smart phone technology. These efforts resulted in the development of an apparatus relating to a theft alarm in a mobile device in the early 2000s. At the time of these pioneering efforts, conventionally implemented technology used to address the problem of deterring theft and assisting in locating the mobile phone was to add a lock/unlock personal identification number (PIN) to lock and unlock the device. In that type of system, the device becomes disabled until a lock/unlock PIN is entered that matches a pre-stored lock unlock PIN in memory of the mobile phone. In that type of system, locking a mobile phone prevents further use, but does not assist a user in finding their mobile phone, nor does it deter thieves from hiding the phone on their person.

61. The Inventor conceived of the invention claimed in the '941 patent as a way to discourage theft of a mobile phone, or if stolen, assist the owner in locating their stolen mobile phone.

62. For example, the Inventor developed a method of remotely triggering an alarm within a mobile wireless device, said method comprising: receiving an alarm trigger signal from a service provider to said mobile wireless device based on user authorization; triggering a sensory output from said mobile wireless device based on receipt of said alarm trigger signal from said service provider; and preventing a current holder of said mobile wireless device from stopping said sensory output unless an alarm PIN is manually entered by said holder into said mobile wireless device.

63. One advantage of the '941 patented invention is that it deters theft of a mobile phone. (*See* '941 patent at 1:6-10.)

64. Another advantage of the patented invention is that it assists in locating a mobile phone. (*See id.*)

U.S. Patent No. 7,039,435

65. Richard I. McDowell and Phillip D. Mooney are the inventors of U.S. Patent No. 7,039,435 ("the '435 patent"). A true and correct copy of the '435 patent is attached as Exhibit I.

66. The '435 patent resulted from the pioneering efforts of Messrs. MacDowell and Mooney (hereinafter "the Inventors") in the area of mobile telecommunication devices. These efforts resulted in the development of a proximity regulation system for use with a portable cell phone and a method of operation thereof. At the time of these pioneering efforts, one attempt to reduce the transmit power level of a portable cell phone when located near a human body was to permanently reduce the power of the transmitter in cell phones or to use cell phones with a base, such as in an automobile. However, it is a drawback to permanently reduce the power of the

transmitter in cell phones because this also reduces the quality of service. It is also a drawback to use a base, as it does not allow the flexibility demanded by users of a portable cell phone. The Inventors conceived of the invention claimed in the '435 patent as a way to reduce the transmit power level of a portable cell phone when located near a human body.

67. For example, the Inventors developed 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.

68. One advantage of the '435 patented invention is that it automatically reduces the transmit power level of a portable cell phone when located near a human body. (*See* '435 patent at 1:63-65.)

69. Another advantage of the '435 patented invention is that it does not require a permanent reduction of the power of the transmitter in cell phones. (*See* '435 patent at 1:52-53.)

70. Another advantage of the patented invention is that it does not require the use of a cell phone with a base. (*See* '435 patent at 1:56-57.)

U.S. Patent No. 8,396,072

71. Harri A. Jokinen, David Navratil, and Simon P. Davis are the inventors of U.S. Patent No. 8,396,072 ("the '072 patent"). A true and correct copy of the '072 patent is attached as Exhibit J.

72. The ’072 patent resulted from the pioneering efforts of Messrs. Jokinen, Navratil, and Davis in the area of cellular communication traffic routing and management. The Inventors conceived of the invention claimed in the ’072 patent as a way to implement better systems for handling and routing cellular communications in congested networks.

73. For example, the Inventors developed an apparatus for use in controlling congestion in a cell of a communications network, the apparatus comprising: at least one controller and a memory storing a computer program which are configured to: receive and read a series of blocks on a first channel; determine whether there is congestion based on whether said series of blocks comprises a flag indicating that there is congestion, wherein the flag is in at least one of an IMMEDIATE ASSIGNEMENT message or an IMMEDIATE ASSIGNMENT REJECT message; and in the event that the determination is that there is no congestion, initiate an access procedure by transmitting a channel request on a second channel.

74. One advantage of the ’072 patent is that it allows for variable timing of wireless channel access requests based on the mobile device’s detection of network congestion because the more congested the device determines the network to be, the longer it waits between making wireless channel access requests in order to avoid making the congestion worse. (*See* ’072 patent at 2:45.)

U.S. Patent No. 8,792,432

75. Brian Martin and Keiichi Kubota are the inventors of U.S. Patent No. 8,792,432 (“the ’432 patent”). A true and correct copy of the ’432 patent is attached as Exhibit K.

76. The ’432 patent resulted from the pioneering efforts of Messrs. Martin and Kubota (hereinafter “the Inventors”) in the general area of wireless communication systems.

77. For example, the Inventors developed an apparatus comprising: at least one processor; and at least one memory storing a computer program; wherein the at least one memory storing the computer program is configured with the at least one processor to cause the apparatus to at least: broadcast an indication to direct a user equipment 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; in which one value of the indication directs the user equipment to prioritize the inter-frequency over the intra-frequency neighbor cell measurements for inclusion in the uplink connection request message; and the at least one memory storing the computer program is configured with the at least one processor to cause the apparatus to direct the user equipment to prioritize the intra-frequency neighbor cell measurements over the inter-frequency neighbor cell measurements for inclusion in the uplink connection request message by broadcasting the indication having a different value or by not broadcasting the indication, and in which the indication is within an information element of system information sent 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.

78. One advantage of the ’432 patent is that it provides for a way to help mobile device handsets better communicate neighbor cell tower measurements to their current cell tower over channels where the message size is extremely limited. (*See* ’432 patent at 3:55–4:10.)

DEFENDANTS ACTIVITIES

79. On information and belief, each T-Mobile Defendant makes, uses, sells, imports and/or provides or caused to be used certain mobile phones such as the T-Mobile REVVL 6 Pro 5G, T-Mobile REVVL 6 5G, T-Mobile SyncUp Drive, T-Mobile REVVL 6x Pro 5G, T-Mobile

REVVL 6x 5G, T-Mobile REVVL Tab 5G, T-Mobile REVVL V+ 5G, T-Mobile REVVL V (collectively the "Accused Instrumentalities").

COUNT I – INFRINGEMENT OF U.S. PATENT NO. 8,204,554

80. The allegations set forth in the foregoing paragraphs are incorporated into this First Claim for Relief.

81. On June 19, 2012, the '554 patent was duly and legally issued by the United States Patent and Trademark Office under the title "System and Method for Conserving Battery Power in a Mobile Station."

82. BNR is the assignee and owner of the right, title and interest in and to the '554 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

83. Upon information and belief, Defendants have and continues to directly infringe one or more claims of the '554 patent, e.g. claim 1, by selling, offering to sell, making, using, and/or providing and causing to be used Accused Instrumentalities that include a proximity sensor. The proximity sensor in the Accused Instrumentalities, such as the T-Mobile REVVL 6 Pro 5G, detect when a mobile device user (i) is on a call and (ii) has his or her mobile device positioned proximal to their face, ear, or cheek. When these conditions are detected, the display screen on the mobile device goes dark, which results in battery power savings and prevents the user from accidently selecting buttons on the screen during an ongoing call.

84. Upon information and belief and after a reasonable investigation the Accused Instrumentalities infringe the '554 patent. The Accused Instrumentalities include mobile stations that include a display. For instance, the T-Mobile REVVL 6 Pro 5G is a mobile device that includes a display. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692)

85. The Accused Instrumentalities also include 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. For instance, the T-Mobile REVVL 6 Pro 5G includes a proximity sensor that is adapted to generate a signal indicating whether one's face, ear or cheek is proximate. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

86. The Accused Instrumentalities also include a microprocessor that is adapted to 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. For instance, the T-Mobile REVVL 6 Pro 5G has a microprocessor that is adapted to determine whether a user has performed an action to initiate or receive a call. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

87. The Accused Instrumentalities' microprocessor is adapted to activate the proximity sensor in response to a determination that the second condition exists. For instance, the T-Mobile REVVL 6 Pro 5G's microprocessor is adapted to activate the proximity sensor if the user has performed an action to initiate/receive a call. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

88. The Accused Instrumentalities' microprocessor is adapted to receive the signal from the proximity sensor. For instance, the T-Mobile REVVL 6 Pro 5G's microprocessor is adapted to receive a signal from the proximity sensor. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

89. The Accused Instrumentalities' microprocessor is adapted to reduce power to the display if the signal from the proximity sensor indicates that the first condition exists. For

instance, the T-Mobile REVVL 6 Pro 5G's microprocessor is adapted to reduce power to the display if the signal from the proximity sensor indicates that the T-Mobile REVVL 6 Pro 5G is proximate to the user's face, ear, or cheek. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

90. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one of claim of the '554 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, *et seq.*, directly or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

91. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '554 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

92. T-Mobile US, Inc. has been aware of the '554 patent and its infringement thereof at least as early as the filing of this Complaint.

93. Upon information and belief, since Defendants had knowledge of the '554 patent, Defendants have induced and continue to induce others to infringe at least one claim of the '554 patent, e.g. claim 1, under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to each of Defendant' partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '554 patent.

94. In particular, Defendant' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused

Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities.

95. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendant have had actual knowledge of the '554 patent and knowledge that its acts were inducing infringement of the '554 patent since at least the date when Defendant received notice that such activities infringed the '554 patent.

96. Each Defendant's infringement of the '554 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

97. Each Defendant's infringement of the '554 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

98. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant' infringement of the '554 patent, including without limitation and/or not less than a reasonable royalty.

99. Plaintiff has been harmed by each Defendant's infringing activities.

COUNT II – INFRINGEMENT OF U.S. PATENT NO. 7,319,889

100. The allegations set forth in the foregoing paragraphs are incorporated into this Second Claim for Relief.

101. On January 15, 2008, the '889 patent was duly and legally issued by the United States Patent and Trademark Office under title "System and Method for Conserving Battery Power in a Mobile Station."

102. BNR is the assignee and owner of the right, title and interest in and to the '889 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

103. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the '889 patent, e.g. claim 1, by making, using, selling, importing and/or providing and causing to be used Accused Instrumentalities that include a proximity sensor.

104. Upon information and belief and after a reasonable investigation, at least the Accused Instrumentalities infringe the '889 patent. The Accused Instrumentalities include mobile stations that include a display. For instance, the T-Mobile REVVL 6 Pro 5G is a mobile device that include a display. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

105. The Accused Instrumentalities also include a proximity sensor adapted to generate a signal indicative of proximity of an external object. For instance, the T-Mobile REVVL 6 Pro 5G includes a proximity sensor that detects the presence of one's face, ear, or cheek. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

106. The Accused Instrumentalities also include a microprocessor that is adapted to determine whether a telephone call is active, to receive the signal from the proximity sensor, and 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. For instance, the T-Mobile REVVL 6 Pro 5G determines whether a user has pressed the call answer button to initiate an active call, once the call button is pressed and the mobile device is moved closer to the head, the T-Mobile REVVL 6 Pro 5G's displays go dark indicating that a signal has been received from the proximity sensor, after a user presses the call button to initiate a wireless telephone call and

moves the mobile device closer to his or her head, the display on the T-Mobile REVVL 6 Pro 5G goes dark, indicating that the display has reduced power. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

107. The Accused Instrumentalities' 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. For instance, the T-Mobile REVVL 6 Pro 5G's proximity sensors will detect whether an external object is proximate substantially concurrently with initiation of an outgoing call or reception of an incoming call. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

108. Defendants have infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one of claim of the '889 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, *et seq.*, directly or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

109. On information and belief, these Accused Instrumentalities are used, marketed, provided to, and/or used by or for each of Defendant's partners, clients, customers, and end users across the country and in this District.

110. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '889 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

111. T-Mobile US, Inc. has been aware of the '889 patent and its infringement thereof at least as early as the filing of this Complaint.

112. Upon information and belief, since at least the time Defendants received notice, Defendants have induced and continues to induce others to infringe at least one claim of the ’889 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to each of Defendant’ partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one of claim of the ’889 patent.

113. In particular, Defendants’ actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities.

114. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the ’889 patent and knowledge that its acts were inducing infringement of the ’889 patent since at least the date when Defendants received notice that such activities infringed the ’889 patent.

115. Each Defendant’s infringement of the ’889 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys’ fees.

116. Each Defendant’s infringement of the ’889 patent is exceptional and entitles BNR to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

117. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant’ infringement of the ’889 patent, including without limitation and/or not less than a reasonable royalty.

118. Plaintiff has been harmed by each Defendant’s infringing activities.

COUNT III – INFRINGEMENT OF U.S. PATENT NO. RE 48,629

119. The allegations set forth in the foregoing paragraphs are incorporated into this Third Claim for Relief.

120. On July 6, 2021, the '629 patent was duly and legally reissued by the United States Patent and Trademark Office under the title "Backward-compatible Long Training Sequences for Wireless Communication Networks."

121. BNR is the assignee and owner of the right, title and interest in and to the '629 patent, including the right to assert all causes of action arising under the Patent and the right to any remedies for infringement of it.

122. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the '629 patent, including at least claim 1, making, using, selling, importing and/or providing and causing to be used the Accused Instrumentalities that operate according to the 802.11n standard, such as T-Mobile REVVL 6 Pro 5G mobile phones.

123. The 802.11n standard was introduced on or about October 2009, and 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. (*See* 802.11-2016 at 19.3.9.4.6 or 802.11-2009 at 20.3.9.4.6.)

124. Upon information and belief after a reasonable investigation, at least the Accused Instrumentalities infringe the '629 patent. The Accused Instrumentalities are wireless communication devices that include a signal generator that generates an extended long training sequence. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11n compliant and, therefore, use

a specific HT-LTF sequence that is transmitted in the case of 20 MHz operation. (*See* 802.11-2016 at 19.3.9.4.6 or 802.11-2009 at 20.3.9.4.6; *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692) This corresponds to the long training sequence with minimum peak-to-average power ratio described in the '629 patent. (*See id.*) Devices operating in accordance with the 802.11n standard (known as "wireless stations" or "STAs") must be able to generate the HT-LTF described.

125. The Accused Instrumentalities include an Inverse Fourier Transformer operatively coupled to the signal generator. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11n compliant and, therefore, use an encoding process that requires a reverse Fourier transformer. (*See* 802.11-2016 and 19.3.4(b) or 802.11-2009 at 20.3.4(b); *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

126. The Accused Instrumentalities include an Inverse Fourier Transformer (as explained above) that 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. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11n compliant and, therefore, process the HT-LTF training sequence from the signal generator. (*See* 802.11-2016 at Figure 19-9 and 19.3.9.4.6; *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

127. The T-Mobile REVVL 6 Pro 5G also provides an optimal HT-LTF training sequence with a minimal peak-to-average ratio. (*See* 802.11-2016 at 19.3.9.4.6 at Equation 19-23; *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

128. The Accused Instrumentalities also include an optimal extended long training sequence that is carried by a greater number of subcarriers than a standard wireless networking configuration for an OFDM scheme. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11n compliant and, therefore, include an optimal HT-LTF training sequence that is carried by a greater number of subcarriers than is standard for an OFDM scheme. (*See* 802.11-2016 at 19.3.9.4.6 at Equation 19-23 and additional subcarriers noted therein as compared to L-LT; *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

129. The Accused Instrumentalities also include an optimal extended long training sequence that is carried by exactly 56 active subcarriers. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11n compliant and, therefore, include an optimal HT-LTF training sequence that is carried by 56 active subcarriers. (*See* 802.11-2016 at 19.3.9.4.6; *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

130. The Accused Instrumentalities also include an optimal extended long training sequence (as explained above) that is represented by encodings for indexed subcarriers -28 to +28, excluding indexed subcarrier 0 which is set to zero, as follows:

Sub-carrier	*−28*	*−27*	*−26*	*−25*	*−24*	*−23*	*−22*
Encoding	*+1*	*+1*	*+1*	*+1*	*−1*	*−1*	*+1*
Sub-carrier	*−14*	*−13*	*−12*	*−11*	*−10*	*−9*	*−8*
Encoding	*+1*	*+1*	*+1*	*−1*	*−1*	*+1*	*+1*
Sub-carrier	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Encoding	*+1*	*−1*	*−1*	*+1*	*+1*	*−1*	*+1*
Sub-carrier	*15*	*16*	*17*	*18*	*19*	*20*	*21*
Encoding	*+1*	*+1*	*−1*	*−1*	*+1*	*−1*	*+1*
Sub-carrier	*−21*	*−20*	*−19*	*−18*	*−17*	*−16*	*−15*
Encoding	*+1*	*−1*	*+1*	*−1*	*+1*	*+1*	*+1*
Sub-carrier	*−7*	*−6*	*−5*	*−4*	*−3*	*−2*	*−1*
Encoding	*−1*	*+1*	*−1*	*+1*	*+1*	*+1*	*+1*
Sub-carrier	*8*	*9*	*10*	*11*	*12*	*13*	*14*
Encoding	*−1*	*+1*	*−1*	*−1*	*−1*	*−1*	*−1*
Sub-carrier	*22*	*23*	*24*	*25*	*26*	*27*	*28*
Encoding	*−1*	*+1*	*+1*	*+1*	*+1*	*−1*	*−1.*

131. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11n compliant, and therefore include an optimal HT-LTF training sequence that is represented by encodings for indexed subcarriers -28 to +28, excluding indexed subcarrier 0 according to the chart above. (*See*

19.3.9.4.6 at Equation 19-23; *see, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

132. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claim one claim of the '629 patent, e.g., claim 1, in violation of 35 U.S.C. §§ 271, *et seq*., directly or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the '629 Accused Instrumentalities.

133. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '629 patent and its infringement thereof at least since receiving a notice email from BNR dated April 21, 2023.

134. T-Mobile US, Inc. has been aware of the '629 patent and its infringement thereof at least as early as the filing of this Complaint.

135. Upon information and belief, since Defendants have had knowledge of the '629 patent, Defendants have induced and continues to induce others to infringe at least claim 1 of the '629 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to each of Defendant' partners, clients, customers, and end users whose use of the Accused Instrumentalities constitutes direct infringement of at least claim 1 of the '629 patent.

136. In particular, Defendant' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities.

137. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the ’629 patent and knowledge that its acts were inducing infringement of the ’629 patent since at least the date Defendants received notice that such activities infringed the ’629 patent.

138. Each Defendant’s infringement of the ’629 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys’ fees.

139. Each Defendant’s infringement of the ’629 patent is exceptional and entitles BNR to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

140. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant’ infringement of the ’629 patent, including without limitation and/or not less than a reasonable royalty.

141. Plaintiff has been harmed by each Defendant’s infringing activities.

COUNT IV – INFRINGEMENT OF U.S. PATENT NO. 8,416,862

142. The allegations set forth in the foregoing paragraphs are incorporated into this Fourth Claim for Relief.

143. On April 9, 2013, the ’862 patent was duly and legally issued by the United States Patent and Trademark Office under the title “Efficient Feedback of Channel Information in a Closed Loop Beamforming Wireless Communications System.”

144. BNR is the assignee and owner of the right, title and interest in and to the ’862 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

145. Upon information and belief, Defendants have and continue to directly or indirectly infringe one or more claims of the ’862 patent, e.g. claim 1, by selling, offering to sell,

making, using, and/or providing and causing to be used Accused Instrumentalities that operate according to the 802.11ac standard, such as the T-Mobile REVVL 6 Pro 5G mobile phone.

146. The 802.11ac standard was introduced on or about December 2013, and 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 19.3.12.1.)

147. Upon information and belief after a reasonable investigation, at least the Accused Instrumentalities infringe the '862 patent that provide a method for feeding back transmitter beamforming information from a receiving wireless communication device to a transmitting wireless communication device. For instance, the T-Mobile REVVL 6 Pro 5G is 802.11ac compliant and therefore provides a compressed beamforming feedback matrix to a beamformer. (*See, e.g.*, 802.11-2016 at 19.3.12.1; *see, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

148. The Accused Instrumentalities, for example, receive a preamble sequence from a transmitting wireless device. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant receiver and, therefore, receives a PHY preamble with HT-LTFs from a beamformer. (*See, e.g.*, 802.11-2016 at 19.3.13.1; *see, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

149. The Accused Instrumentalities include estimating a channel response based upon the preamble sequence. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device and, therefore, estimates a channel response as a result of receiving the HT-LTF's which are part of the PHY preamble. (*See, e.g.*, 802.11-2016 at 19.3.13.1; *see, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

150. The Accused Instrumentalities include determining an estimated transmitter beamforming unitary matrix (V) based upon the channel response and a receiver beamforming unitary matrix (U). For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device, and therefore calculates a beamforming unitary matrix V based on a singular value decomposition of the channel response H=UDV*, where D is a diagonal matrix and U is a receiver unitary matrix. (*See, e.g.*, 802.11-2016 at 19.3.12.3.6; see, e.g., https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

151. The Accused Instrumentalities include decomposing the estimated transmitter beamforming unitary matrix (V) to produce the transmitter beamforming information. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device and, therefore, determines beamforming feedback matrices and compresses those into the form of angles. (*See, e.g.*, 802.11-2016 at 19.3.12.3.6; *see, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

152. The Accused Instrumentalities include wirelessly sending the transmitter beamforming information to the transmitting wireless device. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device and, therefore, wirelessly sends the compressed beamformed matrices to the beamformer. (*See, e.g.*, 802.11-2016 at 19.3.12.3.6; *see, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

153. Defendants have infringed and are infringing, either literally or under the doctrine of equivalents, at least one claim of the '862 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

154. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '862 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

155. T-Mobile US, Inc. has been aware of the '862 patent and its infringement thereof at least as early as the filing of this Complaint.

156. Upon information and belief, since Defendants have had knowledge of the '862 patent, Defendants have induced and continues to induce others to infringe at least claim 1 of the '862 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant' partners, clients, customers, and end users across the country and in this District, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '862 patent.

157. In particular, Defendant's actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities.

158. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because

Defendants have had actual knowledge of the ’862 patent and knowledge that its acts were inducing infringement of the ’862 patent since at least the date Defendants received notice that such activities infringed the ’862 patent.

159. Each Defendant’s infringement of the ’862 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys’ fees.

160. Each Defendant’s infringement of the ’862 patent is exceptional and entitles BNR to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

161. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant’ infringement of the ’862 patent, including without limitation and/or not less than a reasonable royalty.

162. Plaintiff has been harmed by each Defendant’s infringing activities.

COUNT V – INFRINGEMENT OF U.S. PATENT NO. 7,564,914

163. The allegations set forth in the foregoing paragraphs are incorporated into this Fifth Claim for Relief.

164. On July 21, 2009, the ’914 patent was duly and legally issued by the United States Patent and Trademark Office under the title “Method and System for Frame Formats for MIMO Channel Measurement Exchange.”

165. BNR is the assignee and owner of the right, title and interest in and to the ’914 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

166. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the ’914 patent, including at least claim 1, by selling, offering to sell,

making, using, and/or providing and causing to be used instrumentalities that operate according to the 802.11ac standard, including the Accused Instrumentalities.

167. 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 space-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." (*Id.*) Devices implementing the beamforming standardization according to 802.11ac standard must be capable of providing compressed beamforming feedback matrices as set forth above.

168. On information and belief after a reasonable investigation, the Accused Instrumentalities infringe the '914 patent that provide a method for transmitting data via a plurality of radio frequency (RF) channels utilizing a plurality of transmitting antennas. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device that transmits data via a plurality of radio frequency (RF) channels utilizing a plurality of transmitting antennas. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

169. The Accused Instrumentalities receive feedback information via at least one of the plurality of RF channels. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device that receives feedback information via at least one of the plurality of RF channels. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

170. The Accused Instrumentalities modify a transmission mode based on the feedback information. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device that modifies a transmission mode based on the feedback information. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

171. The Accused Instrumentalities receive the feedback information comprising channel estimates based on transmission characteristics of the transmitted data via at least one of the plurality of transmitting antennas. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device that receives the feedback information comprising channel estimates based on transmission characteristics of the transmitted data via at least one of the plurality of transmitting antennas; and deriving the feedback information from mathematical matrix decomposition of channel estimates. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

172. The Accused Instrumentalities derive the feedback information from mathematical matrix decomposition of channel estimates. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device that derives the feedback information from mathematical matrix decomposition of channel estimates. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

173. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one claim of the ’914 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, *et seq.*, directly or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

174. On information and belief, these Accused Instrumentalities are used marketed, provided to, and/or used by or for each of Defendant' partners, clients, customers and end users across the country and in this District.

175. Upon information and belief, Defendants have been aware of the '914 patent and its infringement thereof at least as early as the filing of this complaint for patent infringement.

176. Upon information and belief, since Defendants have had knowledge of the '914 patent, Defendant has induced and continues to induce others to infringe at least claim 1 of the '914 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant's partners, customers, clients, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least claim 1 of the '914 patent.

177. In particular, Defendants' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '914 patent and knowledge that its acts were inducing infringement of the '914 patent since at least the date Defendants received notice that such activities infringed the '914 patent.

178. Each Defendant's infringement of the '914 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

179. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant' infringement of the '914 patent, including without limitation and/or not less than a reasonable royalty.

180. Plaintiff has been harmed by each Defendant's infringing activities.

COUNT VI – INFRINGEMENT OF U.S. PATENT NO. 7,957,450

181. The allegations set forth in the foregoing paragraphs are incorporated into this Sixth Claim for Relief.

182. On January 7, 2011, the '450 patent was duly and legally issued by the United States Patent and Trademark Office under the title "Method and System for Frame Formats for MIMO Channel Measurement Exchange."

183. BNR is the assignee and owner of the right, title and interest in and to the '450 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

184. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the '450 patent, e.g. claim 1, by selling, offering to sell, making, using, and/or providing and causing to be used Accused Instrumentalities that operate according to the 802.11ac standard, such as the T-Mobile REVVL 6 Pro 5G mobile phone.

185. 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 space-time stream CSD in Table 19-10 from the measured channel before computing a set of matrices for feedback to the beamformer." (*See, e.g.,* 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." (*Id.*) Devices

implementing the beamforming standardization according to 802.11ac standard must be capable of providing compressed beamforming feedback matrices as set forth above.

186. Upon information and belief after a reasonable investigation, at least the Accused Instrumentalities infringe the '450 patent. The Accused Instrumentalities provide a system for communication having one or more circuits of a mobile terminal that are operable to compute a plurality of channel estimate matrices based on signals received by the mobile terminal from a base station, via one or more downlink RF channels, wherein the plurality of channel estimate matrices comprise coefficients derived from performing a singular value matrix decomposition (SVD) on the received signals and that is 802.11ac compliant. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device and has one or more circuits of a mobile terminal that are operable to compute a plurality of channel estimate matrices based on signals received by the mobile terminal from a base station, via one or more downlink RF channels, wherein the plurality of channel estimate matrices comprise coefficients derived from performing a singular value matrix decomposition (SVD) on the received signals. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

187. The Accused Instrumentalities include one or more circuits operable to transmit the coefficients as feedback information to the base station, via one or more uplink RF channels. For instance, the T-Mobile REVVL 6 Pro 5G is an 802.11ac compliant wireless device and, therefore, includes one or more circuits operable to transmit the coefficients as feedback information to the base station, via one or more uplink RF channels. (See, e.g., https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

188. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one claim of the '450 patent, e.g. claim 1, in

violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

189. Upon information and belief, T-Mobile USA Inc. has had knowledge of the '450 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

190. T-Mobile US, Inc. has been aware of the '450 patent and its infringement thereof at least as early as the filing of this Complaint.

191. Upon information and belief, since Defendants have had knowledge of the '450 patent, Defendants have induced and continue to induce others to infringe at least claim 1 of the '450 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant' partners, customers, clients, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least claim 1 of the '450 patent.

192. In particular, Defendant' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendant has had actual knowledge of the '450 patent and knowledge that its acts were inducing infringement of the '450 patent since at least the date Defendant received notice that such activities infringed the '450 patent.

193. Each Defendant's infringement of the '450 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

194. Each Defendant's infringement of the '450 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

195. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant' infringement of the '450 patent, including without limitation and/or not less than a reasonable royalty.

196. Plaintiff has been harmed by each Defendant's infringing activities.

COUNT VII – INFRINGEMENT OF U.S. PATENT NO. 6,941,156

197. The allegations set forth in the foregoing paragraphs are incorporated into this Seventh Claim for Relief.

198. On September 6, 2005, the '156 patent was duly and legally issued by the United States Patent and Trademark Office under the title "Automatic Handoff for Wireless Piconet Multi Mode Cell Phone."

199. BNR is the assignee and owner of the right, title and interest in and to the '156 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

200. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the '156 patent, e.g. claim 1, by selling, offering to sell, making, using, and/or providing and causing to be used Accused Instrumentalities for transferring a communication link between two different modes of a multimode cellphone. The Accused Instrumentalities, including the REVVL 6 5G mobile phone which include both an RF radio for cellular communications and a separate RF radio for connection to Wi-Fi networks. Further, this smart phones is designed and able to operate simultaneous communication paths at different

frequencies and automatically switch over communication from either the cellular communication or the Wi-Fi functionality to the other.

201. Upon information and belief and after a reasonable investigation, at least the Accused Instrumentalities infringe the '156 patent that are multimode cell phones that include a cell phone functionality and an RF communication functionality separate from the cell phone functionality. For instance, the T-Mobile REVVL 6 5G is a multimode cell phone that include a cell phone functionality and an RF communication functionality separate from the cell phone functionality. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-5g?sku=610214675064.)

202. The Accused Instrumentalities also include an automatic switch over module, in communication with both the cell phone functionality and the RF communication functionality, operable to switch a communication path established on the other of the cell phone functionality and the RF communication functionality. For instance, the T-Mobile REVVL 6 5G includes an automatic switch over module, in communication with both the cell phone functionality and the RF communication functionality, operable to switch a communication path established on the other of the cell phone functionality and the RF communication functionality. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-5g?sku=610214675064.)

203. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one claim of the '156 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

204. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '156 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

205. T-Mobile US, Inc. has been aware of the '156 patent and its infringement thereof at least as early as the filing of this Complaint.

206. Upon information and belief, since Defendants had knowledge of the '156 patent, Defendant has induced and continues to induce others to infringe at least claim 1 of the '156 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendant' partners, customers, clients, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least claim 1 of the '156 patent.

207. In particular, Defendant' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '156 patent and knowledge that its acts were inducing infringement of the '156 patent since at least the date Defendants received notice that such activities infringed the '156 patent.

208. Upon information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '156 patent and that its acts were inducing infringement of the '156 patent since Defendants have had knowledge of the '156 patent.

209. Each Defendant's infringement of the '156 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

210. Each Defendant's infringement of the '156 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

211. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant' infringement of the '156 patent, including without limitation and/or not less than a reasonable royalty.

212. Plaintiff has been harmed by each Defendant's infringing activities.

COUNT VIII – INFRINGEMENT OF U.S. PATENT NO. 6,696,941

213. The allegations set forth in the foregoing paragraphs are incorporated into this Eighth Claim for Relief.

214. On February 24, 2004, the '941 patent was duly and legally issued by the United States Patent and Trademark Office under the title "Theft Alarm in Mobile Device."

215. BNR is the assignee and owner of the right, title and interest in and to the '941 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

216. Upon information and belief, Defendant have and continue to directly infringe one or more claims of the '941 patent, e.g. claim 10, by selling, offering to sell, making, using, and/or providing and causing to be used Accused Instrumentalities for remotely triggering an alarm within a mobile phone. The Accused Instrumentalities, such as T-Mobile REVVL 6 5G smart phone, have an alarm capable of being remotely triggered by a remote trigger detection element which responds to an alarm personal identification number (PIN) entered by a remote user to produce an alarm signal that triggers a display within the mobile phone.

217. Upon information and belief and after a reasonable investigation, at least the Accused Instrumentalities infringe the '941 patent. The Accused Instrumentalities comprise a remotely triggering means for an alarm within a mobile wireless device. For instance, the T-Mobile REVVL 6 5G smart phone is a mobile wireless devices having a remotely triggering means for an alarm. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-5g?sku=610214675064.)

218. The Accused Instrumentalities also include a means for receiving an alarm trigger signal from a service provider to the mobile wireless device based on user authorization. For instance, the T-Mobile REVVL 6 5G includes an antenna for receiving an alarm trigger signal from a service provider based on user authorization. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-5g?sku=610214675064.)

219. The Accused Instrumentalities also include means for triggering a sensory output based on receipt of the alarm trigger signal from the service provider. For instance, the T-Mobile REVVL 6 5G includes means for triggering a sensory output based on receipt of the alarm trigger signal from the service provider. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-5g?sku=610214675064.)

220. The Accused Instrumentalities also include means for preventing a current holder of the mobile wireless device from stopping the sensory output unless an alarm PIN is manually entered by the holder into the mobile wireless device. For instance, the T-Mobile REVVL 6 5G includes means for preventing a current holder of the mobile wireless device from stopping the sensory output unless an alarm PIN is manually entered by the holder into the mobile wireless device. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-5g?sku=610214675064.)

221. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one claim of the '941 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, *et seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

222. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '941 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

223. T-Mobile US, Inc. has been aware of the '941 patent and its infringement thereof at least as early as the filing of this Complaint.

224. Upon information and belief, since Defendants had knowledge of the '941 patent, Defendants have induced and continue to induce others to infringe at least claim 1 of the '941 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendants' partners, customers, clients, and end-users, whose use of the Accused Instrumentalities constitutes direct infringement of at least claim 1.

225. In particular, Defendants' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '941 patent and knowledge that its acts

were inducing infringement of the ’941 patent since at least the date Defendants received notice that such activities infringed the ’941 patent.

226. Each Defendant’s infringement of the ’941 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys’ fees.

227. Each Defendant’s infringement of the ’941 Patent is exceptional and entitles BNR to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

228. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant’ infringement of the ’941 patent, including without limitation and/or not less than a reasonable royalty.

229. Plaintiff has been harmed by each Defendant’s infringing activities.

COUNT IX – INFRINGEMENT OF U.S. PATENT NO. 7,039,435

230. The allegations set forth in the foregoing paragraphs are incorporated into this Ninth Claim for Relief.

231. On May 2, 2006, the ’435 patent was duly and legally issued by the United States Patent and Trademark Office under the title “Proximity Regulation System for Use with a Portable Cell Phone and a Method of Operation Thereof.”

232. BNR is the assignee and owner of the right, title and interest in and to the ’435 patent, including the right to assert all causes of action arising under said patent and the right to any remedies for infringement of it.

233. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the ’435 patent, e.g. claim 1, by selling, offering to sell, making, using, and/or providing and causing to be used Accused Instrumentalities having proximity regulation systems, such as the T-Mobile REVVL 6 Pro 5G, which has systems to detect the location of the

mobile device proximate to the user and adjusts the transmit power level of the mobile device based on its location proximate to the user.

234. On information and belief after a reasonable investigation, the Accused Instrumentalities infringe the '435 patent. The Accused Instrumentalities include a power circuit that provides a network adjusted transmit power level as a function of a position to a communications tower. For instance, the T-Mobile REVVL 6 Pro 5G includes 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). The claimed power signal is part of the Long-Term Evolution ("LTE") standard, which is utilized by the T-Mobile REVVL 6 Pro 5G.

235. More specifically, section 5.1.1 of the LTE standard addresses the "UE behavior" and states:

> If the UE transmits PUSCH without a simultaneous PUCCH for the serving cell c, then the UE transmit power $P_{\mathrm{PUSCH},c}(i)$ for PUSCH transmission in subframe i for the serving cell c is given by
>
> $$P_{\mathrm{PUSCH},c}(i) = \min\begin{Bmatrix} P_{\mathrm{CMAX},c}(i), \\ 10\log_{10}(M_{\mathrm{PUSCH},c}(i)) + P_{\mathrm{O\_PUSCH},c}(j) + \alpha_c(j)\cdot PL_c + \Delta_{\mathrm{TF},c}(i) + f_c(i) \end{Bmatrix} \text{ [dBm]}$$

(*See* https://www.etsi.org/deliver/etsi_ts/136200_136299/136213/10.04.00_ 60/ts_136213v100 400p.pdf at 5.1.1.)

236. The Accused Instrumentalities have 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. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

237. The Accused Instrumentalities also have 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. (*See, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

238. Defendants have infringed and are infringing, either literally or under the doctrine of equivalents, at least one claim of the '435 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, et seq., directly or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

239. On information and belief, these Accused Instrumentalities are used marketed, provided to, and/or used by or for each of Defendant' partners, clients, customers and end users across the country and in this District.

240. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '435 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

241. T-Mobile US, Inc. has been aware of the '435 patent and its infringement thereof at least as early as the filing of this Complaint.

242. Upon information and belief, since Defendants had knowledge of the '435 patent, Defendants have induced and continues to induce others to infringe at least claim 1 of the '435 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Defendants' partners, customers, clients, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least claim 1 of the '435 patent.

243. In particular, Defendants' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities.

244. Upon information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '435 patent and that its acts were inducing infringement of the '435 patent since Defendants have had knowledge of the '435 patent.

245. Each Defendant's infringement of the '435 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

246. Each Defendant's infringement of the '435 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

247. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant' infringement of the '435 Patent, including without limitation and/or not less than a reasonable royalty.

248. Plaintiff has been harmed by each Defendant's infringing activities.

COUNT X – INFRINGEMENT OF U.S. PATENT NO. 8,396,072

249. The allegations set forth in the foregoing paragraphs are incorporated into this Tenth Claim for Relief.

250. On March 12, 2013, the '072 patent was duly and legally issued by the United States Patent and Trademark Office under the title "Method and Apparatus for Channel Traffic Congestion Avoidance in a Mobile Communication System."

251. BNR is the assignee and owner of the right, title and interest in and to the '072 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

252. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the '072 patent, e.g. claim 1, by selling, offering to sell, making, using, and/or providing and causing to be used instrumentalities that operate according to the GSM/EDGE standard, including the T-Mobile REVVL 6 Pro 5G mobile phone.

253. The GSM standard, which was introduced in 1991, establishes protocols for 2G digital cellular networks. By the mid-2010s, GSM was the global standard for mobile communications and accounted for more than 90% of cellular networks worldwide. The '072 Patent reads on version 10.4.0 of the GSM standard, which was published in October 2010. (*See* https://www.etsi.org/deliver/etsi_ts/144000_144099/144018/10.04.00_60/ts_144018v100400p.pdf.) The GSM standard sets forth a protocol for channeling traffic congestion detection and management in a mobile communication system. (*See id.* at 3.3.1.1.1a.)

254. Upon information and belief and after a reasonable investigation, at least the Accused Instrumentalities infringe the '072 patent. The Accused Instrumentalities include controlling congestion in a cell of a communications network. For instance, the T-Mobile

REVVL 6 Pro 5G is GSM compliant and utilize the implicit reject indication described in 3.3.1.1.11. (*See id.* at 3.3.1.1.1a; *see, e.g.*, https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692) The implicit reject indication from the network corresponds to the channel traffic congestion detection described in the '072 Patent. (*See* https://www.etsi.org/deliver/etsi_ts/144000_144099/144018/10.04.00_60/ts_144018v100400p.pdf at 3.3.1.1.1a) ("The network may at any time include an implicit reject indication for the PS domain or the CS domain within an IMMEDIATE ASSIGNMENT message using the *IA Rest Octets* IE (see sub-clause 10.5.2.16) or within an IMMEDIATE ASSIGNMENT REJECT or an IMMEDIATE ASSIGNMENT EXTENDED message using the *Feature Indicator* IE (see sub-clause 10.5.2.76)[.]") Devices operating in accordance with the GSM standard are apparatuses embodying the described traffic congestion detection.

255. The Accused Instrumentalities include at least one controller and a memory storing a computer program. For instance, the T-Mobile REVVL 6 Pro 5G is GSM/EDGE compliant, and therefore include at least one controller and a memory storing a computer program. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

256. The Accused Instrumentalities are configured to receive and read a series of blocks on a first channel. For instance, the T-Mobile REVVL 6 Pro 5G is GSM/EDGE compliant, and therefore are configured to receive and read a series of blocks on a first channel. (*See, e.g.,* https://www.etsi.org/deliver/etsi_ts/144000_144099/144018/10.04.00_60/ts_144018v100400p.pdf at 3.3.1.1.2 (noting that "[t]he RR [(Radio Resource)] entity of a mobile state is configured for 'low access priority'…[and] initiates the immediate assignment procedure by leaving idle mode

and listening to the downlink CCCH [(Common Control Channel),]" which indicates receipt of the first channel.).)

257. The Accused Instrumentalities are configured to determine whether there is congestion based on whether said series of blocks comprises a flag indicating that there is congestion, wherein the flag is in at least one of an IMMEDIATE ASSIGNMENT message or an IMMEDIATE ASSIGNMENT REJECT message. For instance, the T-Mobile REVVL 6 Pro 5G is GSM/EDGE compliant and therefore is configured to determine whether there is congestion based on whether said series of blocks comprises a flag indicating that there is congestion. (*See id.* at 3.3.1.1.2 (noting that "[i]f the RR message indicates an implicit reject for the CS [(Circuit Switched)] domain (see sub-clause 3.3.1.1.1a) the mobile station shall abort the immediate assignment procedure and initiate the Implicit Reject procedure (*see* sub-clause 3.3.1.1.3.2a).") Since the T-Mobile REVVL 6 Pro 5G is GSM/EDGE compliant, the flag is in at least one of an IMMEDIATE ASSIGNMENT message or an IMMEDIATE ASSIGNMENT REJECT message. *See id.* at 3.3.1.1.1a (noting that "[t]he network may at any time include an implicit reject indication for the PS domain or the CS domain within an IMMEDIATE ASSIGNMENT message…or within an IMMEDIATE ASSIGNMENT REJECT.").

258. In the event that the determination is that there is no congestion, the Accused Instrumentalities are configured to initiate an access procedure by transmitting a channel request on a second channel. For instance, the T-Mobile REVVL 6 Pro 5G is GSM/EDGE compliant and therefore in the event that there is a determination that there is no congestion, the devices initiate an access procedure by transmitting a channel request on a second channel. (*See id.* at 3.3.1.1.2.) The GSM standard specifies the following in the event that a determination is reached that there is no congestion: "the RR entity of the mobile station schedules the sending of

CHANNEL REQUEST (or EGPRS PACKET CHANNEL REQUEST) messages on the RACH and proceeds according to the remainder of this subclause." (*Id.*) The RACH (Random Access Channel) constitutes the claimed second channel. (*See id.*)

259. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one claim of the '072 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, et *seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

260. On information and belief, these Accused Instrumentalities are used marketed, provided to, and/or used by or for each of Defendant' partners, clients, customers and end users across the country and in this District.

261. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the '072 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

262. T-Mobile US, Inc. has been aware of the '072 patent and its infringement thereof at least as early as the filing of this Complaint.

263. Upon information and belief, since at least the time Defendants received notice, Defendants have induced and continues to induce others to infringe at least claim 1 of the '072 patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to each of Defendants' partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '072 patent.

264. In particular, Defendants' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '072 patent and knowledge that its acts were inducing infringement of the '072 patent since at least the date Defendants received notice that such activities infringed the '072 patent.

265. Each Defendant's infringement of the '072 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

266. Each Defendant's infringement of the '072 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

267. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendant' infringement of the '072 Patent, including without limitation and/or not less than a reasonable royalty.

268. Plaintiff has been harmed by each Defendant's infringing activities.

COUNT XI – INFRINGEMENT OF U.S. PATENT NO. 8,792,432

269. The allegations set forth in the foregoing paragraphs are incorporated into this Eleventh Claim for Relief.

270. On July 29, 2014 the '432 patent was duly and legally issued by the United States Patent and Trademark Office under the title "Prioritizing RACH Message Contents."

271. BNR is the assignee and owner of the right, title and interest in and to the '432 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

272. Upon information and belief, Defendants have and continue to directly infringe one or more claims of the '432 patent, including at least claim 1 by selling, offering to sell, making, using, and/or providing and causing to be used instrumentalities that operate according to the GSM/EDGE standard, including its T-Mobile REVVL 6 Pro 5G mobile phone.

273. Upon information and belief and after a reasonable investigation, at least the Accused Instrumentalities infringe the '432 patent. The Accused Instrumentalities include the T-Mobile REVVL 6 Pro 5G which 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. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

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

275. The Accused Instrumentalities include compliance with the TS 25.331 v.11.4.0 Standard that 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.) For instance, the T-Mobile REVVL 6 Pro 5G, 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. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

276. The Accused Instrumentalities operate in accordance with the TS 25.331 v.11.4.0 Standard for transmitting 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. For instance, the T-Mobile REVVL 6 Pro 5G 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. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

277. The Accused Instrumentalities operate in accordance with the TS 25.331 v.11.4.0 Standard that 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 intrafrequency cells reported first, and an "IntraEUTRAInter" indication limits the number of interfrequency 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 interfrequency 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.

278. 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. For instance, the T-Mobile REVVL 6 Pro 5G are receiving wireless devices (cellular phones) that are advertised as containing features that comply with the TS 25.331 v.11.4.0 Standard or later, including an LTE Category that complies with that version of the standard or later. For example, Defendant's T-Mobile REVVL 6 Pro 5G is advertised as containing the MediaTek Dimensity 700 processor, which supports LTE Category 12. LTE Category 12 was added in TS 25.331 Release 11; therefore, the Defendant T-Mobile REVVL 6 Pro 5G supports TS 25.331 v.11.4.0 or later. (See, e.g., https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

279. Because Defendant T-Mobile REVVL 6 Pro 5G complies with the TS 25.331 v.11.4.0 Standard or later, it therefore implements the mandatory portions of that standard described above. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

280. Because of its compliance with the TS 25.331 v.11.4.0 Standard or later, the T-Mobile REVVL 6 Pro 5G 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 interfrequency 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. (*See, e.g.,* https://www.t-mobile.com/cell-phone/t-mobile-revvl-6-pro-5g?sku=610214674692.)

281. Defendants have infringed and are infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least one claim of the ’432 patent, e.g. claim 1, in violation of 35 U.S.C. §§ 271, et *seq.*, directly and/or indirectly, by making, using, offering for sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Instrumentalities.

282. On information and belief, these Accused Instrumentalities are used marketed, provided to, and/or used by or for each of Defendants’ partners, clients, customers and end users across the country and in this District.

283. Upon information and belief, T-Mobile USA, Inc. has had knowledge of the ’432 patent and its infringement thereof at least since receiving a notice letter from BNR dated August 22, 2019.

284. T-Mobile US, Inc. has been aware of the ’432 patent and its infringement thereof at least as early as the filing of this Complaint.

285. Upon information and belief, since at least the time Defendants received notice, Defendants have induced and continue to induce others to infringe at least one claim of the ’432

patent under 35 U.S.C. § 271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to each of Defendant' partners, clients, customers, and end users, whose use of the Accused Instrumentalities constitutes direct infringement of at least one claim of the '432 patent.

286. In particular, Defendants' actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Instrumentalities and providing instruction materials, training, and services regarding the Accused Instrumentalities. On information and belief, Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because Defendants have had actual knowledge of the '432 patent and knowledge that its acts were inducing infringement of the '432 patent since at least the date Defendants received notice that such activities infringed the '432 patent.

287. Each Defendant's infringement of the '432 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

288. Each Defendant's infringement of the '432 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

289. BNR is entitled to recover from Defendants all damages that BNR has sustained as a result of Defendants' infringement of the '432 patent, including without limitation and/or not less than a reasonable royalty.

290. Plaintiff has been harmed by each Defendant's infringing activities.

JURY DEMAND

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, BNR demands a trial by jury on all issues triable as such.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff demands judgment for itself and against Defendants as follows:

A. An adjudication that each Defendant has infringed U.S. Patent Nos. 8,204,554, 7,319,889, RE 48,629, 8,416,862, 7,564,914, 7,957,450, 6,941,156, 6,696,941 7,039,435, 8,396,072, and 8,792,432;

B. An award of pre- and post-judgment interest, as allowed by law;

C. A judgment that each Defendant has infringed one or more claims of the Asserted Patents;

D. An award of damages to be paid by each Defendant adequate to compensate BNR for Defendant' past infringement of U.S. Patent Nos. 8,204,554, 7,319,889, RE 48,629, 8,416,862, 7,564,914, 7,957,450, 6,941,156, 6,696,941, 7,039,435, 8,396,072, and 8,792,432 and any continuing or future infringement through the date such judgment is entered, including interest, costs, expenses, and an accounting of all infringing acts including, but not limited to, those acts not presented at trial;

E. An award of enhanced damages under 35 U.S.C. § 284, in the form of treble damages.

F. A declaration that this case is exceptional under 35 U.S.C. § 285, and an award of BNR's reasonable attorneys' fees; and

G. An award to BNR of such further relief at law or in equity as the Court deems just and proper.

Dated: October 13, 2023

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/s/ Paul Richter

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