IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

BELL NORTHERN RESEARCH, LLC, *Plaintiff,* v. NXP SEMICONDUCTORS, N.V.; NXP, B.V.; and NXP USA, INC., *Defendants.*	C.A. No. 1:24-cv-1341 JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Bell Northern Research, LLC ("BNR" or "Plaintiff"), for its Complaint against

Defendants NXP Semiconductors, N.V.; NXP, B.V.; and NXP USA, Inc. (collectively, "NXP"

or "Defendants"), 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 North Michigan Avenue, Chicago, Illinois 60611.

3.   BNR is informed and believes Defendant NXP N.V. has its principal place of

business and headquarters at 60 High Tech Campus, Eindhoven, Netherlands, 5656 AG. BNR is

informed and believes that Defendant NXP N.V. imports, sells for importation, and/or sells after

importation into the United States products that are made using the patented systems and

methods ("Accused Products"), including at least the NXP 88W8997 2.4/5 GHz Dual-Band 2x2

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Wi-Fi 5 (802.11ac) + Bluetooth 5.3 system-on-chip ("NXP Exemplary Accused Product"), either directly or by directing the co-defendant NXP entities to do so.

4.   BNR is informed and believes Defendant NXP B.V. has its principal place of business and headquarters at 60 High Tech Campus, Eindhoven, Netherlands, 5656 AG. Defendant NXP B.V. is a subsidiary of or otherwise controlled by Defendant NXP N.V. BNR is informed and believes that Defendant NXP N.V. imports, sells for importation, and/or sells after importation the Accused Products, including the NXP Exemplary Accused Product, in the United States, either directly or by directing other co-defendant NXP entities to do so.

5.   BNR is informed and believes Defendant NXP USA, Inc. has its principal place of business and headquarters at 6501 William Cannon Drive West, Austin, TX 78735. BNR is informed and believes Defendant NXP USA is a subsidiary of or otherwise controlled by Defendant NXP N.V. and/or NXP B.V. as to the sale for importation, importation, and/or sale after importation into the United States of the Accused Products, including the NXP Exemplary Accused Product. BNR is informed and believes that Defendant NXP USA imports, sells for importation, and/or sells after importation into the United States the Accused Products, including the NXP Exemplary Accused Product, either directly or by directing other co-defendant NXP entities to do so.

JURISDICTION AND VENUE

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

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

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

9.   Upon information and belief, Defendant NXP Semiconductors, N.V. is not a resident in the United States and may be sued in any judicial district. Defendant NXP

Semiconductors has a place of business located at 60 High Tech Campus, Eindhoven,

Netherlands, 5656 AG. Defendant NXP Semiconductors has committed acts of infringement in

this District.

10.   Upon information and belief, Defendant NXP B.V. is not a resident in the United

States and may be sued in any judicial district. Defendant NXP B.V. has a place of business

located at 60 High Tech Campus, Eindhoven, Netherlands, 5656 AG. Defendant NXP B.V. has

committed acts of infringement in this District.

11.   Upon information and belief, Defendant NXP USA, Inc. has its principal place of

business and headquarters at 6501 William Cannon Drive West, Austin, TX 78735. Defendant

NXP USA, Inc. has committed acts of infringement within this district.

12.   Upon information and belief, Defendants are subject to this Court's general and

specific personal jurisdiction, because the Defendants have sufficient minimum contacts within

the State of Texas and this District, pursuant to due process and/or the Texas Long Arm Statute,

because the Defendants purposefully availed itself of the privileges of conducting business in the

State of Texas and in this District, because the Defendants regularly conduct and solicits

business within the State of Texas and within this District, and because Plaintiff's causes of

action arise directly from the Defendants' business contacts and other activities in the State of

Texas and this District.

BACKGROUND

13.   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.

14.   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.

15.   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.

16.   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.

17.   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.

18.   The BNR Patent portfolio comprises hundreds of patents that reflect important developments in telecommunications that were invented and refined by leading technology research companies, including Agere, LSI, and Broadcom. These include U.S. Patent Nos. RE 49,509, and 7,957,450 (collectively, these patents comprise the "Asserted Patents").

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

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

U.S PATENT NO. RE 49,509

21.   Jason Alexander Trachewsky and Rajendra T. Moorti are the inventors of U.S. Patent No. RE 49,509 (the '509 patent). A true and correct copy of the '509 patent is attached as Exhibit A.

22. The '509 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.

23. 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.

24. 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, and wherein the optimal extended long training sequence is carried by exactly 56 active sub-carriers.

25. 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* '509 patent at 4:22-24.)

26.   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* '509 patent at 4:24-28.)

U.S PATENT NO. 7,957,450

27.   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 B.

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

29.   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.

30.   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.

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

32.   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.)

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

DEFENDANTS' ACTIVITIES

34.   NXP makes, uses, sells, imports and/or provides or caused to be used wireless communications devices, such as the NXP 88W8997 2.4/5 GHz Dual-Band 2x2 Wi-Fi 5 (802.11ac) + Bluetooth 5.3 system-on-chip (the NXP Exemplary Accused Product), and other Accused Products including (but not limited to) the NXP 88Q9098, 88Q9098S, 88W8801, 88W8887, 88W8897, 88W8897P, 88W8964, 88W8977, 88W8987, 88W8987S, 88W9054, 88W9098, AW690, CW641, IW416, IW612, and IW620 products.

COUNT I – INFRINGEMENT OF U.S. PATENT NO. RE 49,509

35.   The allegations set forth in the foregoing paragraphs 1 through 34 are incorporated into this First Claim for Relief.

36.   On April 25, 2023, the '509 patent was duly and legally issued by the United States Patent and Trademark Office under the title "Backward-Compatible Long Training Sequences for Wireless Communication Networks."

37.   BNR is the assignee and owner of the right, title and interest in and to the '509 patent, including the right to assert all causes of action arising under the patent and the right to any remedies for infringement of it.

38.   Upon information and belief, the Defendants have and continue to directly infringe one or more claims of the '509 patent, including at least claim 21, by selling, offering to sell, making, using, and/or providing and causing to be used Products that operate according to the 802.11n standard, such as NXP 88W8997 devices, which operate using the 802.11ac standard that is backward-compatible with the 802.11n standard. A chart showing exemplary

infringement of the '509 patent by NXP's 88W8997 device is provided in Exhibit C to this Complaint.

39.   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.)

40.   Upon information and belief after a reasonable investigation, at least the Accused Products infringe the '509 patent. The Accused Products are wireless communication devices that include a signal generator that generates an extended long training sequence. For instance, the NXP 88W8997 is 802.11n compliant because it is 802.11ac compliant, and, therefore, uses 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.*, Ex. I.) This corresponds to the long training sequence with minimum peak-to-average power ratio described in the '509 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.

41.   The Accused Products include an Inverse Fourier Transformer operatively coupled to the signal generator. For instance, the NXP 88W8997 is 802.11n compliant and, therefore, uses 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.*, Ex. C.)

42.   The Accused Products 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 NXP 88W8997 is 802.11n compliant and, therefore, processes 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.*, Ex. I.) The NXP 88W8997 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.,* Ex. C.)

43.   The Accused Products 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 NXP 88W8997 is 802.11n compliant and, therefore, includes 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.,* Ex. C.)

44.   The Accused Products also include an optimal extended long training sequence that is carried by exactly 56 active subcarriers. For instance, the NXP 88W8997 is 802.11n compliant and, therefore, includes 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.,* Ex. C.)

45.   Defendants have infringed and is infringing, individually and/or jointly, either literally or under the doctrine of equivalents, at least claim one claim of the '509 patent, *e.g.*, claim 21, 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 Products.

46.   Upon information and belief, NXP has been aware of the '509 patent and its infringement thereof at least as early as the filing of this Complaint.

47.   Upon information and belief, since the Defendants have had knowledge of the '509 patent, NXP has induced and continues to induce others to infringe at least claim 21 of the '509 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 NXP's partners, clients, customers, and end users whose use of the Accused Products constitutes direct infringement of at least claim 21 of the '509 patent.

48.   In particular, NXP's actions that aid and abet others such as its partners, customers, clients, and end users to infringe include advertising and distributing the Accused Products and providing instruction materials, training, and services regarding the Accused Products. On information and belief, NXP has engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because NXP has had actual knowledge of the '509 patent and knowledge that its acts were inducing infringement of the '509 patent since at least the date NXP received notice that such activities infringed the '509 patent.

49.   Upon information and belief, the Defendants have engaged in such actions with specific intent to cause infringement or with willful blindness to the resulting infringement because the Defendants have had actual knowledge of the '509 patent and that its acts were inducing infringement of the '509 patent since NXP has had knowledge of the '509 patent.

50.   NXP's infringement of the '509 patent is willful and deliberate, entitling BNR to enhanced damages and attorneys' fees.

51.   NXP's infringement of the '509 patent is exceptional and entitles BNR to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

52.   BNR is entitled to recover from NXP all damages that BNR has sustained as a result of Defendants' infringement of the '509 patent, including without limitation and/or not less than a reasonable royalty.

53.   Plaintiff has been harmed by NXP's infringing activities.

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

54.   The allegations set forth in the foregoing paragraphs 1 through 53 are incorporated into this Second Claim for Relief.

55.   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."

56.   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.

57.   Upon information and belief, the Defendants have and continue to directly infringe one or more claims of the '450 patent, including at least claim 1, by selling, offering to sell, making, using, and/or providing and causing to be used Products that operate according to the 802.11ac standard, such as NXP 88W8997 devices, which operate using the 802.11ac standard. A chart showing exemplary infringement of the '450 patent by NXP's 88W8997 device is provided in Exhibit D to this Complaint.

58.   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.

59.   Upon information and belief after a reasonable investigation, at least the Accused Products infringe the '450 patent. The Accused Products 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 NXP 88W8997 device is 802.11ac compliant 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* Ex. D.)

60.   The Accused Products 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 NXP 88W8997 device is 802.11ac compliant 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* Ex. D.)

61.   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

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sale, selling, offering for lease, leasing in the United States, and/or importing into the United States without authority or license, the Accused Products.

62.   NXP has been aware of the '450 patent and its infringement thereof at least as early as January 31, 2023.

63.   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 Defendants' partners, customers, clients, and end users, whose use of the Accused Products constitutes direct infringement of at least claim 1 of the '450 patent.

64.   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 Products and providing instruction materials, training, and services regarding the Accused Products. 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 '450 patent and knowledge that its acts were inducing infringement of the '450 patent since at least the date Defendants received notice that such activities infringed the '450 patent.

65.   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 '450 patent and that its acts were inducing infringement of the '450 patent since Defendants have had knowledge of the '450 patent.

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

67.   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.

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

69.   Plaintiff has been harmed by Defendants' 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 BNR demands judgment for itself and against the Defendant as follows:

A.   An adjudication that each Defendants have infringed U.S. Patent Nos. RE 49,509 and 7,957,450;

B.   An award of damages to be paid by Defendants adequate to compensate BNR for Defendants' past infringement of U.S. Patent Nos. RE 49,509 and 7,957,450 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;

C.   Enhanced damages for willful infringement;

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

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

and proper.

Dated: November 1, 2024   Respectfully submitted,

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