UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

COLLISION COMMUNICATIONS, INC., Plaintiff, v. NOKIA CORPORATION, NOKIA SOLUTIONS AND NETWORKS OY, and NOKIA OF AMERICA CORPORATION, Defendants.	)	Civil Action No. 2:21-cv-00308 **COMPLAINT FOR PATENT INFRINGEMENT** **JURY TRIAL DEMANDED**

PLAINTIFF'S COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Collision Communications, Inc. ("Collision") hereby files this Complaint for Patent Infringement against Nokia Corporation ("Nokia Corp."), Nokia Solutions and Networks Oy ("NSN Oy"), and Nokia of America Corporation ("Nokia USA") (collectively, "Nokia").

NATURE OF THE ACTION

1. This is a civil action for infringement under the patent laws of the United States of America, 35 U.S.C. § 1 *et seq*.

2. Collision is the owner of all rights, title, and interest in U.S. Patent Nos. 7,233,620 ("'620 Patent"); 7,593,492 ("'492 Patent"); 7,724,851 ("'851 Patent"); 9,814,071 ("'071 Patent"); 9,888,479 ("'479 Patent"); and 10,477,561 ("'561 Patent") (collectively, the "Asserted Patents"), which are attached as Exhibits 1-6.

PARTIES

3. Plaintiff Collision is a Delaware corporation with its principal place of business at 20 Depot Street, Suite 2A, Peterborough, NH 03458. Collision, which was formed in 2011, is a

telecommunications research and development company that creates and implements proprietary methods for reducing signal interference in cellular networks.

4. Since its formation, Collision has aimed to develop and commercialize interference mitigation and cancellation techniques and equipment that enable cellular base stations to operate at peak efficiency, and to that end has invested substantial resources in research and development efforts.

5. On information and belief, Defendant Nokia Corporation is a corporation organized and existing under the laws of Finland with its principal place of business at Karakaari 7, 02610 Espoo, Finland. On information and belief, Nokia Corporation acquired Alcatel-Lucent on or around November 2, 2016.

6. On information and belief, Defendant Nokia Solutions and Networks Oy is a corporation organized and existing under the laws of Finland with its principal place of business at Karaportti 3, 02610 Espoo, Finland. Nokia Solutions and Networks Oy is a wholly owned subsidiary of Nokia Corporation.

7. On information and belief, Defendant Nokia of America Corporation is a Delaware corporation with its principal place of business at 600 Mountain Avenue, Murray Hill, New Jersey, 07974. Nokia of America Corporation is an indirect wholly owned subsidiary of Nokia Corporation and Nokia Solutions and Networks Oy.

8. On information and belief, Defendant Nokia of America Corporation is the surviving legal entity of several acquisitions, mergers, and/or corporate changes of name, including Nokia's acquisition of Alcatel-Lucent. For example, on information and belief, effective August 8, 2013, Nokia Siemens Networks US LLC was renamed Nokia Solutions and Networks US LLC. Effective November 30, 2017, Nokia Solutions and Network Holdings

USA, Inc. merged into Nokia Solutions and Networks US LLC. Furthermore, effective January 1, 2018, Nokia Solutions and Networks US LLC merged into Alcatel-Lucent USA Inc., which was renamed Nokia of America Corporation.

JURISDICTION AND VENUE

9. This is a civil action for infringement under the patent laws of the United States of America, 35 U.S.C. § 1 *et seq*. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

10. This Court has personal jurisdiction over Nokia Corp., NSN Oy, and Nokia USA because, directly or through intermediaries, they have committed acts within Texas giving rise to this action and/or have established minimum contacts with Texas such that the exercise of jurisdiction would not offend traditional notions of fair play and substantial justice. For example, as determined through the Texas Comptroller of Public Accounts website, NSN Oy is registered to do business in the State of Texas. *See* Exhibit 7. As determined through the Texas Comptroller of Public Accounts website, Nokia USA is similarly registered to do business in the State of Texas. *See* Exhibit 8.

11. Nokia maintains a presence in the State of Texas, and the Eastern District of Texas in particular. For example, Nokia USA's website advertises that it maintains its U.S. headquarters in the State of Texas. *See* Exhibit 9, at 3. Nokia's website further advertises that Nokia USA maintains established places of business in the Eastern District of Texas, including, at least: (1) an office at 2525 Highway 121, Lewisville, Texas, 75056; (2) a NokiaEDU Training Center at 601 Data Drive, Plano, Texas 75075; and (3) a data center in Plano, Texas. *See, e.g.*, Exhibit 9, at 2; https://www.nokia.com/contact-us/offices/#north-america (last visited Aug. 4, 2021); *see also IPCom, Gmbh & Co. KG v. AT&T Corp., Defendant, and Nokia of Am. Corp.,*

Intervenor, 2:20-cv-00322-JRG, D.I. 47, ¶¶61-63 (E.D. Tex. Feb. 9, 2021) (Nokia admitting the existence of a "Nokia facility in Lewisville, Texas," a "Nokia [training center] facility in Plano, Texas," and "a data center in Plano").

12. Nokia USA also employs individuals, solicits business, engages in other persistent courses of conduct, and derives revenue from goods and methods used or consumed by, and services offered or provided to, persons and/or entities in the State of Texas and this judicial district. For example, during the infringing time period, Nokia has operated the "NokiaEDU Training Center" in Plano, Texas to deliver "a top-quality learning experience" to its customers. *See, e.g.*, https://learningstore.nokia.com/locations/files/US-Plano.pdf (last visited Aug. 4, 2021). The training facility is "equipped with state-of-the-art technology, amenities and helpful staff." *Id.*

13. Nokia USA maintains additional offices in nearby locations throughout Texas, including its U.S. headquarters in Dallas. *See, e.g.*, https://www.nokia.com/about-us/company/worldwide-presence/north-america/ (last visited Aug. 4, 2021); https://www.nokia.com/contact-us/offices/#north-america (last visited Aug. 4, 2021); Exhibit 9, at 2. In addition, job openings at Nokia's Plano and Dallas locations are posted on its website (www.nokia.com). *See, e.g.*, https://careers.nokia.com/jobs/optics-waveprime-system-architect-62745 (advertising an system architect job opening for its Plano, Texas office) (last visited Aug. 4, 2021). Nokia operates an additional NokiaEDU Training Center in Dallas. *See, e.g.*, https://www.nokia.com/about-us/careers/ (last visited Aug. 4, 2021); https://learningstore.nokia.com/locations/files/US-Dallas.pdf (last visited Aug. 4, 2021). Nokia's activities in Texas have intensified this year as it launched "its first Open RAN (O-RAN) Collaboration and Testing Center" in its U.S. headquarters in Dallas.

https://www.rcrwireless.com/20210617/americas/nokia-opens-oran-test-facility-texas (Aug. 4, 2021).

14. In May 2020, Nokia announced it "achieved the world's fastest 5G speeds in its Over-the-Air (OTA) network" in Texas. *See, e.g.*, https://www.nokia.com/about-us/news/releases/2020/05/19/nokia-achieves-world-record-5g-speeds/ (last visited Aug. 4, 2021). This achievement was possible using Nokia's AirScale Radio Access, a product accused of infringement in this case. *Id.* Nokia's AirScale Radio Access "combines the efficiency of Single RAN supporting 2G, 3G, 4G, and 5G and the flexibility of cloud RAN and open RAN." *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/. (last visited Aug. 4, 2021).

15. Nokia Corp., NSN Oy, and/or Nokia USA also operate the website www.nokia.com, which is accessible to and directed toward citizens of the State of Texas and this judicial district.

16. Nokia Corp., NSN Oy, and/or Nokia USA, including their predecessors-in-interest, have contracted and partnered with various entities, including but not limited to the three largest nationwide cellular carriers—Sprint/T-Mobile, Verizon, and Dallas-based AT&T—to perform services and/or deliver products nationwide, including in this judicial district.

17. During the infringing time period, Nokia Corp., NSN Oy, and/or Nokia USA have placed one or more infringing products, including Nokia's 3G and 4G LTE infrastructure products, into the stream of commerce via an established distribution channel with the knowledge and/or understanding that such products were being offered for sale, and/or sold to customers, and/or utilized in this judicial district. For example, Nokia Corp., NSN Oy, and/or Nokia USA have longstanding contracts with all three major nationwide carriers—Sprint/T-

Mobile, Verizon, and Dallas-based AT&T—to supply 3G and 4G LTE infrastructure products to be used in enhancing each carrier's nationwide network. *See, e.g.*, https://www.fiercewireless.com/wireless/t-mobile-picks-ericsson-nsn-as-its-lte-vendors (identifying Nokia as one of T-Mobile's primary infrastructure vendors for its LTE network) (last visited Aug. 4, 2021); https://www.wraltechwire.com/2010/02/10/att-picks-ericsson-alcatel-lucent-for-4g-network/ (identifying Nokia and Alcatel-Lucent (which later was acquired by Nokia) as suppliers of AT&T's LTE infrastructure equipment) (last visited Aug. 4, 2021); https://www.fiercewireless.com/wireless/alcatel-lucent-snags-4b-verizon-contract-posts-q3-profit (announcing contract between Verizon and Alcatel-Lucent for 3G network expansion and LTE network buildout) (last visited Aug. 4, 2021); https://www.fiercewireless.com/tech/at-t-chooses-ericsson-alcalu-for-lte (noting AT&T is "extend[ing] its existing relationship with [Alcatel-Lucent]" to move to LTE due to compatibility with existing 3G equipment from Alcatel-Lucent) (last visited Aug. 4, 2021).

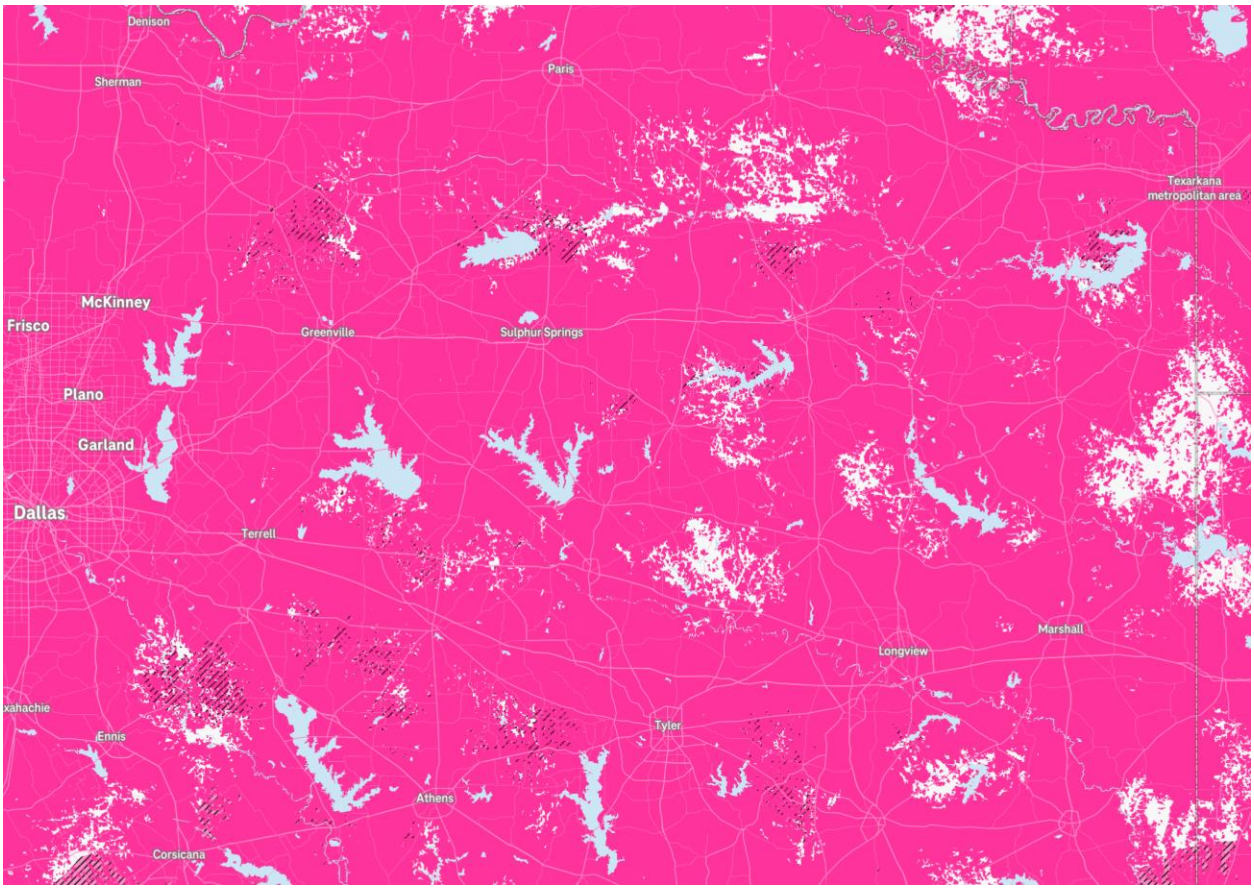
Nokia's Partnership with T-Mobile to Deploy Its Products Nationwide, Including In This Judicial District

18. Nokia Corp., NSN Oy, and/or Nokia USA were selected in 2012 as one of T-Mobile's "primary infrastructure vendors for its [then-]forthcoming LTE network. *See* https://www.fiercewireless.com/wireless/t-mobile-picks-ericsson-nsn-as-its-lte-vendors (last visited Aug. 4, 2021). In 2014, Nokia extended its "long-term relationship with T-Mobile under a new contract to help the operator continue the expansion of its fastest nationwide 4G LTE network." *See* https://www.nokia.com/about-us/news/releases/2014/10/01/t-mobile-extends-partnership-with-nokia-networks-to-support-further-expansion-of-its-4g-lte-network/ (last visited Aug. 4, 2021); *see also* https://www.fiercewireless.com/wireless/t-mobile-will-work-nokia-networks-to-launch-lte-carrier-aggregation (last visited Aug. 4, 2021). According to the

announcement, Nokia "has deployed 4x2 and 4x4 MIMO-capable radio technology in its LTE base stations" since 2012, and "T-Mobile's LTE solution is comprised of [Nokia's] best-in-class Flexi Multiradio10 Base Station." *Id.*

19. Nokia Corp., NSN Oy, and/or Nokia USA also contracted with at least T-Mobile to deploy Nokia's Single RAN technology in its nationwide network. Including within this judicial district. For example, in 2018 Nokia announced a $3.5 billion deal with T-Mobile to deploy its technology, including its AirScale radio platform nationwide. *See, e.g.*, https://www.nokia.com/about-us/news/releases/2018/07/30/t-mobile-and-nokia-ink-35-billion-multi-year-5g-network-agreement/ (last visited Aug. 4, 2021). Nokia's AirScale radio access platform "provides efficient and scalable mobile network coverage and capacity – for 2G, 3G, 4G and 5G with common Single RAN hardware, software, management and services." *See, e.g.*, *id.*; https://www.nokia.com/networks/radio-access/airscale/single-ran-advanced/ ("Nokia Single RAN consists of multipurpose hardware and common software for 2G, 3G, 4G and 5G NSA and SA technologies") (last visited Aug. 4, 2021); https://www.nokia.com/networks/radio-access/airscale/radio/ ("The Nokia AirScale radio portfolio supports all radio access technologies 2G, 3G, FDD and TDD 4G and 5G") (last visited Aug. 4, 2021); https://www.nokia.com/networks/radio-access/airscale/baseband/ ("The AirScale System Module simplifies 2G, 3G, 4G and 5G Single RAN deployments") (last visited Aug. 4, 2021). In early 2021, Nokia Corp., NSN Oy, and/or Nokia USA "announced a continuation of its long standing T-Mobile partnership with a five-year deal" to continue to deploy its AirScale radio access solutions for T-Mobile's nationwide network. *See, e.g.*, https://www.nokia.com/about-us/news/releases/2021/01/14/nokia-supports-t-mobile-5g-evolution-with-five-year-expansion-deal/ (last visited Aug. 4, 2021). T-Mobile provides 3G and 4G LTE coverage in this judicial

district. *See* https://www.t-mobile.com/coverage/coverage-map (last visited Aug. 4, 2021); https://www.fiercewireless.com/operators/t-mobile-s-cdma-shutdown-already-harms-consumers-says-coalition. For example, the light pink color in the excerpt of T-Mobile's network coverage map reproduced below identifies 4G LTE coverage provided by T-Mobile in this judicial district:



https://www.t-mobile.com/coverage/coverage-map (last visited Aug. 4, 2021).

20. On information and belief, Nokia deploys its 3G and 4G LTE products to provide these T-Mobile services in this judicial district.

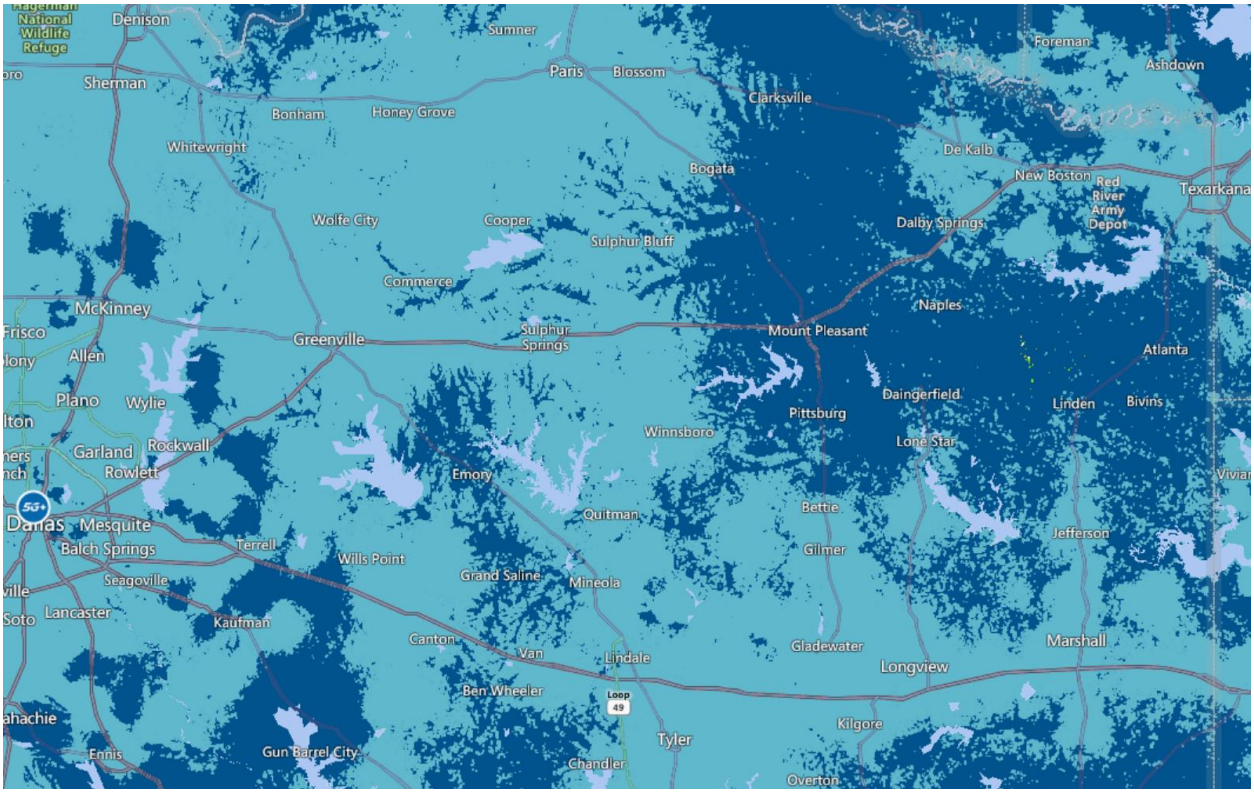
Nokia's Partnership with AT&T to Deploy Its Products Nationwide, Including In This Judicial District

21. Nokia Corp., Nokia USA, and NSN Oy have also contracted with Dallas-based AT&T for infrastructure equipment nationwide, including in this judicial district. Alcatel-Lucent, which was later acquired by Nokia, partnered with AT&T in 2008 to provide equipment

that would enable AT&T to "deploy 3G radio network elements in a variety of locations." https://www.rcrwireless.com/20080214/free-reports/alcatel-lucent-scores-at-t-mobility-deal (last visited Aug. 4, 2021). In February 2010, Alcatel-Lucent was selected by AT&T to provide LTE cell-tower equipment and "to build out [AT&T's] LTE network." *See, e.g.*, https://www.wraltechwire.com/2010/02/10/att-picks-ericsson-alcatel-lucent-for-4g-network/ (last visited Aug. 4, 2021); https://www.rcrwireless.com/20100210/carriers/at-t-picks-ericsson-alcatel-lucent-for-lte-rollout (last visited Aug. 4, 2021); *IPCom, Gmbh & Co. KG v. AT&T Corp., Defendant, and Nokia of Am. Corp., Intervenor*, 2:20-cv-00322-JRG, D.I. 47 (E.D. Tex. Feb. 9, 2021) ("Nokia admits it provides base stations to AT&T."). In early 2021, Nokia announced a five-year contract with AT&T, to integrate "Nokia's C-Band RAN technology … with existing Nokia LTE RAN equipment [already] deployed by AT&T." *See, e.g.*, https://www.nokia.com/about-us/news/releases/2021/03/18/nokia-supports-5g-for-att-customers-with-five-year-c-band-deal/ (last visited Aug. 4, 2021). According to the announcement, the "[d]eal features Nokia's massive MIMO antenna solutions, macro remote radio heads and next generation AirScale baseband equipment." *See, e.g.*, *id.* Moreover, Nokia Corp., NSN Oy, and/or Nokia USA, in collaboration with AT&T, are launching a "5G Innovation Studio" to "provid[e] a space where customers can explore and try out tech using advanced network capabilities" in Plano, Texas, which is located within this judicial district. *See, e.g.*, https://www.fiercewireless.com/5g/at-t-launches-5g-innovation-studio-ericsson-nokia (last visited Aug. 4, 2021).

22. AT&T offers 3G and 4G LTE coverage in this judicial district. *See, e.g.*, https://www.att.com/maps/wireless-coverage.html (last visited Aug. 4, 2021); https://www.att.com/support/article/wireless/KM1324171/ (last visited Aug. 4, 2021). The dark

blue color in the excerpt of AT&T's coverage map reproduced below identifies 4G LTE coverage in this judicial district:



https://www.att.com/maps/wireless-coverage.html (last visited Aug. 4, 2021).

Upon information and belief, the base stations that support LTE also support 3G communications.

23. Upon information and belief, Nokia deploys its LTE products to provide these AT&T services in this judicial district.

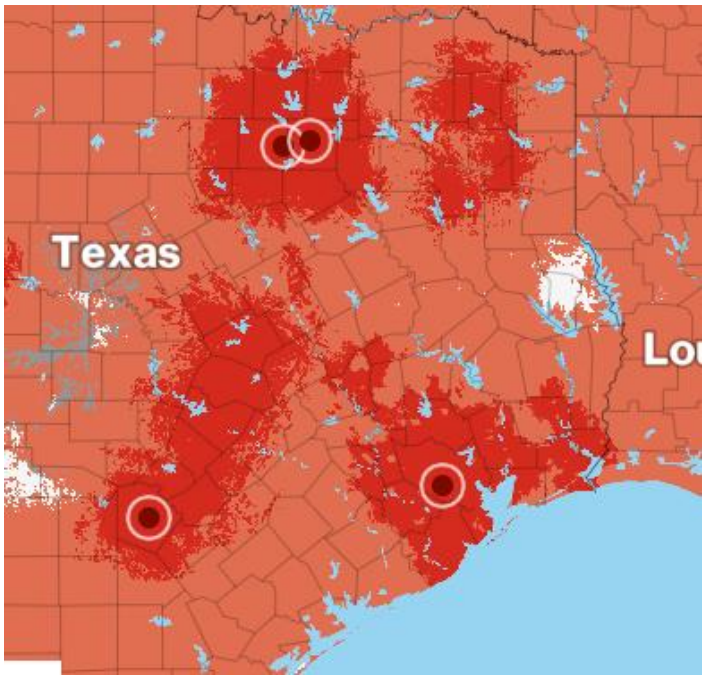
Nokia's Partnership with Verizon to Deploy Its Products Nationwide, Including In This Judicial District

24. Nokia Corp., NSN Oy, and/or Nokia USA have also contracted with Verizon wireless for infrastructure equipment that is deployed nationwide, including in this judicial district. For example, "Verizon's network historically has been . . . half Nokia gear." *See, e.g.*, https://www.fiercewireless.com/financial/samsung-scores-6b-network-deal-verizon (last visited

Aug. 4, 2021). As another example, Alcatel-Lucent, which Nokia later acquired, was "one of the key vendors of CDMA and LTE infrastructure for Verizon Wireless." *See, e.g.*, https://www.verizon.com/about/news/vzw/2010/01/pr2010-01-06f (last visited Aug. 4, 2021). In 2013, Verizon announced it would use Alcatel-Lucent's "LTE small cell products" to enhance the coverage of its LTE network, and Alcatel-Lucent was a "primary radio access network (RAN) vendor[] for Verizon's LTE network." *See, e.g.*, https://www.fiercewireless.com/wireless/verizon-taps-alcatel-lucent-ericsson-for-lte-small-cells (last visited Aug. 4, 2021). In 2018, Nokia Corp., NSN Oy, and/or Nokia USA collaborated to reach "record-breaking speeds on [Verizon's] 4G LTE [network]" using "Nokia's AirScale base station." *See, e.g.*, https://www.verizon.com/about/news/verizon-nokia-and-qualcomm-use-lte-advanced-technology-six-carrier-aggregation-reach-145-gbps (last visited Aug. 4, 2021). Also in 2018, Nokia Corp., NSN Oy, and/or Nokia USA contracted with Verizon to provide its AirScale Cloud RAN architecture to provide for Verizon's future requirements for its nationwide 4G network and beyond. *See, e.g.*, https://www.nokia.com/about-us/news/releases/2018/02/26/nokia-intel-and-verizon-collaborate-on-new-virtualized-ran-architectures-on-path-to-commercialization/ (last visited Aug. 4, 2021).

25. In 2016, Verizon and Nokia carried out 5G field tests in the Dallas-Fort Worth area using Nokia's "5G-ready" AirScale equipment. *See, e.g.*, http://www.rcrwireless.com/20160223/test-and-measurement/verizon-nokia-push-5g-toward-reality-tag6 (last visited Aug. 4, 2021). According to this article, Nokia's commercially available AirScale equipment, which runs 4G LTE, will help customers to migrate to early 5G services in 2017. *Id.*

26. Verizon offers 3G and 4G LTE coverage in this judicial district and the state of Texas. *See, e.g.*, https://www.verizon.com/coverage-map/ (last visited Aug. 4, 2021); https://www.verizon.com/about/news/3g-cdma-network-shut-date-set-december-31-2022 (last visited Aug. 4, 2021). Both light and dark orange indicate 4G LTE coverage:



https://www.verizon.com/coverage-map/ (last visited Aug. 4, 2021).

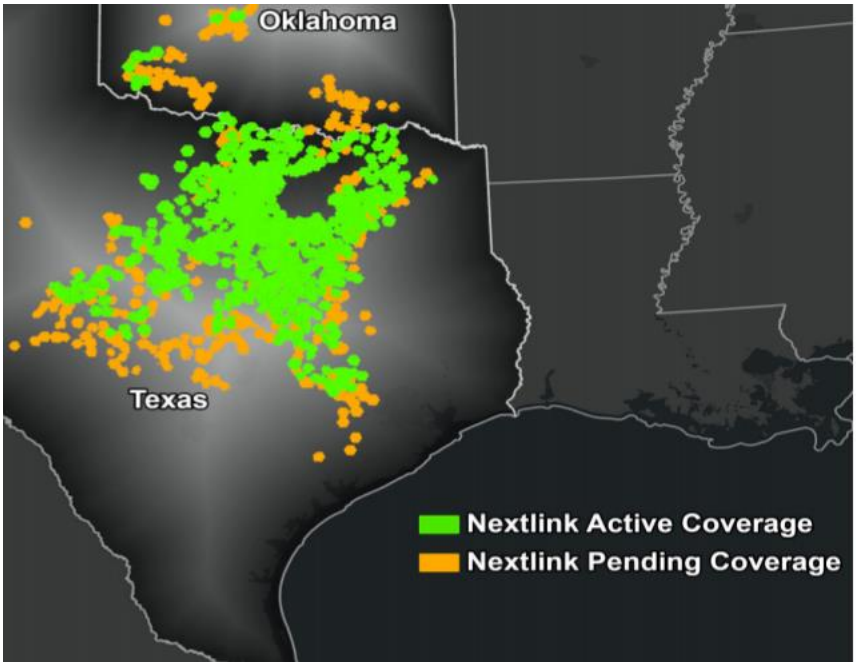
27. Upon information and belief, Nokia deploys its 3G and LTE products to provide these Verizon services in this judicial district.

Nokia's Partnership with Nextlink Internet to Deploy Its Products in Texas, Including In This Judicial District

28. Nokia Corp. NSN Oy, and/or Nokia USA have also contracted with Nextlink Internet to deploy Nokia's "AirScale 4G LTE RAN" to deploy a "CBRS 4G LTE network to deliver … broadband service" to "underserved regions" across the Central United States, including in Texas. *See, e.g.*, https://www.nokia.com/about-us/news/releases/2020/10/14/nokia-and-nextlink-internet-bring-5g-ready-wireless-internet-to-rural-americans/ (last visited Aug. 4, 2021);

https://ecfsapi.fcc.gov/file/103182243815475/Nextlink%20RDOF%20Ex%20Parte%20Letter%20-%20Rosenworcel.pdf at 4 ("Today, Nextlink is actively rolling out the Nokia, carrier-grade CBRS platform across all of its CAF states.") (last visited Aug. 4, 2021). As part of this deal, Nokia and Nextlink are "deploying up to 25 new towers a month" in areas Nextlink provides coverage to, which includes this judicial district. *Id.*

29. Nextlink Internet offers internet coverage in this judicial district, including in at least Cooke, Denton, Grayson, Collin, Fannin, Lamar, Hopkins, and Van Zandt Counties. *See, e.g.*, https://nextlinkinternet.com/sign-up/?lang=en_ (last visited Aug. 4, 2021). Nextlink's active coverage, including in the judicial district, is shown below in green:



https://ecfsapi.fcc.gov/file/103182243815475/Nextlink%20RDOF%20Ex%20Parte%20Letter%20-%20Rosenworcel.pdf, at 2 (last visited Aug. 4, 2021).

30. Upon information and belief, Nextlink provides these services in this judicial district using, at least in part, Nokia Corp.'s, NSN Oy's, and/or Nokia USA's LTE products.

* * *

31. In addition to these commercial relationships and this business presence in Texas and this judicial district, Nokia Corp., NSN Oy, and/or Nokia USA have availed themselves and/or participated in litigation in courts within the State of Texas and this judicial district in particular. For example, Nokia USA recently intervened in lawsuits in this district against its customers AT&T, Sprint, and Verizon. *See, e.g., IPCom Gmbh & Co. v. AT&T Inc.*, No. 2:20-cv-00322-JRG (E.D. Tex. filed Oct. 1, 2020) (lead) (involving AT&T and Verizon); *Sol IP, LLC v. AT&T Mobility LLC*, No. 2:18-cv-00526-RWS-RSP (E.D. Tex. filed Dec. 3, 2018) (lead) (involving AT&T, Sprint, and Verizon). Nokia Corp., NSN Oy, and/or Nokia USA have also asserted patents in the State of Texas and this judicial district. *See, e.g., Nokia Sols. and Network US LLC v. Huawei Techs. Co.*, No. 2:16-cv-00753-JRG (E.D. Tex. filed July 11, 2016) (naming Nokia Solutions and Networks Oy and the predecessor to Nokia of America Corporation as plaintiffs).

32. For the reasons set forth above, venue is proper for Nokia USA under 28 U.S.C. § 1400(b).

33. Furthermore, because this Court has personal jurisdiction over Nokia Corp. and NSN Oy—both foreign corporations—venue is proper pursuant to 28 U.S.C. § 1391(c).

COLLISION'S PATENTS

34. In a telecommunications network, a cellular base station accepts signals from mobile devices and transmits those signals elsewhere, either to other mobile devices or to the core network. Base stations receive interfering signals, such as signals transmitted from other mobile devices, as noise. Noise decreases network performance and efficiency. Base stations typically tolerate noise or implement means to avoid interference, but both strategies result in suboptimal network performance. The Asserted Patents disclose interference mitigation and

cancellation systems and methods that allow base stations to, for example, disaggregate and detect multiple user signals, extract the "interfering" signals, and subtract the interfering signals from reconstructed signals. Using Collision's patented technology, a base station can receive a larger volume of signals by decreasing or mitigating the effects of interference, thereby improving network efficiency.

'620 Patent

35. The '620 Patent, titled "Bandwidth-Efficient Wireless Network Modem," was duly and lawfully issued on June 19, 2007. Collision is the owner of all right, title, and interest in the '620 Patent, including the right to sue for past infringement. A true and correct copy of the '620 Patent is attached hereto as Exhibit 1.

36. The claims of the '620 Patent are not directed to basic tools of scientific and technological work, fundamental economic practices, or the use of an abstract mathematical formula.

37. Rather, the '620 Patent addresses problems and shortcomings in the field of wireless communications, and multi-user networks in particular, and claims novel and inventive technological solutions to such problems and shortcomings. For example, the '620 Patent describes limitations in the prior art, in which wireless network management schemes employ methods to partition a network into communication channels, such as Frequency Division Multiple Access (FDMA) systems that "assign each terminal to a separate, non-overlapping frequency band" ('620 Patent at 1:48-49), Time Division Multiple Access (TDMA) systems that "assign each terminal to a separate non-overlapping time slot" ('620 Patent at 1:49-51) and Code Division Multiple Access (CDMA) schemes that "assign each terminal to a separate modulating waveform so that the cross correlation between each terminal is negligible." '620 Patent at 1:51-54.

38. The technology recited in the claims of the ’620 Patent specifies how to dynamically assign multiple users to allocated channels, enabling multiple signals to be received on the same channel—a result that overrides the routine and conventional practice of granting channel access. For example, instead of the conventional approach of ignoring the signal-to-noise ratio in order to determine whether to allow additional users to connect, the ’620 Patent discloses the novel approach of reconstructing an estimate of interfering signals and calculating noise power to determine whether there is sufficient noise margin to allow additional users to communicate over the wireless channel.

39. The claims of the ’620 Patent address technical problems arising out of the field of channel allocation in a multi-user and multi-channel network. For example, the ’620 Patent explains:

> The prior art schemes are inefficient in the sense that given sufficient signal to noise strength or coding redundancy, more communicators could use the allocated bandwidth if provided with means for detecting the excess signal margin and means for demodulating signals in the presence of interference.

’620 Patent at 3:15-20.

40. The ’620 patent solves this technological problem through the technological solution of determining the signal-to-noise ratio in a channel is sufficient to jointly demodulate additional signals on that channel and dynamically allocating channels accordingly, thereby improving the efficiency of the wireless communication system.

’492 Patent

41. The ’492 Patent, titled “Combinational Hybrid Turbo-MUD,” was duly and lawfully issued on September 22, 2009. Collision is the owner of all right, title, and interest in the ’492 Patent, including the right to sue for past infringement. A true and correct copy of the ’492 Patent is attached hereto as Exhibit 2.

42. The claims of the ’492 Patent are not directed to basic tools of scientific and technological work, fundamental economic practices, or the use of an abstract mathematical formula.

43. Rather, the ’492 Patent addresses problems and shortcomings in the field of wireless communications, and multi-user detection in particular, and claims novel and inventive technological solutions to such problems and shortcomings. For example, the ’492 Patent describes limitations in the prior art multi-user detection systems, in which complex, high fidelity multi-user detection systems “require too many computations to keep up with real-time transmissions,” but faster multi-user detection schemes cause “poor quality output when there are many or strongly correlated interferers or users.” ’492 Patent at 6:43-54.

44. The technology recited in the claims of the ’492 patent specifies a system that uses at least two multi-user detectors, and a decision unit that selects from among the multi-user detectors—a configuration that overrides the routine and conventional practice of using a single multi-user detector. For example, instead of using a single multi-user detector for all communications, the ’492 describes that allowing different multi-user detectors depending on the signals being processed, such as a faster, lower complexity multi-user detector for simpler signals, and a slower, higher-complexity MUD for more complex signals.

45. The claims of the ’492 Patent address technical problems arising out of the field of multi-user wireless communication. For example, the ’492 Patent explains how, in the art at the time, multi-user detection systems were either too slow or suffered from poor quality:

> In general, soft or hard output versions of the optimum maximum likelihood multi-user detector (Verdu, Multiuser Detection, Cambridge University Press, 1998) or an M algorithm (as described, for instance, in Schlegel, Trellis Coding, IEEE Press, 1997) with a moderate to high value of M causes the Turbo MUD to require too many computations to keep up with real time transmissions. Using a fast, but inferior, multiuser detection

> scheme such as a linear-based detector or those detailed in the text "Multiuser Detection" by Sergio Verdu causes poor quality output when there are many or strongly correlated interferers or users.

'492 Patent at 6:43-54.

46. The '492 Patent solves this technological problem through the novel technological solution of using a decision unit which selects a multi-user detector from at least two multi-user detectors. The multi-user detection decision unit decides, based on decision criteria, which multi-user detector should accept and process the received signals. The multi-user detection unit can use a variety of decision criteria, including the number of symbols, the correlation matrix between users, expected bit error rate, eigendecomposition of correlation matrix, signal-to-interference-plus-noise ratio ("SINR"), and expected SINR.

47. The system claimed in the '492 Patent therefore provides a novel way to improve the quality and spectral efficiency of wireless communications, as well as techniques for sharing limited bandwidth among high capacity users.

'851 Patent

48. The '851 Patent, titled "Receiver with Multiple Collectors in a Multiple User Detection System," was duly and lawfully issued on May 25, 2010. Collision is the owner of all right, title, and interest in the '851 Patent, including the right to sue for past infringement. A true and correct copy of the '851 Patent is attached hereto as Exhibit 3.

49. The claims of the '851 Patent are not directed to basic tools of scientific and technological work, fundamental economic practices, or the use of an abstract mathematical formula.

50. Rather, the '851 Patent addresses problems and shortcomings in the field of wireless communications, and networks utilizing multi-user detection in particular, and claims novel and inventive technological solutions to such problems and shortcomings. The '851 Patent

recognized that, as the total number of users in a telecommunications network increases, and thus as the total number of interfering signals rises, multi-user detection (MUD) systems known in the art at the time encounter computational difficulties that prevent the system from adequately and efficiently handling the volume of signals. For example, the '851 Patent explains that:

> The ability of multiuser detection procedures to perform the required processing in real time to produce reliable symbol estimates is a known drawback of multiuser detection based systems. This is due to the fact that as the total number of interfering signals goes up, the non-optimal MUD algorithms that perform short cuts in detection and estimation of symbols relative to the maximum likelihood exhaustive search MUD algorithm begin to fail. Moreover, as the number of users is increased beyond the number of dimensions (independent receiver measurements), the algorithm mathematics become ill defined and cannot be computed.

'851 Patent at 2:30-40.

51. The technology recited in the claims of the '851 Patent specifies how to collect and process multiple independent measurements of signals in order to increase the throughput of a multi-user detection-based multiple access digital communications system in which multiple user transmit signals on the same channel—a result that overrides the routine and conventional practice of decreasing the number of users on a given channel so as not to exceed the amount of interference the MUD system can handle. For example, instead of attempting to reduce interference by decreasing the number of users transmitting on a given channel, the '851 Patent provides a novel method which exploits this interference by collecting and processing the interfering signals in a specific way.

52. The claims of the '851 Patent address technical problems arising out of the field of MUD-based multiple access wireless networks. For example, the '851 Patent explains how, in the art at the time, state-of-the-art receivers and MUD algorithms would begin to suffer degraded performance under conditions of heavy interference caused by many users, a problem unique to wireless networks:

> Cellular or PCS systems provide high quality voice service in a wide-ranging geographical coverage area at relatively low cost. However, since many users transmit energy on the same communications channel, a number of inherent difficulties arise, particularly when a large number of user receivers attempt to detect the information associated with a particular user when there is heavy signal interference created by other users of the system at the same time. Typically the signal of interest cannot be received or the quality of reception is significantly degraded.
>
> One way of solving this problem is to separate the interfering transmissions at the receiver, using signal processing techniques. However, today's current state of the art receivers are not capable of detecting and decoding the information associated with each user under conditions of heavy interference.

'851 Patent at 1:27-42.

53. The '851 Patent solves this technological problem through the technological solution of utilizing a signal receiver having two or more collectors, where each collector has its own parameter estimation unit. The outputs from the multiple collectors are sent to an organizational unit, which uses time stamp information to stack digitally received signals into a vector measurement at each time stamp. The organizational unit combines the individual sets of parameter estimates into a combined set that is forwarded to the multi-user detection unit.

54. The technological solution of the '851 Patent increases the total number of users that may operate in a given channel, thereby improving bandwidth efficiency.

'071 Patent

55. The '071 Patent, titled "Media Access Control Protocol for Multiuser Detection Enabled Ad-Hoc Wireless Communications," was duly and lawfully issued on November 7, 2017. Collision is the owner of all right, title, and interest in the '071 Patent, including the right to sue for past infringement. A true and correct copy of the '071 Patent is attached hereto as Exhibit 4.

56. The claims of the ’071 Patent are not directed to basic tools of scientific and technological work, fundamental economic practices, or the use of an abstract mathematical formula.

57. Rather, the ’071 Patent addresses problems and shortcomings in the field of wireless communications, and shared, multi-user wireless networks in particular, and claims novel and inventive technological solutions to such problems and shortcomings. For example, the ’071 patent explains the following issue in the prior art:

> [I]t is typically not possible for collision detection to be used in a wireless network, since it is generally not possible for a wireless node to monitor the network while it is transmitting. Hence, it is not generally possible for a wireless node to directly detect collisions during transmission, making it impossible for a wireless network to use collision detection protocols such as CSMA/CD. Also, due to distances and intervening structures, it may not be possible for a specific node in a wireless network to detect signals from all other wireless nodes on the network. The likelihood of inadvertent collisions in wireless ad hoc networks is therefore much greater than for wired networks.

’071 Patent at 2:11-23.

58. The technology recited in the claims of the ’071 Patent specifies how to implement a system which allows multiple simultaneous transmissions to be decoded by the receiving node without attempting to avoid collisions—a result that overrides the routine and conventional practice of separating out transmissions into separate access channels. For example, instead of requiring transmitting nodes to separate their entire transmissions into separate unshared channels, the ’071 Patent provides a novel transmission protocol which allows the receiving node to decode simultaneous transmissions by separating out parameter-detecting signals into separate unshared channels while allowing data signals to be carried in shared channels.

59. The claims of the ’071 Patent address technical problems arising out of the field of multiple access wireless networking. For example, the ’071 Patent explains how, in the art at the time, shared networks avoided collisions by having only one node transmit on a channel at a time, which limited the achievable communication speed on the network, a problem unique to shared wireless networks:

> Depending on the circumstances, some or all of the above spread-spectrum technologies can be combined so as to yield a further increase in communication speed. In general, however, even when spread-spectrum technologies are employed, the communication speed of a shared ad hoc wireless network is still significantly limited due to the requirement that only one node transmit over a single communication channel at any given time, and due to the added overhead of the various protocols that are used to avoid and/or recover from packet collisions.

’071 Patent at 3:4-13.

60. The ’071 Patent solves this technological problem through the technological solution of receiving nodes in a communications network accepting parameter-estimating symbol patterns transmitted via an “unshared, dedicated, low-collision or collision-free parameter channel” provided by the receiving node in addition to the shared communication channel. ’071 Patent at 3:45-47. The parameter-estimating symbol patterns allow receiving nodes to accurately estimate multi-user detection-relevant parameters, such as amplitude, phase, relative carrier frequency offset, and rough time delay, for each of the transmitting nodes. Because the parameter-estimating symbol patterns do not require a high rate of data transmission, the use of relatively low data-rate parameter channels may conserve bandwidth.

61. The technological solution of the ’071 Patent increases the communication capacity of a wireless network by up to an order of magnitude or more.

'479 Patent

62. The '479 Patent, titled "Method and System for Improving Efficiency in a Cellular Communications Network," was duly and lawfully issued on February 6, 2018. Collision is the owner of all right, title, and interest in the '479 Patent, including the right to sue for past infringement. A true and correct copy of the '479 Patent is attached hereto as Exhibit 5.

63. The claims of the '479 Patent are not directed to basic tools of scientific and technological work, fundamental economic practices, or the use of an abstract mathematical formula.

64. Rather, the '479 Patent addresses problems and shortcomings in the field of wireless communications, and wireless networks with a plurality of adjacent cells in close proximity in particular, and claims novel and inventive technological solutions to such problems and shortcomings. For example, the '479 Patent describes limitations in prior art base stations (BS) where noise levels change for communications with user equipment (UE) due to UEs connected to neighboring BSs. The '479 patent explains that "a BS typically selects and assigns operating parameters to a UE according to a predicted Signal to Interference and Noise Ratio (SINR) for a selected communication channel." '479 Patent at 1:66-2:2. But when "background interference in a cell [varies] rapidly, as new UE's initiate or cease communications with base stations in neighboring cells, and as the neighboring base stations make changes to the operating parameters of their UE's, often in response to rapid fluctuations in background interference experienced by these neighboring cells" ('479 Patent at 2:26-31), the predictions of prior art systems are inaccurate and cause "the base station 102 to allocate non optimal operating parameters to the UE 104" ('479 Patent at 3:6-7), reducing the network operating efficiency and quality of service.

65. The technology recited in the claims of the ’479 Patent specifies a novel way to maximize data transmission rates at a level that allows continued reception—a result that overrides the routine and conventional practice of minimizing interference. For example, instead of minimizing the level of background interference created by communications, which can lead to lower transmission rates because devices can be required to transmit with lower power, the ’479 Patent requires base stations to control communications such that the changes to interference levels are minimized such that a higher, constant level of interference that can be handled by the BS can exist such that higher data rates are obtained. Moreover, instead of averaging measured background interference or predicting background interference based merely on information from neighboring cells as was done in the prior art, the ’479 patent requires base stations to predict future background interference based on the current determined background interference level and revised operating parameters.

66. The claims of the ’479 Patent address technical problems arising out of the field of wireless communications. For example, the ’479 Patent explains how, in the art at the time, BSs would change operating parameters in response to rapid fluctuations in the background interference experienced by neighboring cells, which in turn would render predictions based on measurements made at an earlier time unreliable, causing a drop in quality of service, because the operating parameters have a strong effect on the background interference level:

> If the actual background interference is in region 302 when the UE 104 later transmits, ie. is less than the predicted background interference level 306, and hence the SINR is actually higher than expected, the base station 102 could have successfully chosen operating parameters for UE 104 to obtain higher spectral efficiency. If the actual background interference is in the region 304 when the UE 104 later transmits, ie. is greater than the predicted interference level 306, and hence the SINR is actually lower than expected, the UE 104 to likely to have a packet error necessitating a packet retransmission.

> Therefore any deviation of the actual background interference from the predicted background interference causes the base station 102 to allocate non optimal operating parameters to the UE 104. Accordingly, the quality and efficiency with which a cell is managed depends to a significant extent on the accuracy of the background interference predictions made by its base station.

'479 Patent at 2:60-3:20.

67. The '479 patent solves this technological problem through the novel technological solution of specifying BS operating rules to revise the UE operating parameters so that they minimize the average rate and size of fluctuations of background interference levels.

'561 Patent

68. The '561 Patent, entitled "Method and System for Improving Efficiency in a Cellular Communications Network," was duly and lawfully issued on November 12, 2019. Collision is the owner of all right, title, and interest in the '561 Patent, including the right to sue for past infringement. A true and correct copy of the '561 Patent is attached hereto as Exhibit 6.

69. The claims of the '561 Patent are not directed to basic tools of scientific and technological work, fundamental economic practices, or the use of an abstract mathematical formula.

70. Rather, the '561 Patent addresses problems and shortcomings in the field of wireless communications, and wireless networks with a plurality of adjacent cells in close proximity in particular, and claims novel and inventive technological solutions to such problems and shortcomings. For example, the '561 Patent describes limitations in prior art base stations (BS) where noise levels change for communications with user equipment (UE) due to UEs connected to neighboring BSs. The '561 patent explains that "a BS typically selects and assigns operating parameters to a UE according to a predicted Signal to Interference and Noise Ratio (SINR) for a selected communication channel." '561 Patent at 2:7-10. But when "background

interference in a cell [varies] rapidly, as new UE's initiate or cease communications with base stations in neighboring cells, and as the neighboring base stations make changes to the operating parameters of their UE's, often in response to rapid fluctuations in background interference experienced by these neighboring cells" ('561 Patent at 2:33-40), the predictions of prior art systems are inaccurate and cause "the base station 102 to allocate non optimal operating parameters to the UE 104" ('561 Patent at 3:14-15), reducing the network operating efficiency and quality of service.

71. The technology recited in the claims of the '561 Patent specifies a novel way to maximize data transmission rates at a level that allows continued reception—a result that overrides the routine and conventional practice of minimizing interference. For example, instead of minimizing the level of background interference created by communications, which can lead to lower transmission rates because devices can be required to transmit with lower power, the '561 Patent requires base stations to control communications such that the changes to interference levels are minimized such that a higher, constant level of interference that can be handled by the BS can exist such that higher data rates are obtained. Moreover, instead of averaging measured background interference or predicting background interference based merely on information from neighboring cells as was done in the prior art, the '561 patent requires base stations to predict future background interference based on the current determined background interference level and revised operating parameters.

72. The claims of the '561 Patent address technical problems arising out of the field of wireless communications. For example, the '561 Patent explains how, in the art at the time, BSs would change operating parameters in response to rapid fluctuations in the background interference experienced by neighboring cells which in turn would render predictions based on

measurements made at an earlier time unreliable, causing a drop in quality of service, because the operating parameters have a strong effect on the background interference level:

> If the actual background interference is in region 302 when the UE 104 later transmits, ie. is less than the predicted background interference level 306, and hence the SINR is actually higher than expected, the base station 102 could have successfully chosen operating parameters for UE 104 to obtain higher spectral efficiency. If the actual background interference is in the region 304 when the UE 104 later transmits, ie. is greater than the predicted interference level 306, and hence the SINR is actually lower than expected, the UE 104 to likely to have a packet error necessitating a packet retransmission.
>
> Therefore any deviation of the actual background interference from the predicted background interference causes the base station 102 to allocate non optimal operating parameters to the UE 104. Accordingly, the quality and efficiency with which a cell is managed depends to a significant extent on the accuracy of the background interference predictions made by its base station.

'561 Patent at 3:1-18.

73. The '561 patent solves this technological problem through the novel technological solution of specifying BS operating rules to revise the UE operating parameters so that they minimize the average rate and size of fluctuations of background interference levels.

NOKIA'S INFRINGING PRODUCTS AND ACTIVITIES

74. On information and belief, Nokia makes, uses, sells, offers for sale, and/or imports, cellular base stations in the United States and in this District that support at least 3G and 4G and practice at least one claim of each of the Asserted Patents. For example, Nokia's AirScale base stations implement Nokia's Single RAN, which supports wireless communications in 2G, 3G, 4G, and 5G. *See, e.g.*, https://www.nokia.com/networks/portfolio/single-ran-advanced/ (last visited Aug. 4, 2021); https://onestore.nokia.com/asset/200026?_ga=2.15668277.22983469.1621276730-599134674.1617295711&_gac=1.254824058.1619024593.CjwKCAjwmv-

DBhAMEiwA7xYrd5IySQrykKqtBspGKGNVNfWvgn5OrNLoTqJUlDUpyBPZEXKHtiwSshoCnZQQAvD_BwE (last visited Aug. 4, 2021). Collectively, all of Nokia's accused cellular base stations are referred to hereinafter as the "Accused Products."

FIRST CAUSE OF ACTION
(Infringement of U.S. Patent No. 7,233,620)

75. Collision realleges and incorporates by reference the allegations set forth in the foregoing paragraphs of its Complaint.

76. Nokia makes, uses (including through testing), sells, and/or offers to sell in the United States, and/or imports into the United States, Accused Products that incorporate or make use of one or more of the inventions covered by the '620 Patent. For example, the Accused Products implement a packet scheduler described in Nokia's documentation for RAN968 that, in combination with the interference cancellation receiver for enhanced HSUPA (described in Nokia's documentation for RAN1308, RAN2250, and RAN3040), practices each and every limitation of claim 1. *See* Exhibit 10.

77. By making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, Nokia has injured Collision and is liable to Collision for directly infringing one or more claims of the '620 Patent, including without limitation claim 1, pursuant to 35 U.S.C. § 271(a).

78. Nokia also infringes the '620 Patent under 35 U.S.C. § 271(b) & (c).

79. Upon information and belief, Nokia knew of the '620 Patent or was willfully blind to the '620 Patent. For example, Nokia knew of the '620 Patent before the filing of this action, at least by virtue of Collision's specific identification of the '620 Patent to Nokia in 2012. Collision also provided notice of the existence of its patent portfolio to Nokia during various discussions between Nokia and Collision between 2012 and 2018 relating to possible integration

of certain Collision technology in Nokia's base stations. It was also publicly known no later than July 5, 2012, that Collision owned the '620 Patent, after Collision recorded its assignment of the '620 Patent, along with other Asserted Patents and pending applications, at the USPTO. Also, Nokia has had knowledge of the '620 Patent at least by virtue of the filing of this Complaint. Nokia's infringement of the '620 Patent is willful, deliberate, and intentional.

80. Nokia knowingly encourages and intends to induce infringement of the '620 Patent by making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, with knowledge and specific intention that such products will be used by Nokia or its customers in a network that infringes the '620 Patent. For example, Nokia expressly advertises that its portfolio of products "provides efficient and scalable mobile network coverage and capacity" for 3G and 4G where "nationwide coverage" is required. *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/.

81. Nokia also contributes to the infringement of the '620 Patent. Nokia makes, uses, sells, and/or offers to sell Accused Products in the United States, and/or imports them into the United States, knowing that those products constitute a material part of the claimed invention, that they are especially made or adapted for use in infringing the '620 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

82. Nokia's infringement of the '620 Patent has been and continues to be deliberate and willful, and this is therefore an exceptional case warranting an award of enhanced damages and attorneys' fees pursuant to 35 U.S.C. §§ 284, 285.

83. To the extent applicable, Collision has complied with the marking requirements set forth in 35 U.S.C. § 287.

84. As a result of Nokia's infringement of the '620 Patent, Collision has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Nokia's infringement, but in no event less than a reasonable royalty with interest and costs.

85. On information and belief, Nokia's infringement in violation of the federal patent laws will continue to injure Collision unless otherwise enjoined by this Court.

SECOND CAUSE OF ACTION
(Infringement of U.S. Patent No. 7,593,492)

86. Collision realleges and incorporates by reference the allegations set forth in the foregoing paragraphs of its Complaint.

87. Nokia makes, uses (including through testing), sells, and/or offers to sell in the United States, and/or imports into the United States, Accused Products that incorporate or make use of one or more of the inventions covered by the '492 Patent. For example, the Accused Products implement a packet scheduler described in Nokia's documentation for RAN968 that, in combination with the interference cancellation receiver for enhanced HSUPA (described in Nokia's documentation for RAN1308, RAN2250, and RAN3040), practices each and every limitation of claim 1. *See* Exhibit 11.

88. By making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, Nokia has injured Collision and is liable to Collision for directly infringing one or more claims of the '492 Patent, including without limitation claim 1, pursuant to 35 U.S.C. § 271(a).

89. Nokia also infringes the '492 Patent under 35 U.S.C. § 271(b) & (c).

90. Upon information and belief, Nokia knew of the '492 Patent or was willfully blind to the '492 Patent. For example, the '492 Patent issued on September 22, 2009, and Collision provided notice of the existence of its patent portfolio to Nokia during various

discussions between Nokia and Collision between 2012 and 2019 relating to possible integration of certain Collision technology in Nokia's base stations. It was also publicly known no later than July 5, 2012, that Collision owned the '492 Patent, after Collision recorded its assignment of the '492 Patent, along with other Asserted Patents and pending applications, at the USPTO. Also, Nokia has had knowledge of the '492 Patent at least by virtue of the filing of this Complaint. Nokia's infringement of the '492 Patent is willful, deliberate, and intentional.

91. Nokia knowingly encourages and intends to induce infringement of the '492 Patent by making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, with knowledge and specific intention that such products will be used by Nokia or its customers in a network that infringes the '492 Patent. For example, Nokia expressly advertises that its portfolio of products "provides efficient and scalable mobile network coverage and capacity" for 3G and 4G where "nationwide coverage" is required. *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/.

92. Nokia also contributes to the infringement of the '492 Patent. Nokia makes, uses, sells, and/or offers to sell Accused Products in the United States, and/or imports them into the United States, knowing that those products constitute a material part of the claimed invention, that they are especially made or adapted for use in infringing the '492 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

93. Nokia's infringement of the '492 Patent has been and continues to be deliberate and willful, and this is therefore an exceptional case warranting an award of enhanced damages and attorneys' fees pursuant to 35 U.S.C. §§ 284, 285.

94. To the extent applicable, Collision has complied with the marking requirements set forth in 35 U.S.C. § 287.

95. As a result of Nokia's infringement of the '492 Patent, Collision has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Nokia's infringement, but in no event less than a reasonable royalty with interest and costs.

96. On information and belief, Nokia's infringement in violation of the federal patent laws will continue to injure Collision unless otherwise enjoined by this Court.

THIRD CAUSE OF ACTION
(Infringement of U.S. Patent No. 7,724,851)

97. Collision realleges and incorporates by reference the allegations set forth in the foregoing paragraphs of its Complaint.

98. Nokia makes, uses (including through testing), sells, and/or offers to sell in the United States, and/or imports into the United States, products that incorporate or make use of one or more of the inventions covered by the '851 Patent, including the Accused Products. For example, the Accused Products implement a Nokia AirFrame Fronthaul Gateway and an advanced receiver for MU-MIMO that implement Nokia's LTE1545 feature, which collectively practice each and every limitation of claim 1 by virtue of their implementation of functionality described in 3GPP LTE specifications TS36.300, TS 36.211, and 36.311, in addition to the Common Public Radio Interface (CPRI) and/or Open Base Station Architecture Initiative (OBSAI) specifications. *See* Exhibit 12.

99. By making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, Nokia has injured Collision and is liable to Collision for directly infringing one or more claims of the '851 Patent, including without limitation claim 1, pursuant to 35 U.S.C. § 271(a).

100. Nokia also infringes the '851 Patent under 35 U.S.C. § 271(b) & (c).

101. Upon information and belief, Nokia knew of the ’851 Patent or was willfully blind to the ’851 Patent. For example, the ’851 Patent issued on May 25, 2010, and Collision provided notice of the existence of its patent portfolio to Nokia during various discussions between Nokia and Collision between 2012 and 2019 relating to possible integration of certain Collision technology in Nokia’s base stations. It was publicly known no later than July 5, 2012, that Collision owned the ’851 Patent, after Collision recorded its assignment of the ’851 Patent, along with other Asserted Patents and pending applications, at the USPTO. Also, Nokia has had knowledge of the ’851 Patent at least by virtue of the filing of this Complaint. Nokia’s infringement of the ’851 Patent is willful, deliberate, and intentional.

102. Nokia knowingly encourages and intends to induce infringement of the ’851 Patent by making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, with knowledge and specific intention that such products will be used by Nokia or its customers in a network that infringes the ’851 Patent. For example, Nokia expressly advertises that its portfolio of products “provides efficient and scalable mobile network coverage and capacity” for 3G and 4G where “nationwide coverage” is required. *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/.

103. Nokia also contributes to the infringement of the ’851 Patent. Nokia makes, uses, sells, and/or offers to sell Accused Products in the United States, and/or imports them into the United States, knowing that those products constitute a material part of the claimed invention, that they are especially made or adapted for use in infringing the ’851 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

104. Nokia's infringement of the '851 Patent has been and continues to be deliberate and willful, and this is therefore an exceptional case warranting an award of enhanced damages and attorneys' fees pursuant to 35 U.S.C. §§ 284, 285.

105. To the extent applicable, Collision has complied with the marking requirements set forth in 35 U.S.C. § 287.

106. As a result of Nokia's infringement of the '851 Patent, Collision has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Nokia's infringement, but in no event less than a reasonable royalty with interest and costs.

107. On information and belief, Nokia's infringement in violation of the federal patent laws will continue to injure Collision unless otherwise enjoined by this Court.

FOURTH CAUSE OF ACTION
(Infringement of U.S. Patent No. 9,814,071)

108. Collision realleges and incorporates by reference the allegations set forth in the foregoing paragraphs of its Complaint.

109. Nokia makes, uses (including through testing), sells, and/or offers to sell in the United States, and/or imports into the United States, Accused Products that incorporate or make use of one or more of the inventions covered by the '071 Patent. For example, the Accused Products implement an advanced receiver for MU-MIMO that implements Nokia's LTE1545 feature together with the requirements of the 3GPP LTE specifications TS 36.300, TS 36.211, and TS 36.331 to implement each and every limitation of claim 1. *See* Exhibit 13.

110. By making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, Nokia has injured Collision and is liable to Collision for directly infringing one or more claims of the '071 Patent, including without limitation claim 1, pursuant to 35 U.S.C. § 271(a).

111. Nokia also infringes the ’071 Patent under 35 U.S.C. § 271(b) & (c).

112. Upon information and belief, Nokia knew of the ’071 Patent or was willfully blind to the ’071 Patent. For example, the application leading to the ’071 Patent published as U.S. Patent Pub. No. 2011/0051674 on March 3, 2011 and issued on November 7, 2017. Collision provided notice of the existence of its patent portfolio, including the fact that Collision had pending patent applications, to Nokia during various discussions between Nokia and Collision between 2012 and 2018 relating to possible integration of certain Collision technology in Nokia’s base stations. It was also publicly known no later than July 5, 2012, that Collision owned the application leading to the ’071 Patent, after Collision recorded its assignment of the application leading to the ’071 Patent, along with other Asserted Patents and pending applications, at the USPTO. Also, Nokia has had knowledge of the ’071 Patent at least by virtue of the filing of this Complaint. Nokia’s infringement of the ’071 Patent is willful, deliberate, and intentional.

113. Nokia knowingly encourages and intends to induce infringement of the ’071 Patent by making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, with knowledge and specific intention that such products will be used by Nokia or its customers in a network that infringes the ’071 Patent. For example, Nokia expressly advertises that its portfolio of products “provides efficient and scalable mobile network coverage and capacity” for 3G and 4G where “nationwide coverage” is required. *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/.

114. Nokia also contributes to the infringement of the ’071 Patent. Nokia makes, uses, sells, and/or offers to sell Accused Products in the United States, and/or imports them into the United States, knowing that those products constitute a material part of the claimed invention,

that they are especially made or adapted for use in infringing the '071 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

115. Nokia's infringement of the '071 Patent has been and continues to be deliberate and willful, and this is therefore an exceptional case warranting an award of enhanced damages and attorneys' fees pursuant to 35 U.S.C. §§ 284,285.

116. To the extent applicable, Collision has complied with the marking requirements set forth in 35 U.S.C. § 287.

117. As a result of Nokia's infringement of the '071 Patent, Collision has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Nokia's infringement, but in no event less than a reasonable royalty with interest and costs.

118. On information and belief, Nokia's infringement in violation of the federal patent laws will continue to injure Collision unless otherwise enjoined by this Court.

FIFTH CAUSE OF ACTION
(Infringement of U.S. Patent No. 9,888,479)

119. Collision realleges and incorporates by reference the allegations set forth in the foregoing paragraphs of its Complaint.

120. Nokia makes, uses (including through testing), sells, and/or offers to sell in the United States, and/or imports into the United States, Accused Products that incorporate or make use of one or more of the inventions covered by the '479 Patent. For example, the Accused Products implement Nokia's LTE1336 feature, which is described in Nokia's documentation, to practice each and every limitation of claim 1. *See* Exhibit 14.

121. By making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, Nokia has injured Collision and is liable to

Collision for directly infringing one or more claims of the '479 Patent, including without limitation claim 1, pursuant to 35 U.S.C. § 271(a).

122. Nokia also infringes the '479 Patent under 35 U.S.C. § 271(b) & (c).

123. Upon information and belief, Nokia knew of the '479 Patent or was willfully blind to the '479 Patent. Collision provided notice of the existence of its patent portfolio, including the fact that Collision had pending patent applications, to Nokia during various discussions between Nokia and Collision between 2012 and 2018 relating to possible integration of certain Collision technology in Nokia's base stations. It was also publicly known no later than July 5, 2012, that Collision owned a portfolio of patents related to the subject matter of the '479 Patent, including other Asserted Patents and pending applications, after Collision recorded a patent assignment at the USPTO. Also, Nokia has had knowledge of the '479 Patent at least by virtue of the filing of this Complaint. Nokia's infringement of the '479 Patent is willful, deliberate, and intentional.

124. Nokia knowingly encourages and intends to induce infringement of the '479 Patent by making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, with knowledge and specific intention that such products will be used by Nokia or its customers in a network that infringes the '479 Patent. For example, Nokia expressly advertises that its portfolio of products "provides efficient and scalable mobile network coverage and capacity" for 3G and 4G where "nationwide coverage" is required. *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/.

125. Nokia also contributes to the infringement of the '479 Patent. Nokia makes, uses, sells, and/or offers to sell Accused Products in the United States, and/or imports them into the United States, knowing that those products constitute a material part of the claimed invention,

that they are especially made or adapted for use in infringing the '479 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

126. Nokia's infringement of the '479 Patent has been and continues to be deliberate and willful, and this is therefore an exceptional case warranting an award of enhanced damages and attorneys' fees pursuant to 35 U.S.C. §§ 284, 285.

127. To the extent applicable, Collision has complied with the marking requirements set forth in 35 U.S.C. § 287.

128. As a result of Nokia's infringement of the '479 Patent, Collision has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Nokia's infringement, but in no event less than a reasonable royalty with interest and costs.

129. On information and belief, Nokia's infringement in violation of the federal patent laws will continue to injure Collision unless otherwise enjoined by this Court.

SIXTH CAUSE OF ACTION
(Infringement of U.S. Patent No. 10,477,561)

130. Collision realleges and incorporates by reference the allegations set forth in the foregoing paragraphs of its Complaint.

131. Nokia makes, uses (including through testing), sells, and/or offers to sell in the United States, and/or imports into the United States, Accused Products that incorporate or make use of one or more of the inventions covered by the '561 Patent. For example, the Accused Products implement Nokia's LTE1336 feature, which is described in Nokia's documentation, to practice each and every limitation of claim 1. *See* Exhibit 15.

132. By making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, Nokia has injured Collision and is liable to

Collision for directly infringing one or more claims of the ’561 Patent, including without limitation claim 1, pursuant to 35 U.S.C. § 271(a).

133. Nokia also infringes the ’561Patent under 35 U.S.C. § 271(b) & (c).

134. Upon information and belief, Nokia knew of the ’561 Patent or was willfully blind to the ’561 Patent. Collision provided notice of the existence of its patent portfolio, including the fact that Collision had pending patent applications, to Nokia during various discussions between Nokia and Collision between 2012 and 2018 relating to possible integration of certain Collision technology in Nokia’s base stations. It was also publicly known no later than July 5, 2012, that Collision owned a portfolio of patents related to the subject matter of the ’561 Patent, including other Asserted Patents and pending applications, after Collision recorded a patent assignment at the USPTO. Also, Nokia has had knowledge of the ’561 Patent at least by virtue of the filing of this Complaint. Nokia’s infringement of the ’561 Patent is willful, deliberate, and intentional.

135. Nokia knowingly encourages and intends to induce infringement of the ’561 Patent by making, using, offering for sale, and/or selling Accused Products in the United States, and/or importing them into the United States, with knowledge and specific intention that such products will be used by Nokia or its customers in a network that infringes the ’561 Patent. For example, Nokia expressly advertises that its portfolio of products “provides efficient and scalable mobile network coverage and capacity” for 3G and 4G where “nationwide coverage” is required. *See, e.g.*, https://www.nokia.com/networks/portfolio/radio-access-networks-ran/.

136. Nokia also contributes to the infringement of the ’561 Patent. Nokia makes, uses, sells, and/or offers to sell Accused Products in the United States, and/or imports them into the United States, knowing that those products constitute a material part of the claimed invention,

that they are especially made or adapted for use in infringing the '561 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

137. Nokia's infringement of the '561 Patent has been and continues to be deliberate and willful, and this is therefore an exceptional case warranting an award of enhanced damages and attorneys' fees pursuant to 35 U.S.C. §§ 284, 285.

138. To the extent applicable, Collision has complied with the marking requirements set forth in 35 U.S.C. § 287.

139. As a result of Nokia's infringement of the '561 Patent, Collision has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Nokia's infringement, but in no event less than a reasonable royalty with interest and costs.

140. On information and belief, Nokia's infringement in violation of the federal patent laws will continue to injure Collision unless otherwise enjoined by this Court.

DEMAND FOR JURY TRIAL

Collision hereby demands a trial by jury of all issues so triable in this action.

PRAYER FOR RELIEF

Collision respectfully requests this Court grant relief as follows:

A. Judgment that Nokia has infringed one or more claims of each of the Asserted Patents in this litigation pursuant to 35 U.S.C. §§ 271(a), 271(b), and/or 271(c), and that Nokia is liable for damages caused by such infringement;

B. Judgment requiring Nokia to make an accounting of damages resulting from Nokia's infringement of the Asserted Patents;

C. Judgment permanently enjoining Nokia, its officers, agents, servants, employees, attorneys, parent and subsidiary corporations, assigns and successors in interest, and those

persons in active concert or participation with them, from continued acts of infringement of the Asserted Patents;

D. Judgment awarding Collision its damages resulting from Nokia's infringement of the Asserted Patents, and increasing such damages pursuant to 35 U.S.C. § 284 because of the willful and deliberate nature of Nokia's conduct;

E. A judicial determination of the conditions for future infringement such as an ongoing royalty;

F. Judgment requiring Nokia to pay Collision's costs and expenses, along with pre-judgment and post-judgment interest, for Nokia's infringement of each of the Asserted Patents;

G. An order that this case is "exceptional" pursuant to 35 U.S.C. § 285, entitling Collision to an award of its reasonable and necessary attorneys' fees, expenses, and costs, and prejudgment interest thereon; and

H. Any such other and further relief as the Court deems just and proper.

Dated: August 10, 2021

/s/ *Melissa R. Smith*

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