

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

REDWOOD TECHNOLOGIES, LLC,

Plaintiff,

v.

LUMEN TECHNOLOGIES, INC.,

Defendant.

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JURY TRIAL DEMANDED

C.A. NO. 6:22-cv-627

PLAINTIFF’S COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Redwood Technologies, LLC (“Redwood”) files this Complaint against Defendant Lumen Technologies, Inc. for infringement of U.S. Patent No. 7,359,457 (the “457 patent”), U.S. Patent No. 7,917,102 (the “102 patent”), U.S. Patent No. 8,111,671 (the “671 patent”), U.S. Patent No. 9,462,536 (the “536 patent”), and U.S. Patent No. 10,498,571 (the “571 patent”), collectively, the “Asserted Patents.”

THE PARTIES

1. Redwood Technologies, LLC is a Texas limited liability company, with a principal place of business at 812 West McDermott Dr. #1038, Allen, TX 75013.

2. On information and belief, Lumen Technologies, Inc. (f/k/a CenturyLink, Inc. and d/b/a Lumen, CenturyLink, and Quantum Fiber), collectively (“Lumen” or “Defendant”), is a corporation organized under the laws of Louisiana, with a regular and established place of business located at 84 W. Ave. E, Copperas Cove, TX 76522.

3. Prior to the filing of the Complaint, Redwood sent a letter received by Lumen on November 8, 2021, where Redwood attempted to engage Lumen and/or its agents in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a

license to be taken in the absence of litigation. Lumen ignored Redwood's request to engage in licensing discussions. Indeed, Lumen has known about the Asserted Patents since at least November 8, 2021, when Lumen received notice of its infringement of these patents via the letter sent by Redwood. Furthermore, Redwood sent a follow-up letter received by Lumen on January 7, 2022.

4. Prior to the filing of the Complaint, Redwood sent another letter received by Lumen on May 17, 2022, where Redwood again attempted to engage Lumen and/or its agents in licensing discussions related to the Asserted Patents for reasonable and non-discriminatory terms for a license to be taken in the absence of litigation. Lumen again ignored Redwood's request to engage in licensing discussions. Indeed, Lumen has known about each of the Asserted Patents since at least May 17, 2022, when Lumen received another notice of its infringement of the Asserted Patents via the letter sent by Redwood.

5. Lumen's past and continuing making, using, selling, offering for sale, leasing, and/or importation, and/or inducing its subsidiaries, affiliates, retail partners, and customers in the making, using, selling, offering for sale, and/or importing the accused Wi-Fi compliant devices throughout the United States i) willfully infringe each of the Asserted Patents and ii) impermissibly take the significant benefits of Redwood's patented technologies without fair compensation to Redwood.

6. Lumen is engaged in making, using, selling, offering for sale, leasing, and/or importing, and/or induces its subsidiaries, affiliates, retail partners, and customers in the making, using, selling, offering for sale, and/or importing throughout the United States, including within this District, products, such as access points, accused of infringement.

JURISDICTION AND VENUE

7. This action arises under the patent laws of the United States, namely 35 U.S.C. §§ 271, 281, and 284-285, among others.

8. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

9. This Court has personal jurisdiction over Lumen in accordance with due process and/or the Texas Long Arm Statute because, among other things, Lumen does business in this State by, among other things, maintaining offices in this District, including maintaining its office located at 84 W. Ave. E, Copperas Cove, TX 76522 and “recruit[ing] Texas residents, directly or through an intermediary located in this state, for employment inside or outside this state.” TEX. CIV. PRAC. & REM. CODE § 17.042(3):

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<https://jobs.lumen.com/global/en>.

10. Further, this Court has personal jurisdiction over Lumen because it has engaged, and continues to engage, in continuous, systematic, and substantial activities within this State, including the substantial marketing and sale of products and services within this State and this District. Indeed, this Court has personal jurisdiction over Lumen because it has committed acts giving rise to Redwood's claims for patent infringement within and directed to this District, has derived substantial revenue from its goods and services provided to individuals in this State and this District, and maintains regular and established places of business in this District, including at least its facilities in Copperas Cove.

11. Relative to patent infringement, Lumen has committed and continues to commit acts in violation of 35 U.S.C. § 271, and has made, used, marketed, distributed, offered for sale, leased, imported, and/or sold infringing products in this State, including in this District, and otherwise engaged in infringing conduct within and directed at, or from, this District. Such products have been and continue to be offered for sale, distributed to, sold, and used in this District, and the infringing conduct has caused, and continues to cause, injury to Redwood, including injury suffered within this District. These are purposeful acts and transactions in this State and this District such that Lumen reasonably should know and expect that it could be haled into this Court because of such activities.

12. In addition, Lumen has knowingly induced and continues to knowingly induce infringement within this District by advertising, marketing, offering for sale, leasing, and/or selling devices pre-loaded with infringing functionality within this District, to consumers, customers, manufacturers, distributors, resellers, partners, and/or end users, and providing instructions, user

manuals, advertising, and/or marketing materials which facilitate, direct or encourage the use of infringing functionality with knowledge thereof.

13. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400(b) because Lumen has regular and established places of business in this District and has committed acts of infringement in this District. Lumen's regular and established places of business in this District include, at least, its facilities in Copperas Cove.

14. With respect to the '457 patent, the '102 patent, and the '571 patent, the Accused Products are devices that include, but are not limited, to devices that support IEEE 802.11n and/or IEEE 802.11ac and/or IEEE 802.11ax (e.g., Actiontec C1000A, Actiontec C1900A, Actiontec C2000A, Actiontec C2300A, Actiontec C3000A, Actiontec PK5000, Actiontec PK5001A, Actiontec Q1000, Adtran C424G, Axon C4000BG, Axon C4000LG, Axon C4000XG, Calix C844G, Westell 7500, Zyxel C1000Z, Zyxel C1100Z, Zyxel C2100Z, Zyxel C3000Z, Zyxel C3510XZ, Zyxel C4000BZ, Zyxel C4000LZ, Zyxel FR1000Z, Zyxel PK5000Z, Zyxel PK5001Z, Zyxel Q1000Z, Plume Superpod, and Plume Superpod w WiFi 6), as well as, their components, and processes related to the same. With respect to the '671 patent and the '536 patent, the Accused Products are mesh devices that include, but are not limited, to mesh devices that support IEEE 802.11 (e.g., Plume Superpod and Plume Superpod w WiFi 6), as well as, their components, and processes related to the same.

COUNT I

(INFRINGEMENT OF U.S. PATENT NO. 7,359,457)

15. Plaintiff incorporates paragraphs 1 through 14 herein by reference.

16. Redwood is the assignee of the '457 patent, entitled "Transmission Apparatus, Reception Apparatus and Digital Radio Communication Method," with ownership of all

substantial rights in the '457 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

17. The '457 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '457 patent issued from U.S. Patent Application No. 10/827,445.

18. Lumen has and continues to directly and/or indirectly infringe (by inducing infringement) one or more claims of the '457 patent in this judicial district and elsewhere in Texas and the United States.

19. Lumen and/or its agents directly infringe the '457 patent via 35 U.S.C. § 271(a) by using and/or testing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '457 patent. For example, Lumen installs, services, and/or maintains the Accused Products leased, sold, and/or provided to its customers. Indeed, Lumen owns and controls many of the Accused Products it provides to its customers. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“Except for Equipment purchased by you under the terms of this Agreement, or other equipment purchased by you, CenturyLink owns the Equipment regardless of who installed the Equipment.”). Lumen provides Internet service to the Accused Products, such that Lumen causes the Accused Products to perform the Wi-Fi functionality recited by the asserted claims of the '457 patent. Lumen further directs and controls the Accused Products to perform in an infringing manner by providing the requisite Internet service that results in the Accused Product becoming a product that performs Wi-Fi functionality in an infringing manner. *See, e.g.*, <https://www.lumen.com/content/quantumfiber/support/internet/360wifi/faqs.html> (“The

Quantum Fiber modem by itself does not have wireless capability ... The modem will deliver internet over a wired Ethernet connection, but it is not a WiFi device by itself.”). Lumen further controls the performance of the claimed method steps of the Accused Products by conditioning receipt of warranty benefits on the customer’s agreement not to modify the Accused Products. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“This Limited Warranty does not cover defects due to defacement, misuse, abuse, neglect, improper use, improper electrical voltages or current, repairs by others, alterations, modifications, accidents, fire, flood, vandalism, acts of God or the elements.”).

20. For example, Lumen infringes claim 6 of the ’457 patent via the Accused Products. The Accused Products each perform a digital radio communication method.

21. The Accused Products each determine a modulation system from among a plurality of modulation systems based on a communication situation. For example, the Accused Products utilize a Modulation and Coding Scheme (MCS) value that is used to determine the modulation, coding, and number of spatial channels based on information associated with a channel quality assessment. *See, e.g.*, Sections 19.3.5 and 19.3.13.4 of Part 11: Wireless LAN Medium Access Control (MAC) and Physical (PHY) Specifications of IEEE Std 802.11™ -2016 (“IEEE 802.11 2016”). Based on the results of the channel quality assessment, an appropriate MCS value is selected from a plurality of MCS values for transmissions sent by the Accused Products. *See, e.g.*, Section 19.3.5 and Table 19-27 of IEEE 802.11 2016.

22. The Accused Products each modulate a digital transmission signal according to the modulation system previously determined and generates a first symbol. The first symbol comprises a first quadrature baseband signal. For example, the Accused Products generate a first data symbol

(e.g., data), comprising a first quadrature baseband signal, that is modulated according to the MCS value. *See, e.g.*, Section 19.3.5 and Figure 19-22 of IEEE 802.11 2016.

23. The Accused Products each modulate the digital signal according to a predetermined modulation system and generates a second symbol. The second symbol comprises a second quadrature baseband signal. For example, the Accused Products generate a second data symbol (e.g., the HT-SIG), comprising a second quadrature baseband signal, that is modulated according to a predetermined modulation system (e.g., QBPSK). *See, e.g.*, Section 19.3.9.4.3 and Figure 19-22 of IEEE 802.11 2016.

24. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

25. At a minimum, Lumen has known of the '457 patent at least as early as the filing date of the complaint. In addition, Lumen has known about the '457 patent since at least November 8, 2021, when Lumen received notice of its infringement via a letter. Redwood sent another letter, which referenced the prior notice letter, that was received by Lumen on January 7, 2022. Furthermore, Lumen has known about the '457 patent since at least May 17, 2022, when Lumen received notice of its infringement via another letter.

26. On information and belief, since at least the above-mentioned date when Lumen was on notice of its infringement, Lumen has actively induced, under U.S.C. § 271(b), its distributors, customers, subsidiaries, importers, and/or consumers that use and/or test the Accused Products comprising all of the limitations of one or more claims of the '457 patent to directly infringe one or more claims of the '457 patent by using and/or testing the '457 Accused Products. Since at least the notice provided on the above-mentioned date, Lumen does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '457 patent.

Lumen intends to cause, and has taken affirmative steps to induce infringement by its distributors, importers, customers, subsidiaries, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, distributing or making available instructions or manuals for these products, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these recipients in the United States.

27. On information and belief, despite having knowledge of the '457 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '457 patent, Lumen has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Lumen's infringing activities relative to the '457 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

28. Redwood has been damaged as a result of Lumen's infringing conduct described in this Count. Lumen is, thus, liable to Redwood in an amount that adequately compensates Redwood for Lumen's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT II

(INFRINGEMENT OF U.S. PATENT NO. 7,917,102)

29. Plaintiff incorporates paragraphs 1 through 28 herein by reference.

30. Redwood is the assignee of the '102 patent, entitled "Radio Transmitting Apparatus and Radio Transmission Method," with ownership of all substantial rights in the '102 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

31. The '102 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '102 patent issued from U.S. Patent Application No. 11/937,422.

32. Lumen has and continues to directly and/or indirectly infringe (by inducing infringement) one or more claims of the '102 patent in this judicial district and elsewhere in Texas and the United States.

33. Lumen directly infringes the '102 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '102 patent. As to Lumen using and/or testing the Accused Products, Lumen installs, services, and/or maintains the Accused Products leased, sold, and/or provided to its customers. Indeed, Lumen owns and controls many of the Accused Products it provides to its customers. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf ("Except for Equipment purchased by you under the terms of this Agreement, or other equipment purchased by you, CenturyLink owns the Equipment regardless of who installed the Equipment."). Lumen provides Internet service to the Accused Products, such that Lumen causes the Accused Products to perform the Wi-Fi functionality recited by the asserted claims of the '102 patent. Lumen further directs and controls the Accused Products to perform in an infringing manner by providing the requisite Internet service that results in the Accused Product becoming a product that performs

Wi-Fi functionality in an infringing manner. *See, e.g.*, <https://www.lumen.com/content/quantumfiber/support/internet/360wifi/faqs.html> (“The Quantum Fiber modem by itself does not have wireless capability ... The modem will deliver internet over a wired Ethernet connection, but it is not a WiFi device by itself.”). Lumen further controls the performance of the claimed method steps of the Accused Products by conditioning receipt of warranty benefits on the customer’s agreement not to modify the Accused Products. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“This Limited Warranty does not cover defects due to defacement, misuse, abuse, neglect, improper use, improper electrical voltages or current, repairs by others, alterations, modifications, accidents, fire, flood, vandalism, acts of God or the elements.”).

34. For example, Lumen infringes claim 3 of the ’102 patent via the Accused Products. Each of the Accused Products comprise a radio transmitting apparatus that transmits a modulated signal.

35. The Accused Products each comprise circuitry and/or components (hardware and/or software) that forms a transmission frame which includes a frequency offset estimation signal for estimating frequency offset of the modulated signal at a receiving apparatus, a channel fluctuation estimation signal for estimating channel fluctuation of the modulated signal at the receiving apparatus and a gain control signal for performing gain control of the modulated signal at the receiving apparatus. *See, e.g.*, Section 19.1.4 of IEEE 802.11 2016. For example, the Accused Products each form a HT-mixed format PPDU frame, which comprises an L-LTF subframe, which is a frequency offset estimation signal. *See, e.g.*, Figure 17-4 of IEEE 802.11 2016. The HT-mixed format PPDU frame also comprises an HT-LTF subframe, which is a channel fluctuation estimation signal. *See, e.g.*, Section 19.3.9.4.6 of IEEE 802.11 2016. The HT-mixed

format PPDU frame also comprises an L-STF subframe, which is a gain control signal. *See, e.g.*, Section 19.3.9.3.3 of IEEE 802.11 2016.

36. The Accused Products each comprise circuitry and/or components (hardware and/or software) that transmits the transmission frame. *See, e.g.*, Figure 19-2 of IEEE 802.11 2016. The transmission frame includes a first gain control signal and a second gain control signal. For example, the HT-mixed format PPDU comprises a first gain control signal in the L-STF subframe and a second gain control signal in the HT-STF subframe. *See, e.g.*, Sections 19.3.9.3.3 and 19.3.9.4.5 of IEEE 802.11 2016. The first gain control signal is arranged prior to the frequency offset estimation signal. For example, the L-STF subframe is arranged prior to the L-LTF subframe. *See, e.g.*, Section 19.1.4 of IEEE 802.11 2016. The second gain control is arranged subsequent to the frequency offset estimation signal and prior to the channel fluctuation estimation signal. For example, the HT-STF subframe is arranged subsequent to the L-LTF subframe and prior to the HT-LTF subframe. *See, e.g.*, Section 19.1.4 of IEEE 802.11 2016.

37. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

38. At a minimum, Lumen has known of the '102 patent at least as early as the filing date of the complaint. In addition, Lumen has known about the '102 patent since at least November 8, 2021, when Lumen received notice of its infringement via a letter. Redwood sent another letter, which referenced the prior notice letter, that was received by Lumen on January 7, 2022. Furthermore, Lumen has known about the '102 patent since at least May 17, 2022, when Lumen received notice of its infringement via another letter.

39. On information and belief, since at least the above-mentioned date when Lumen was on notice of its infringement, Lumen has actively induced, under U.S.C. § 271(b), its

distributors, customers, subsidiaries, importers, and/or consumers that import, use, purchase, offer to sell, or sell the Accused Products comprising all of the limitations of one or more claims of the '102 patent to directly infringe one or more claims of the '102 patent by using, offering for sale, selling, and/or importing the '102 Accused Products. Since at least the notice provided on the above-mentioned date, Lumen does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '102 patent. Lumen intends to cause, and has taken affirmative steps to induce infringement by its distributors, importers, customers, subsidiaries, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, distributing or making available instructions or manuals for these products to recipients and prospective buyers, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these recipients in the United States.

40. On information and belief, despite having knowledge of the '102 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '102 patent, Lumen has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Lumen's infringing activities relative to the '102 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

41. Redwood has been damaged as a result of Lumen's infringing conduct described in this Count. Lumen is, thus, liable to Redwood in an amount that adequately compensates Redwood for Lumen's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT III

(INFRINGEMENT OF U.S. PATENT NO. 8,111,671)

42. Plaintiff incorporates paragraphs 1 through 41 herein by reference.

43. Redwood is the assignee of the '671 patent, entitled "Wireless Communication System, Wireless Communication Apparatus, Wireless Communication Method and Computer Program," with ownership of all substantial rights in the '671 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

44. The '671 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '671 patent issued from U.S. Patent Application No. 12/610,058.

45. Lumen has and continues to directly and/or indirectly infringe (by inducing infringement) one or more claims of the '671 patent in this judicial district and elsewhere in Texas and the United States.

46. Lumen directly infringes the '671 patent via 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '671 patent. As to Lumen using and/or testing the Accused Products, Lumen installs, services, and/or maintains the Accused Products leased, sold, and/or provided to its customers. Indeed, Lumen owns and controls many of the Accused Products it provides to its customers. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf ("Except

for Equipment purchased by you under the terms of this Agreement, or other equipment purchased by you, CenturyLink owns the Equipment regardless of who installed the Equipment.”). Lumen provides Internet service to the Accused Products, such that Lumen causes the Accused Products to perform the Wi-Fi functionality recited by the asserted claims of the ’671 patent. Lumen further directs and controls the Accused Products to perform in an infringing manner by providing the requisite Internet service that results in the Accused Product becoming a product that performs Wi-Fi functionality in an infringing manner. *See, e.g.*, <https://www.lumen.com/content/quantumfiber/support/internet/360wifi/faqs.html> (“The Quantum Fiber modem by itself does not have wireless capability ... The modem will deliver internet over a wired Ethernet connection, but it is not a WiFi device by itself.”). Lumen further controls the performance of the claimed method steps of the Accused Products by conditioning receipt of warranty benefits on the customer’s agreement not to modify the Accused Products. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“This Limited Warranty does not cover defects due to defacement, misuse, abuse, neglect, improper use, improper electrical voltages or current, repairs by others, alterations, modifications, accidents, fire, flood, vandalism, acts of God or the elements.”).

47. For example, Lumen infringes claim 4 of the ’671 patent via the Accused Products. Each of the Accused Products comprise a wireless communication station. *See, e.g.*, Section 14.14.2.1 and Figure 14-5 of IEEE 802.11 2016.

48. The Accused Products each comprise a transmitter configured to transmit a beacon with information associated with a network being described therein to another communication station to construct a network, where the beacon also includes timing information indicating which time periods during which the communication station cannot receive a transmission. For example,

a transmitter of each of the Accused Products is configured to transmit a beacon containing a Mesh Configuration element advertising the mesh services of a mesh network. *See, e.g.*, Sections 9.4.2.98.1 and 14.13.3.1 of IEEE 802.11 2016. The beacon contains timing information (e.g., the Mesh Awake Window element), indicating which time periods during which the communication station can and cannot receive a transmission in accordance with the communication station's Mesh Power Save Level field. *See, e.g.*, Sections 9.3.3.3, 9.4.2.104, 9.4.2.98.8, 14.14.7, and 14.14.2.2 of IEEE 802.11 2016.

49. The Accused Products each comprise a receiver configured to receive timing information from the another communication station, where the timing information indicates which time periods during which the another communication station cannot receive a transmission. For example, a receiver of each of the Accused Products is configured to receive a beacon containing the Mesh Awake Window and the Neighbor Beacon Interval contained in the Beacon Timing Element. *See, e.g.*, Sections 9.3.3.3, 9.4.2.105, and 14.14.7 of IEEE 802.11 2016. The Mesh Awake Window and the Neighbor Beacon Interval indicate the time periods during which a neighboring communication station can and cannot receive a transmission. *See, e.g.*, Section 14.14.7 and Figure 14-6 of IEEE 802.11 2016.

50. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

51. At a minimum, Lumen has known of the '671 patent at least as early as the filing date of the complaint. In addition, Lumen has known about the '671 patent since at least November 8, 2021, when Lumen received notice of its infringement via a letter. Redwood sent another letter, which referenced the prior notice letter, that was received by Lumen on January 7, 2022.

Furthermore, Lumen has known about the '671 patent since at least May 17, 2022, when Lumen received notice of its infringement via another letter.

52. On information and belief, since at least the above-mentioned date when Lumen was on notice of its infringement, Lumen has actively induced, under U.S.C. § 271(b), its distributors, customers, subsidiaries, importers, and/or consumers that import, use, purchase, offer to sell, or sell the Accused Products comprising all of the limitations of one or more claims of the '671 patent to directly infringe one or more claims of the '671 patent by using, offering for sale, selling, and/or importing the '671 Accused Products. Since at least the notice provided on the above-mentioned date, Lumen does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '671 patent. Lumen intends to cause, and has taken affirmative steps to induce infringement by its distributors, importers, customers, subsidiaries, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, distributing or making available instructions or manuals for these products to recipients and prospective buyers, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these recipients in the United States.

53. On information and belief, despite having knowledge of the '671 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '671 patent, Lumen has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Lumen's infringing activities relative to the '671 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant,

characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

54. Redwood has been damaged as a result of Lumen's infringing conduct described in this Count. Lumen is, thus, liable to Redwood in an amount that adequately compensates Redwood for Lumen's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT IV

(INFRINGEMENT OF U.S. PATENT NO. 9,462,536)

55. Plaintiff incorporates paragraphs 1 through 54 herein by reference.

56. Redwood is the assignee of the '536 patent, entitled "Wireless Communication System, Wireless Communication Apparatus, Wireless Communication Method, and Computer Program," with ownership of all substantial rights in the '536 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

57. The '536 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '536 patent issued from U.S. Patent Application No. 14/507,258.

58. Lumen has and continues to directly and/or indirectly infringe (by inducing infringement) one or more claims of the '536 patent in this judicial district and elsewhere in Texas and the United States.

59. Lumen and/or its agents directly infringe the '536 patent via 35 U.S.C. § 271(a) by using and/or testing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '536 patent. For example, Lumen installs, services, and/or maintains the Accused Products leased, sold, and/or

provided to its customers. Indeed, Lumen owns and controls Accused Products many of the Accused Products it provides to its customers. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“Except for Equipment purchased by you under the terms of this Agreement, or other equipment purchased by you, CenturyLink owns the Equipment regardless of who installed the Equipment.”). Lumen provides Internet service to the Accused Products, such that Lumen causes the Accused Products to perform the Wi-Fi functionality recited by the asserted claims of the ’536 patent. Lumen further directs and controls the Accused Products to perform in an infringing manner by providing the requisite Internet service that results in the Accused Product becoming a product that performs Wi-Fi functionality in an infringing manner. *See, e.g.*, <https://www.lumen.com/content/quantumfiber/support/internet/360wifi/faqs.html> (“The Quantum Fiber modem by itself does not have wireless capability ... The modem will deliver internet over a wired Ethernet connection, but it is not a WiFi device by itself.”). Lumen further controls the performance of the claimed method steps of the Accused Products by conditioning receipt of warranty benefits on the customer’s agreement not to modify the Accused Products. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“This Limited Warranty does not cover defects due to defacement, misuse, abuse, neglect, improper use, improper electrical voltages or current, repairs by others, alterations, modifications, accidents, fire, flood, vandalism, acts of God or the elements.”).

60. For example, Lumen infringes claim 3 of the ’536 patent via the Accused Products. The Accused Products are a mesh station that perform a communication method using a signal described in IEEE 802.11. *See, e.g.*, Sections 14 and 14.13.2.1 of IEEE 802.11 2016.

61. The Accused Products each output, with circuitry, a modulated signal based on information specifying a duration of transmission opportunities and information specifying a periodicity of the transmission opportunities. For example, the accused mesh station includes one or more transmitters that transmit modulated signals based on information contained in the Mesh Beacon. *See, e.g.*, Sections 9.3.3.3, 9.4.2.105, 14.13.3.1, 14.13.4.2.5, and Figure 9-464 of IEEE 802.11 2016. The Mesh Beacon includes the Mesh Awake Window, which specifies the duration of transmission opportunities, and the Beacon Timing element, which contains the Neighbor Target Beacon Transmission Time (“Neighbor TBTT”) and Neighbor Beacon Interval, which specify the periodicity of the transmission opportunities. *See, e.g.*, Sections 9.3.3.3, 9.4.2.104, 9.4.2.105, and 14.13.4 of IEEE 802.11 2016.

62. The Accused Products each set, with the circuitry, an offset of the transmission opportunity indicating a beginning of the transmission opportunity with respect to a beginning of a transmission interval. For example, the Accused Products each perform a TBTT adjustment procedure by subtracting a delay amount from the TBTT, which indicates a beginning of the Mesh Awake Window. *See, e.g.*, Section 14.13.4.4.3 and Figure 14-6 of IEEE 802.11 2016. The adjusted TBTT indicates a beginning of the Mesh Awake Window with respect to the beginning of a Beacon Interval. *See, e.g.*, Section 14.13.4.4.3 and Figure 14-6 of IEEE 802.11 2016.

63. The technology discussion above and the exemplary Accused Products provide context for Plaintiff’s infringement allegations.

64. At a minimum, Lumen has known of the ’536 patent at least as early as the filing date of the complaint. In addition, Lumen has known about the ’536 patent since at least November 8, 2021, when Lumen received notice of its infringement via a letter. Redwood sent another letter, which referenced the prior notice letter, that was received by Lumen on January 7, 2022.

Furthermore, Lumen has known about the '536 patent since at least May 17, 2022, when Lumen received notice of its infringement via another letter.

65. On information and belief, since at least the above-mentioned date when Lumen was on notice of its infringement, Lumen has actively induced, under U.S.C. § 271(b), its distributors, customers, subsidiaries, importers, and/or consumers that use and/or test the Accused Products comprising all of the limitations of one or more claims of the '536 patent to directly infringe one or more claims of the '536 patent by using and/or testing the '536 Accused Products. Since at least the notice provided on the above-mentioned date, Lumen does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '536 patent. Lumen intends to cause, and has taken affirmative steps to induce infringement by its distributors, importers, customers, subsidiaries, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, distributing or making available instructions or manuals for these products, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these recipients in the United States.

66. On information and belief, despite having knowledge of the '536 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '536 patent, Lumen has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Lumen's infringing activities relative to the '536 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such

that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

67. Redwood has been damaged as a result of Lumen's infringing conduct described in this Count. Lumen is, thus, liable to Redwood in an amount that adequately compensates Redwood for Lumen's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

COUNT V

(INFRINGEMENT OF U.S. PATENT NO. 10,498,571)

68. Plaintiff incorporates paragraphs 1 through 67 herein by reference.

69. Redwood is the assignee of the '571 patent, entitled "Transmission Apparatus, Reception Apparatus and Digital Radio Communication Method," with ownership of all substantial rights in the '571 patent, including the right to exclude others and to enforce, sue, and recover damages for past and future infringements.

70. The '571 patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '571 patent issued from U.S. Patent Application No. 16/361,363.

71. Lumen has and continues to directly and/or indirectly infringe (by inducing infringement) one or more claims of the '571 patent in this judicial district and elsewhere in Texas and the United States.

72. Lumen and/or its agents directly infringe the '571 patent via 35 U.S.C. § 271(a) by using and/or testing the Accused Products, their components and processes, and/or products containing the same that incorporate the fundamental technologies covered by the '571 patent. For example, Lumen installs, services, and/or maintains the Accused Products leased, sold, and/or provided to its customers. Indeed, Lumen owns and controls many of the Accused Products it

provides to its customers. *See, e.g.*, https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“Except for Equipment purchased by you under the terms of this Agreement, or other equipment purchased by you, CenturyLink owns the Equipment regardless of who installed the Equipment.”). Lumen provides Internet service to the Accused Products, such that Lumen causes the Accused Products to perform the Wi-Fi functionality recited by the asserted claims of the ’571 patent. Lumen further directs and controls the Accused Products to perform in an infringing manner by providing the requisite Internet service that results in the Accused Product becoming a product that performs Wi-Fi functionality in an infringing manner. *See, e.g.*, <https://www.lumen.com/content/quantumfiber/support/internet/360wifi/faqs.html> (“The Quantum Fiber modem by itself does not have wireless capability ... The modem will deliver internet over a wired Ethernet connection, but it is not a WiFi device by itself.”). Lumen further controls the performance of the claimed method steps of the Accused Products by conditioning receipt of warranty benefits on the customer’s agreement not to modify the Accused Products. *See, e.g.* https://www.centurylink.com/legal/docs/HSI_Subscriber_Agreement_LCTL_ENG.pdf (“This Limited Warranty does not cover defects due to defacement, misuse, abuse, neglect, improper use, improper electrical voltages or current, repairs by others, alterations, modifications, accidents, fire, flood, vandalism, acts of God or the elements.”).

73. For example, Lumen infringes claim 8 of the ’571 patent via the Accused Products. The Accused Products perform a digital radio communication method. *See, e.g.*, Figure 19-2 of IEEE 802.11 2016.

74. The Accused Products each select a first modulation scheme from a plurality of modulation schemes based on a communication situation. For example, each of the Accused

Products utilize a Modulation and Coding Scheme (MCS) value that is used to determine the modulation, coding, and number of spatial channels based on information associated with a channel quality assessment. *See, e.g.*, Sections 19.3.5 and 19.3.13.4 of IEEE 802.11 2016. Based on the results of the channel quality assessment, an appropriate MCS value is selected from a plurality of MCS values for transmissions sent by the Accused Products. *See, e.g.*, Section 19.3.5 and Table 19-27 of IEEE 802.11 2016.

75. The Accused Products each generate a first symbol using the selected first modulation scheme, where the first symbol comprises a first quadrature baseband signal. For example, each of the Accused Products generate a first data symbol (e.g., data), comprising a first quadrature baseband signal, that is modulated according to the MCS value. *See, e.g.*, Section 19.3.5 and Figure 19-22 of IEEE 802.11 2016.

76. The Accused Products each generate a second symbol comprising a pilot symbol using a phase shift keying (PSK) modulation scheme, where the second symbol comprises a second quadrature baseband signal. For example, each of the Accused Products generate a second data symbol (e.g., the HT-SIG), comprising a second quadrature baseband signal, that is modulated according to a predetermined modulation system (e.g., QBPSK). *See, e.g.*, Section 19.3.9.4.3 and Figure 19-22 of IEEE 802.11 2016.

77. The Accused Products each transmit a data signal comprising the first symbol and second symbol. For example, each of the Accused Products transmit an HT-mixed format PPDU signal comprising a data symbol and an HT-SIG symbol. *See, e.g.*, Figure 19-22 of IEEE 802.11 2016.

78. The technology discussion above and the exemplary Accused Products provide context for Plaintiff's infringement allegations.

79. At a minimum, Lumen has known of the '571 patent at least as early as the filing date of the complaint. In addition, Lumen has known about the '571 patent since at least November 8, 2021, when Lumen received notice of its infringement via a letter and a list of relevant patents. Redwood sent another letter, which referenced the prior notice letter, that was received by Lumen on January 7, 2022. Furthermore, Lumen has known about the '571 patent since at least May 17, 2022, when Lumen received notice of its infringement via another letter.

80. On information and belief, since at least the above-mentioned date when Lumen was on notice of its infringement, Lumen has actively induced, under U.S.C. § 271(b), its distributors, customers, subsidiaries, importers, and/or consumers that use and/or test the Accused Products comprising all of the limitations of one or more claims of the '571 patent to directly infringe one or more claims of the '571 patent by using and/or testing the '571 Accused Products. Since at least the notice provided on the above-mentioned date, Lumen does so with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '571 patent. Lumen intends to cause, and has taken affirmative steps to induce infringement by its distributors, importers, customers, subsidiaries, and/or consumers by at least, inter alia, creating advertisements that promote the infringing use of the Accused Products, creating and/or maintaining established distribution channels for the Accused Products into and within the United States, manufacturing the Accused Products in conformity with U.S. laws and regulations, distributing or making available instructions or manuals for these products, testing and certifying features related to infringing features in the Accused Products, and/or providing technical support, replacement parts, or services for these products to these recipients in the United States.

81. On information and belief, despite having knowledge of the '571 patent and knowledge that it is directly and/or indirectly infringing one or more claims of the '571 patent,

Lumen has nevertheless continued its infringing conduct and disregarded an objectively high likelihood of infringement. Lumen's infringing activities relative to the '571 patent have been, and continue to be, willful, wanton, malicious, in bad-faith, deliberate, consciously wrongful, flagrant, characteristic of a pirate, and an egregious case of misconduct beyond typical infringement such that Plaintiff is entitled under 35 U.S.C. § 284 to enhanced damages up to three times the amount found or assessed.

82. Redwood has been damaged as a result of Lumen's infringing conduct described in this Count. Lumen is, thus, liable to Redwood in an amount that adequately compensates Redwood for Lumen's infringements, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

CONCLUSION

83. Plaintiff Redwood is entitled to recover from Lumen the damages sustained by Plaintiff as a result of Lumen's wrongful acts, and willful infringement, in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court.

84. Plaintiff has incurred and will incur attorneys' fees, costs, and expenses in the prosecution of this action. The circumstances of this dispute may give rise to an exceptional case within the meaning of 35 U.S.C. § 285, and Plaintiff is entitled to recover its reasonable and necessary attorneys' fees, costs, and expenses.

JURY DEMAND

85. Plaintiff hereby requests a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

86. Plaintiff respectfully requests that the Court find in its favor and against Lumen, and that the Court grant Plaintiff the following relief:

1. A judgment that Lumen has infringed the Asserted Patents as alleged herein, directly and/or indirectly by way of inducing infringement of such patents;
2. A judgment for an accounting of all damages sustained by Plaintiff as a result of the acts of infringement by Lumen;
3. A judgment and order requiring Lumen to pay Plaintiff damages under 35 U.S.C. § 284, including up to treble damages as provided by 35 U.S.C. § 284, and any royalties determined to be appropriate;
4. A judgment and order requiring Lumen to pay Plaintiff pre-judgment and post-judgment interest on the damages awarded;
5. A judgment and order finding this to be an exceptional case and requiring Lumen to pay the costs of this action (including all disbursements) and attorneys' fees as provided by 35 U.S.C. § 285; and
6. Such other and further relief as the Court deems just and equitable.

Dated: June 16, 2022

Respectfully submitted,

/s/ Patrick J. Conroy

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