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

FRACTUS, S.A.,	§	
	§	
Plaintiff,	§	
	§	
	§	
v.	§	**Civil Action No.**
	§	
VERIZON CONNECT INC. and CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS,	§	**JURY TRIAL DEMANDED**
	§	
	§	
	§	
	§	
Defendants.	§	
	§	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Fractus, S.A. ("Fractus" or "Plaintiff") hereby submits this Complaint for patent infringement against Defendants Verizon Connect Inc. ("Verizon Connect") and Cellco Partnership d/b/a Verizon Wireless ("Verizon Wireless") (collectively, "Verizon" or "Defendants").

THE PARTIES

1. Fractus, S.A. is a foreign corporation duly organized and existing under the laws of Spain with its principal place of business in Barcelona, Spain.

2. Fractus is the owner by assignment of all right, title, and interest in U.S. Patent Nos. 8,456,365, 8,472,908, 8,810,458, 11,031,677, and 12,095,149 (collectively, the "Patents-in-Suit").

3. On information and belief, Verizon Connect is a Delaware corporation with its principal place of business at 5055 North Point Parkway, Alpharetta, GA 30022. On information and belief, Verizon Connect can be served with process through its registered agent, The

Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801.

4. On information and belief, Verizon Wireless is a Delaware partnership with its principal place of business at One Verizon Way, Basking Ridge, New Jersey 07920. On information and belief, Verizon Wireless can be served with process through its registered agent, The Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801.

5. On information and belief, both Verizon Connect and Verizon Wireless are wholly owned subsidiaries of Verizon Communications Inc.

JURISDICTION AND VENUE

6. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq.* This Court has jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

7. This Court has personal jurisdiction over Defendants. Fractus is informed and believes, and on that basis alleges, that Defendants conduct business and have committed acts of patent infringement and/or have induced acts of patent infringement by others in the State of Texas and within this Judicial District. Defendants regularly transact business in the State of Texas and within this District. Defendants have purposefully directed infringing activities at residents of the State of Texas, and this litigation results from those infringing activities. Defendants regularly sell (either directly or indirectly), their products within this District. For example, Defendants have placed and continue to place infringing products into the stream of commerce via an established distribution channel with the knowledge or understanding that such products are being and will continue to be sold in this Judicial District and the State of Texas. Defendants are subject to this Court's specific and/or general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, Tex. Civ. Prac. & Rem. Code § 17.042, due at least to their substantial and pervasive business in this State and Judicial District, including at least part of their infringing activities alleged

herein and deriving substantial revenue from goods sold to Texas residents.

8. Venue in the Eastern District of Texas is proper for Defendants pursuant to 28 U.S.C. §§ 1391(b) and (c) and 1400(b).

9. On information and belief, Defendants have committed infringing acts in this District by making, using, offering for sale, selling, or importing products that infringe the Patents-in-Suit, or by inducing others to infringe the Patents-in-Suit. For example, the Hum+ (Gen 2), a product that infringes at least one of the Patents-in-Suit, as detailed below, is shown as "in stock" at a Verizon Wireless store located at 1805 S Loop 288, Denton, TX 76205.

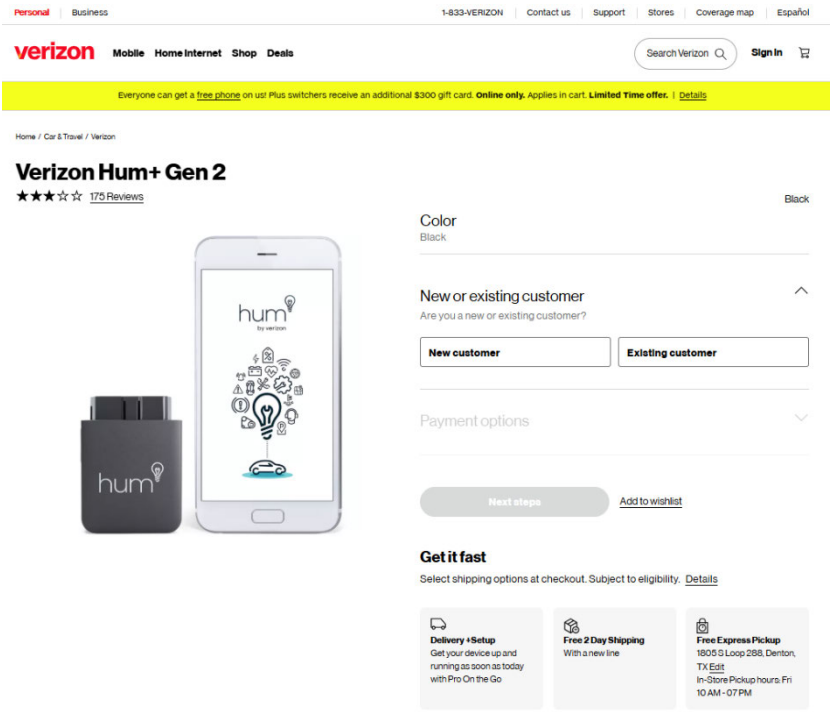


Fig. 1 (source: https://www.verizon.com/connected-devices/hum-plus-gen-2/ [https://perma.cc/638X-HFXP] (last accessed 12/6/2024))

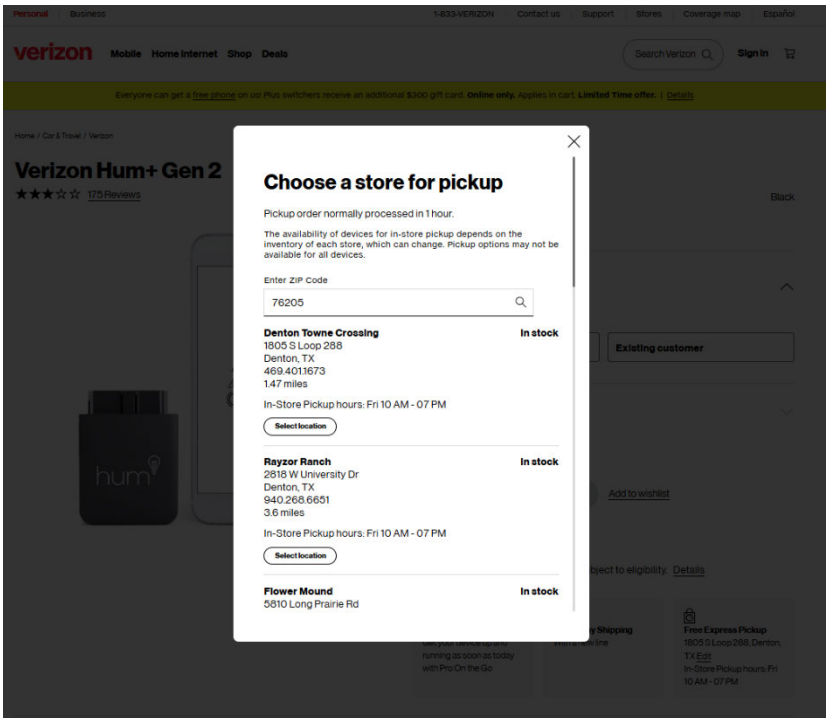


Fig. 2 (source: https://www.verizon.com/connected-devices/hum-plus-gen-2/ [https://perma.cc/638X-HFXP] (select "Free Express Pickup"; type "76205") (last accessed 12/6/2024))

10. The Hum Terms of Service state that the document is an agreement between Verizon Connect and the purchaser of the Hum service.

> This document is an agreement ("Agreement") between Verizon Connect Inc. ("we", "us," or "our"), and you. The Service is described in this Agreement and in greater detail on the Hum website, www.hum.com ("Website"), which contains information about each of Hum's features. You may visit the Website, explore the Hum app, contact us via the Speaker in your Vehicle, or call (800) 711-5800 to: (1) find out more about your subscription, (2) modify your subscription, (3) manage your account, and (4) learn more about the Service.

Fig. 3 (source: https://www.verizon.com/support/hum-by-verizon-legal/ [https://perma.cc/7GY7-FCT9] (last accessed 12/6/2024))

11. The Hum by Verizon mobile application lists Verizon Connect as the developer.

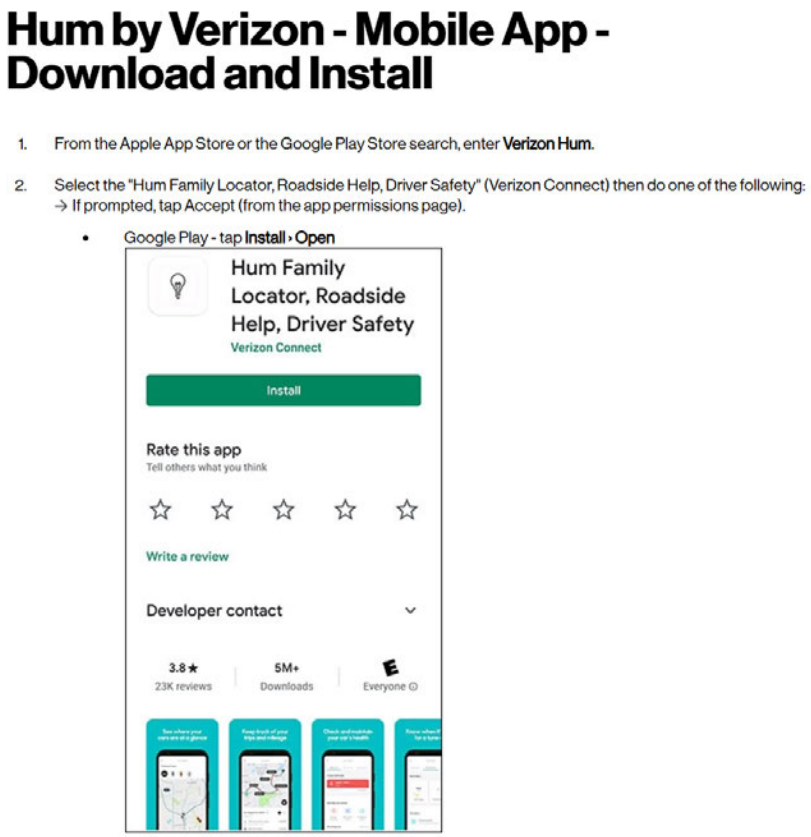


Fig. 4 (source: https://www.verizon.com/support/knowledge-base-208717/ [https://perma.cc/XWX2-E7D7] (last accessed 12/6/2024))

12. On information and belief, Defendants have sold and/or leased products that infringe the Patents-in-Suit and Verizon Connect software associated with those products to customers in this District, including but not limited to local governments and local government entities.

13. On information and belief, Defendants maintain regular and established places of business in this District. Verizon's website (https://www.verizon.com/stores/state/texas) displays information for Verizon Wireless retail stores located in Texas, including at 500 E Loop 281, Longview, TX 75605; 1016 W Southwest Loop 323, Tyler, TX 75701; 8988 S Broadway Ave, Ste 110, Tyler, TX 75703; 2035 N Central Expy, Ste 620, McKinney, TX 75070; 2818 W University Dr, Denton, TX 76201; 1805 S Loop 288, Denton, TX 76205; 3113 N US Hwy 75, Sherman, TX, 75090; and 380 Shannon Rd E, Sulphur Springs, TX 75482.

14. According to Denton County property tax records, Verizon Wireless owns 1805 S Loop 288, Denton, TX 76205, and pays property taxes for this location. *See In re Cray Inc.*, 871 F.3d 1355, 1360 (Fed. Cir. 2017).

Property ID: 953325 For Year 2024

Property Details

Account			
Property ID:	953325	**Geographic ID:** P953325	
Type:	Personal		
Property Use:		**Condo:**	
Location			
Situs Address:	1805 S LOOP 288 DENTON, TX		
Map ID:		**Mapsco:**	
Legal Description:	PERSONAL PROPERTY - CELLULAR PHONE STORE LOCATION. 1805 S LOOP288, DENTON		
Abstract/Subdivision:			
Neighborhood:			
Owner			
Owner ID:	322127		
Name:	CELLCO PARTNERSHIP		
Agent:	KROLL LLC		
Mailing Address:	PROPERTY TAX DEPT P O BOX 7028 BEDMINSTER, NJ 07921-7028		
% Ownership:	100.00%		
Exemptions:	For privacy reasons not all exemptions are shown online.		

Fig. 5 (source: https://esearch.dentoncad.com/Property/View/953325?year=2024&ownerId=322127 [https://perma.cc/EY6E-X9JM] (last accessed 12/6/2024))

15. In a recent action, Defendants admitted that Verizon "maintains places of business in this District, and that Verizon Wireless sells and offers the Hum+ and Hum X in this District." *See* Answer to Am. Compl. ¶¶ 10, 14, 17, *OBD Sensor Sols. LLC v. Verizon Connect Inc.*, No. 2:24-cv-153-JRG-RSP (E.D. Tex. June 7, 2024), ECF No. 18.

PATENTS-IN-SUIT

16. On June 4, 2013, the United States Patent and Trademark Office issued U.S. Patent No. 8,456,365 (the "'365 Patent") to Fractus for an invention entitled "Multi-Band Monopole Antennas for Mobile Communications Devices."

17. On June 25, 2013, the United States Patent and Trademark Office issued U.S. Patent No. 8,472,908 (the "'908 Patent") to Fractus for an invention entitled "Wireless Portable Device Including Internal Broadcast Receiver."

18. On August 19, 2014, the United States Patent and Trademark Office issued U.S. Patent No. 8,810,458 (the "'458 Patent") to Fractus for an invention entitled "Handheld Device with Two Antennas, and Method of Enhancing the Isolation Between the Antennas."

19. On June 8, 2021, the United States Patent and Trademark Office issued U.S. Patent No. 11,031,677 (the "'677 Patent") to Fractus for an invention entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices."

20. On September 17, 2024, the United States Patent and Trademark Office issued U.S. Patent No. 12,095,149 (the "'149 Patent") to Fractus for an invention entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices."

FACTUAL ALLEGATIONS

Fractus Technology

21. Fractus is a company specializing in advanced antenna technologies based in Barcelona, Spain. Fractus was founded by two college friends, Ruben Bonet and Carles Puente. Dr. Puente, a Professor at the Universitat Politècnica de Catalunya, is the lead inventor on the Patents-in-Suit. Dr. Puente's early research work focused on fractal antennas and evolved over time into the widely applicable and flexible antenna designs that appear in and are covered by the Patents-in-Suit.

22. Fractus has designed antennas for and/or has licensed the right to use its technology to leading companies across a variety of industries, including HTC, LG, RIM, Motorola, Samsung, Asus, ZTE, CommScope, Vivint, and ADT. Since its incorporation Fractus has cumulatively sold more than 40 million antennas to customers. Among the numerous awards and honors the company has received for its innovative work, Fractus won the 2004 Frost & Sullivan Award for technological innovation and was named a 2005 Davos World Economic Forum Technology Pioneer and one of Red Herring's top innovative companies for 2006. Fractus inventors were finalists for the European

Patent Office ("EPO") European Inventor Award in 2014, and in April 2017 Fractus received the "European Inspiring Company Award" by the London Stock Exchange and the Elite Group. In October 2017, Fractus was selected by the EPO as an example of an IP strategist for small and medium-sized enterprises. In 2021, Fractus endowed a chair at Pompeu Fabra University in Spain, to enhance technology transfer and research into 6G wireless communications. And, in September 2022, Fractus and the Universitat Politècnica de Catalunya partnered in the creation of a research and technology hub to develop "deep tech" solutions for global challenges.

23. The Patents-in-Suit were filed as a result of novel research by Fractus into antenna design for wireless devices, spanning across miniature antennas, multi-band monopole internal antennas, wireless devices comprising multiple antennas, and antennas for multifunctional wireless devices. Designers of wireless devices often face a number of challenges related to internal antennas capable of enabling efficient multiband operation. As with all antennas, these components both radiate and respond to electromagnetic waves. In the cramped confines of wireless devices, electromagnetic waves given off or absorbed by neighboring components in close proximity to an antenna can significantly impair the antenna's performance and efficiency. Without careful design, these problems may degrade an antenna's electromagnetic performance to the point that the device ceases to function in its intended manner or may require the designer to compromise on other desirable device attributes, such as size. The Patents-in-Suit solve these problems through a variety of novel solutions enabling multiband operation and small size without the efficiency impairments normally faced by these antennas.

Verizon's Infringing Products

24. Verizon makes, uses, sells, offers for sale, and/or imports products in the United

States, including, but not limited to, the SmartWitness CP2 (CP2-VZ-LTE),[1] which is referred to by Verizon as the Fleet Dash Cam and/or Road-facing camera (model 2); SmartWitness KP2 (KP2-VZ),[2] which is referred to by Verizon as the AI Fleet Dashcam, Dual-Facing AI Dash Cam, Road-Facing AI Dashcam, and/or Driver-Facing AI Dashcam; VT-400, which is also sold as a main component of the Hum X (Gen 2); VT-410, which is also sold as a main component of the Hum X (Gen 2) and the Hum+ (Gen 2); Verizon Connect AI-110, which is also referred to as the Meridian Zenith and/or Equipment Asset Tracker-Battery (EAT-B); Verizon Connect AI-111, which is also referred to as the Meridian Prime and/or Equipment Asset Tracker (EAT); Delphi Connect 4G LTE; CalAmp LMU-1230; CalAmp LMU-2630MB; CalAmp LMU-3040LVB; CalAmp LMU-3640LVB; CalAmp TTU-730LV; CalAmp HMU-3640LB; and Xirgo XT6372R (collectively, the "Infringing Products").

25. The above list is not exhaustive. Fractus's investigation of Verizon's Infringing Products is ongoing, and the above list will expand as warranted to include additional Infringing Products with similarly designed antennas.

Notice and Willfulness

26. Fractus first noticed Verizon of the Patents-in-Suit via letters in October and November 2021. The letters informed Verizon that Fractus believed Verizon was infringing Fractus's patents. The letters provided a full list of Fractus's patent portfolio and specifically identified certain Fractus patents—including several of the Patents-in-Suit—which Verizon's products infringed. One letter was sent to Ms. Kendall Butterworth, Vice President and Deputy

[1] On information and belief, after this device launched, SmartWitness was acquired by Sensata Technologies, which later sold this device under the Sensata INSIGHTS brand. Recently, Xirgo Technologies acquired Sensata INSIGHTS.
[2] *See supra* note 1.

General Counsel, Verizon Communications Inc., directly at two addresses and "c/o" Verizon Communications Inc.'s agent, CT Corporation System, in Dallas, Texas. Another letter was sent to Ms. Margaret Mezza, Managing Associate General Counsel of Verizon Connect Inc., directly at two addresses and "c/o" Verizon Connect Inc.'s agent, CT Corporation System, in Dallas, Texas.

27. In February 2022, Ms. Bukola Landis-Aina, Associate General Counsel of Verizon Communications Inc., replied to Fractus's notice letter requesting additional materials. Fractus responded to Ms. Landis-Aina's letter in September 2024, and has not received a reply.

28. Upon information and belief, prior to this lawsuit Verizon never disputed the validity of the Patents-in-Suit. In particular, Verizon has never communicated any allegedly invalidating prior art to Fractus or attempted to bring any post-grant action at the United States Patent and Trademark Office.

29. Verizon's conduct has demonstrated a pattern of bad-faith actions in continuing to infringe upon the Patents-in-Suit despite being on notice that it was infringing Fractus's patents. Verizon has either reviewed Fractus's letters regarding infringement, concluded Verizon needed a license, and yet proceeded to sell infringing products regardless of that determination or, in spite of the notice letters, has failed to make a good-faith effort to evaluate the Patents-in-Suit and thus willfully blinded itself to the need to obtain a license to practice the Patents-in-Suit. Instead of duly obtaining authorization or a license to practice the Patents-in-Suit and as shown below, Verizon has continued making, using, selling, offering for sale, and/or importing into the United States products that infringe the Patents-in-Suit.

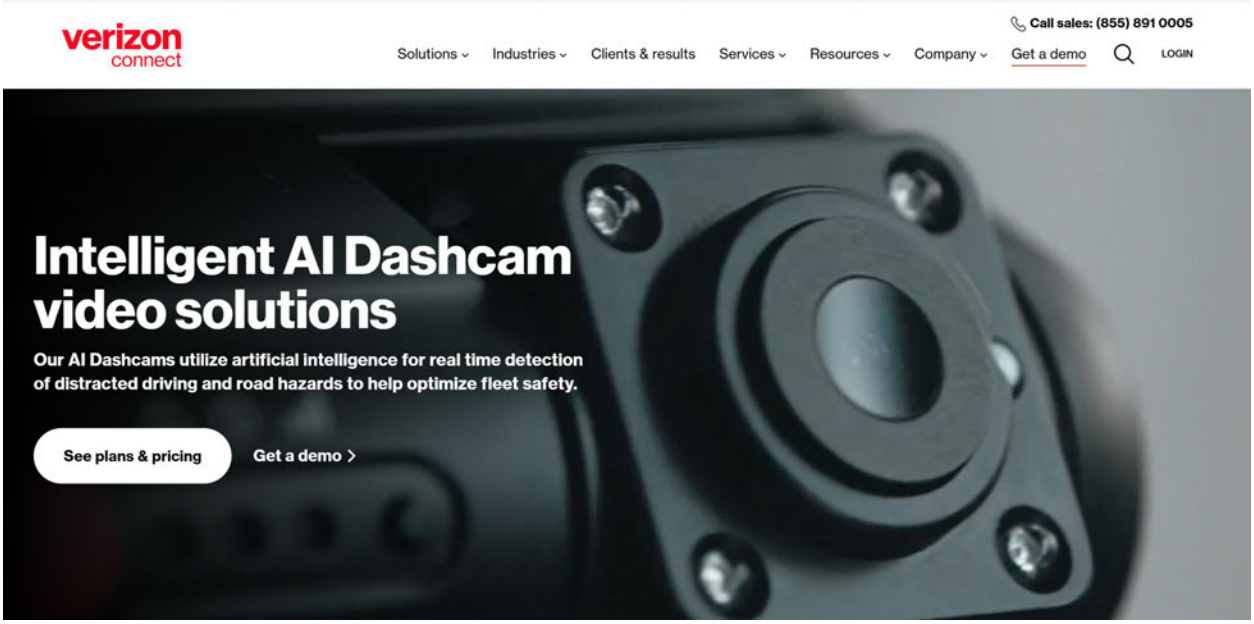


Fig. 6 (source: https://www.verizonconnect.com/solutions/fleet-dash-cam/ [https://perma.cc/HW2V-SSWH] (last accessed 12/6/2024))

INFRINGEMENT OF U.S. PATENT NO. 8,456,365

30. On June 4, 2013, the '365 Patent was duly and legally issued for an invention entitled "Multi-Band Monopole Antennas for Mobile Communications Devices." A true and correct copy of the '365 Patent is attached as Exhibit 1.

31. The '365 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

32. The '365 Patent describes multiband antennas placed within communication devices.

33. As one example, claim 1 of the '365 Patent recites:

A mobile communication device, comprising:

a device housing;

a printed circuit board, the printed circuit board comprising:

a ground plane layer;

a feeding point;

a communication circuitry, the communication circuitry being mounted on the printed circuit board;

wherein the communication circuitry is coupled to the feeding point and to the ground plane layer;

a multi-band antenna capable of operating at multiple frequency bands, the multi-band antenna including an antenna element;

wherein the antenna element operates in cooperation with the ground plane layer;

the antenna element comprising:

a common conductor;

a first radiating arm connected to the common conductor;

a second radiating arm connected to the common conductor;

wherein the common conductor includes a feeding port, the feeding port being coupled to the feeding point;

wherein at least a portion of the first radiating arm and at least a portion of the second radiating arm are arranged on different planes;

wherein the first radiating arm is at least partially shaped according to a grid-dimension curve; and

wherein the printed circuit board, the communication circuitry, and the multi-band antenna are arranged inside the device housing.

34. Defendants have directly infringed and continue to infringe at least claim 1 of the ’365 Patent in violation of 35 U.S.C. § 271(a) by their manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to telematics devices. As detailed below, the Infringing Products meet every limitation of the relevant claims of the ’365 Patent literally or under the doctrine of equivalents.[3]

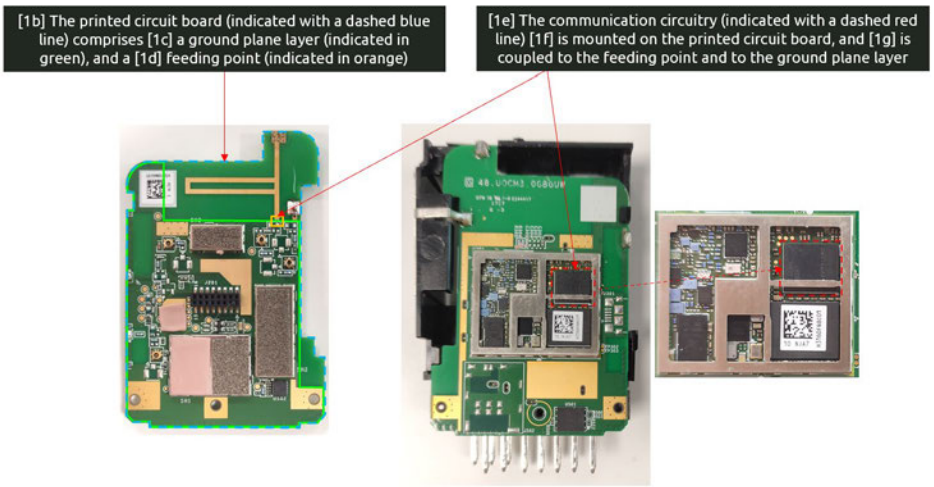
35. As an example, the VT-400 satisfies all claim limitations of at least claim 1 of the ’365 Patent.

[3] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the ’365 Patent.

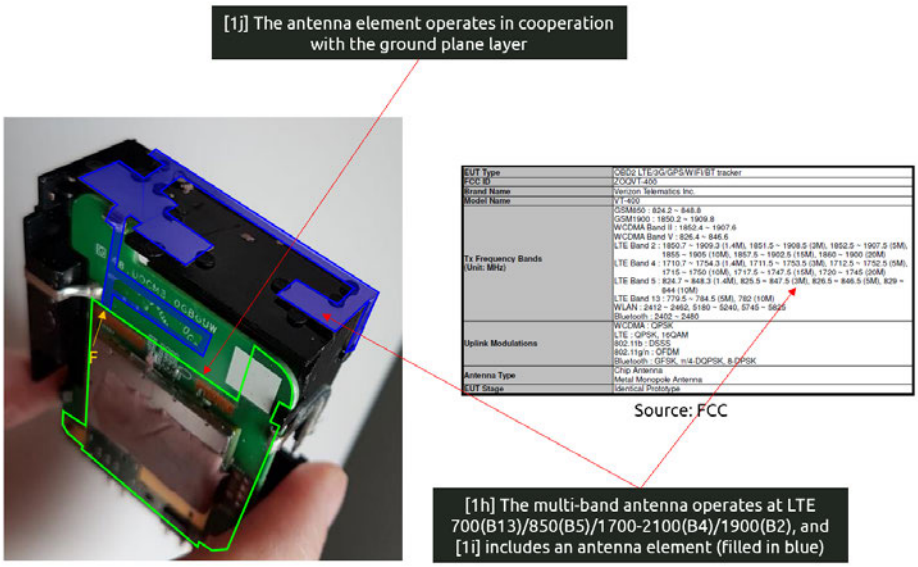
a. A mobile communication device, comprising:

b. a device housing;

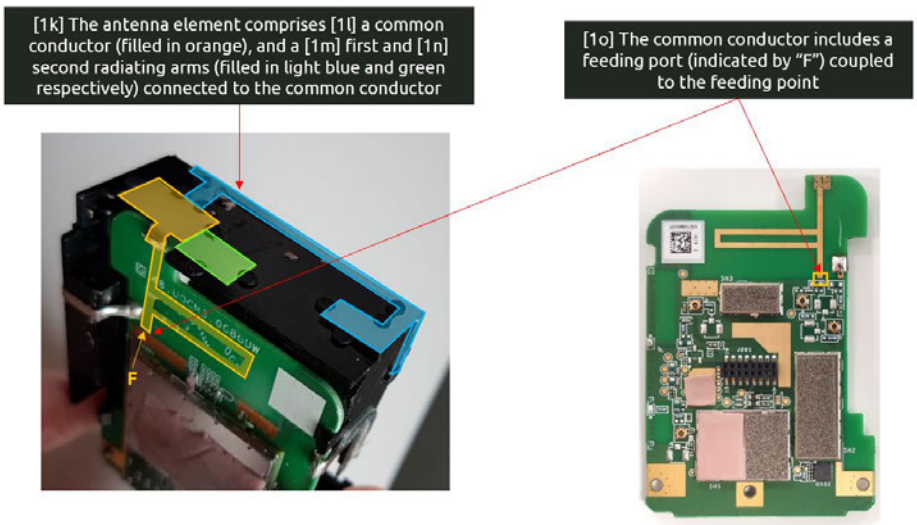
c. a printed circuit board, the printed circuit board comprising: a ground plane layer; a feeding point; a communication circuitry, the communication circuitry being mounted on the printed circuit board; wherein the communication circuitry is coupled to the feeding point and to the ground plane layer;



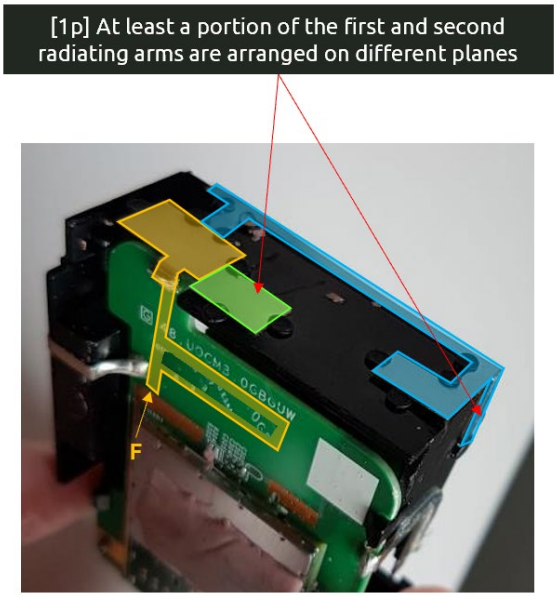
d. a multi-band antenna capable of operating at multiple frequency bands, the multi-band antenna including an antenna element; wherein the antenna element operates in cooperation with the ground plane layer;



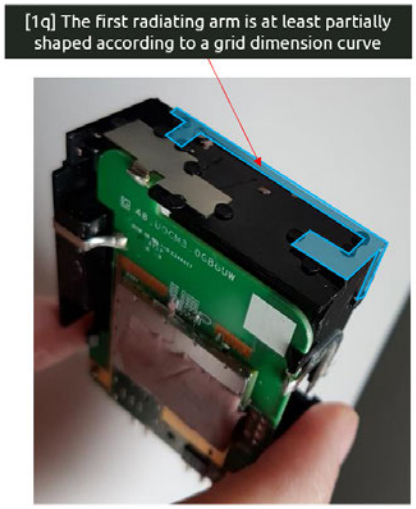
e. the antenna element comprising: a common conductor; a first radiating arm connected to the common conductor; a second radiating arm connected to the common conductor; wherein the common conductor includes a feeding port, the feeding port being coupled to the feeding point



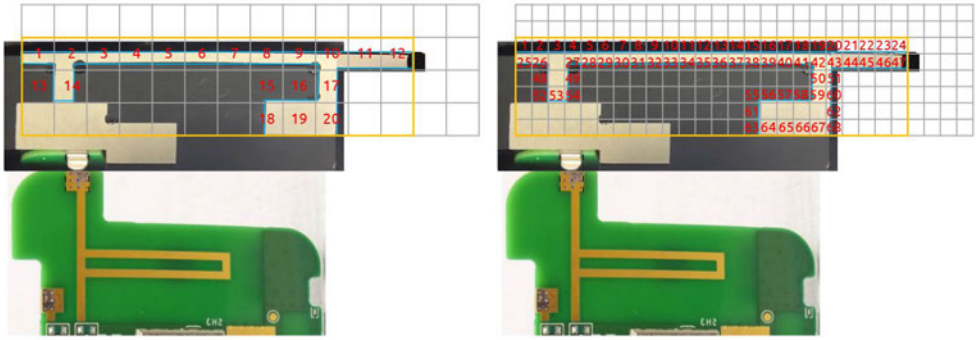
f. wherein at least a portion of the first radiating arm and at least a portion of the second radiating arm are arranged on different planes;



g. wherein the first radiating arm is at least partially shaped according to a grid dimension curve; and

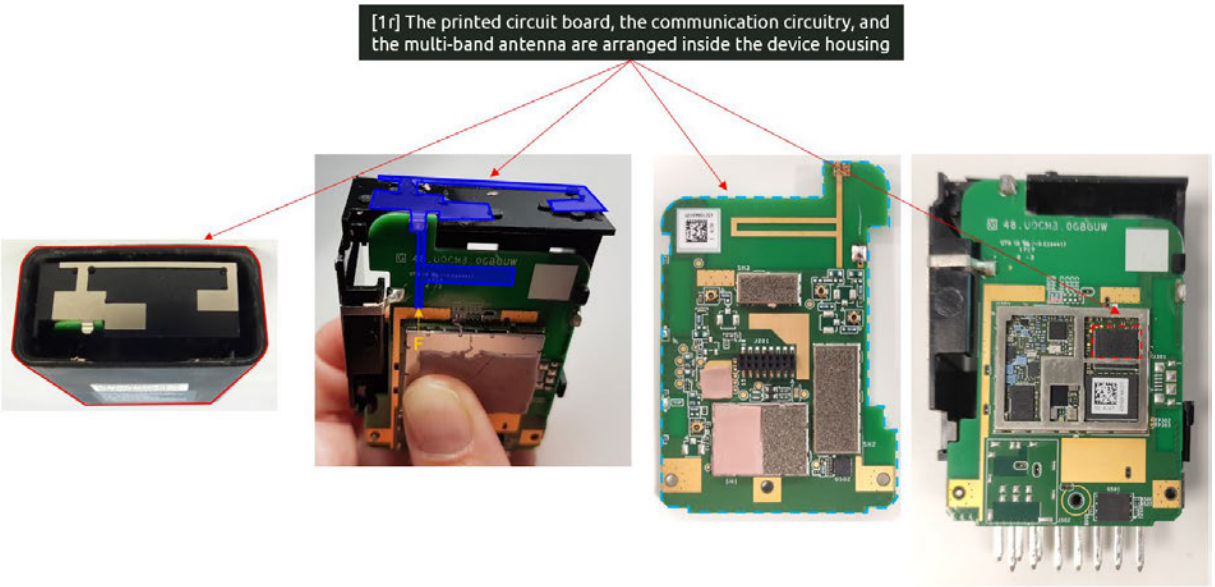


$$\text{Grid dimension } (D_g) = -\frac{\log(N2) - \log(N1)}{\log(L2) - \log(L1)} = \frac{\log(N2) - \log(N1)}{\log(2)} = \frac{\log(68) - \log(20)}{\log(2)} = 1.76 > 1$$



$N_1 = 20$ $N_2 = 68$

h. wherein the printed circuit board, the communication circuitry, and the multi-band antenna are arranged inside the device housing.



36. In addition to directly infringing the ’365 Patent, Defendants indirectly infringe at least claim 1 of the ’365 Patent by active inducement under 35 U.S.C. § 271(b). Defendants have induced, caused, urged, encouraged, aided, and abetted their direct and indirect customers, and/or one or more business partners, to make, use, sell, offer for sale, and/or import Infringing Products. Defendants have done so by acts including but not limited to selling Infringing Products to their customers; marketing Infringing Products; and providing instructions and technical support (available via, e.g., https://opendevelopment.verizonwireless.com/device-showcase/device/6600 [https://perma.cc/8ENF-PAWM] (last accessed 12/6/2024)) for the use of Infringing Products. Such conduct by Defendants was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

37. The acts of infringement by Defendants have caused damage to Fractus, and Fractus is entitled to recover from Defendants the damages sustained by Fractus as a result of Defendants’ wrongful acts in an amount subject to proof at trial. The infringement of Fractus’s exclusive rights under the ’365 Patent by Defendant has damaged and will continue to damage Fractus, causing

irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

INFRINGEMENT OF U.S. PATENT NO. 8,472,908

38. On June 25, 2013, the '908 Patent was duly and legally issued for an invention entitled "Wireless Portable Device Including Internal Broadcast Receiver." A true and correct copy of the '908 Patent is attached as Exhibit 2.

39. The '908 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

40. The '908 Patent relates to a wireless device comprising an antenna element.

41. As one example, claim 1 of the '908 Patent recites:

A wireless portable device for radio communication, comprising:

> at least one antenna element included within the wireless portable device;
>
> at least one ground-plane having a length and a width, no ground-plane having a width larger than 55 mm;
>
> radio frequency communication circuitry for processing a signal received through the at least one antenna element;
>
> at least one matching network operatively arranged between the at least one antenna element and the radio frequency communication circuitry;
>
> the device is arranged for communication involving at least, receiving and processing a signal in accordance with a communication system having a bandwidth with a lower frequency limit (f_{min}) and un upper frequency limit (f_{max});
>
> the at least one antenna element operates as a non-resonant antenna element for frequencies that are not lower than the lower frequency limit (f_{min}) and not higher than the higher frequency limit (f_{max}) so that an imaginary part of an input impedance of the at least one antenna element is not equal to zero for any frequency that is not lower than the lower frequency limit (f_{min}) and not higher than the higher frequency limit (f_{max}); and
>
> the at least one antenna element is configured so that the imaginary part of the input impedance for any selected frequency not lower than the lower frequency limit (f_{min}) and not higher than the higher frequency limit (f_{max}) is closer to zero than the imaginary part of the input impedance for any frequency not lower than the lower frequency limit (f_{min}) and lower than the selected frequency.

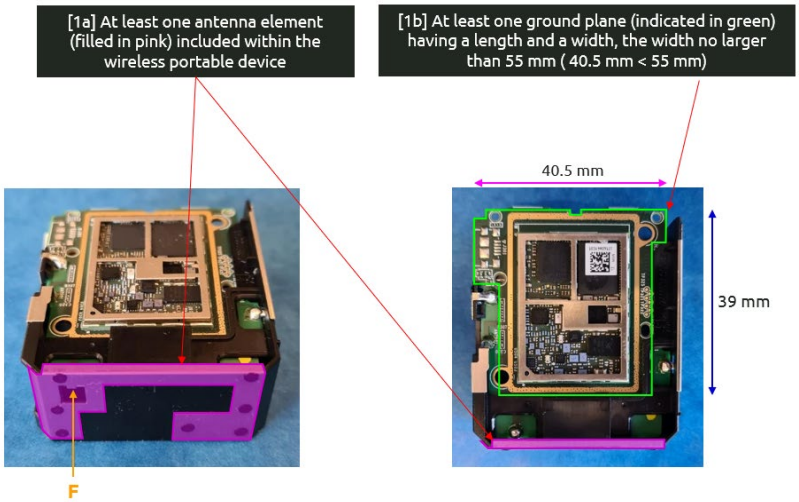
42. Defendants have directly infringed and continue to infringe at least claim 1 of the ’908 Patent in violation of 35 U.S.C. § 271(a) by their manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to telematics devices. As detailed below, the Infringing Products meet every limitation of the relevant claims of the ’908 Patent literally or under the doctrine of equivalents.[4]

43. As an example, the VT-410 satisfies all claim limitations of at sleast claim 1 of the ’908 Patent.

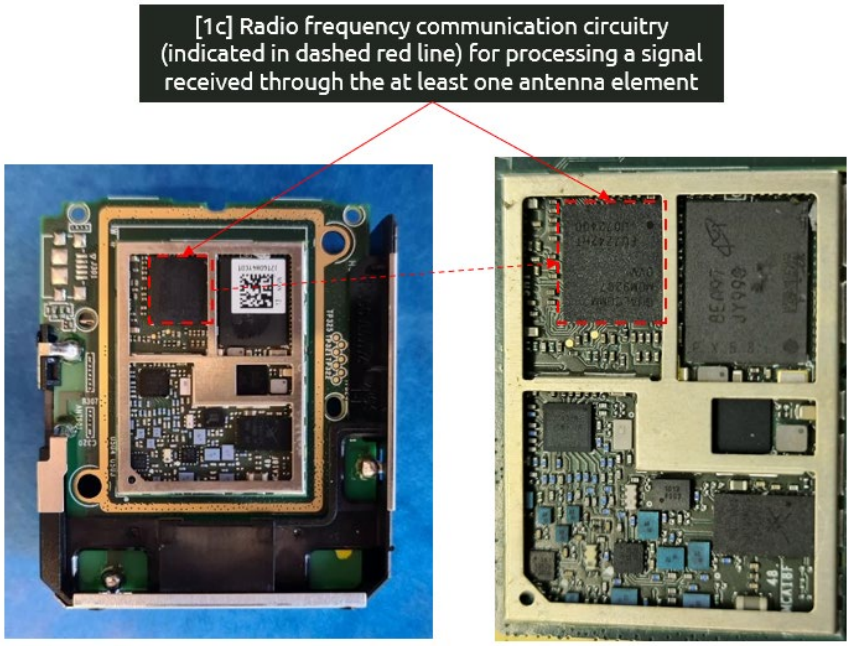
a. A wireless portable device for radio communication, comprising:

b. at least one antenna element included within the wireless portable device; at least one ground-plane having a length and a width, no ground-plane having a width larger than 55 mm;

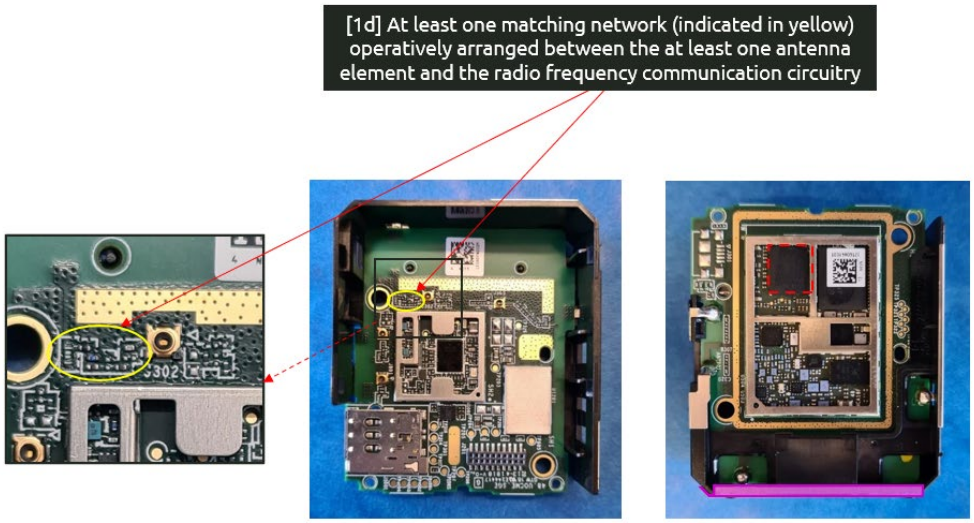
[4] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the ’908 Patent.



c. radio frequency communication circuitry for processing a signal received through the at least one antenna element;



d. at least one matching network operatively arranged between the at least one antenna element and the radio frequency communication circuitry;



e. the device is arranged for communication involving at least, receiving and processing a signal in accordance with a communication system having a bandwidth with a lower frequency limit (f_{min}) and a higher frequency limit (f_{max});

[1e] The device is arranged for communication involving at least, receiving and processing a signal in accordance with the communication system 700(B13) that has a bandwidth with lower frequency limit f_{min} = 746 MHz and higher frequency limit f_{max} = 787 MHz

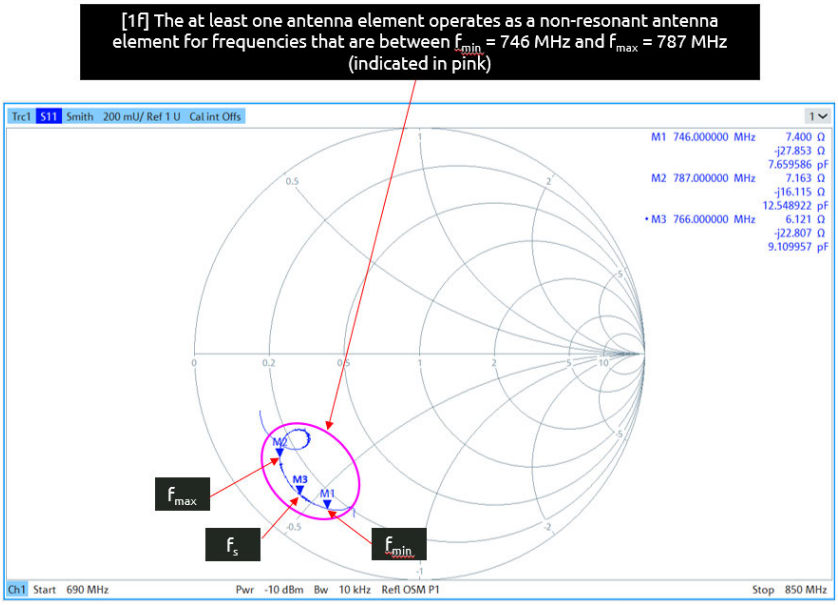
Product: OBD2 LTE/3G/GPS/WIFI/BT tracker
Brand: Verizon Telematics Inc.
Test Model: VT-410
Sample Status: Production Unit
Applicant: Verizon Connect.
Date of Evaluation: Apr. 24, 2018
Standards: FCC Part 2 (Section 2.1091)
KDB 447498 D01 General RF Exposure Guidance v06
IEEE C95.1-1992

Antenna Type	Frequency Band (MHz)
Metal	WCDMA II 1852.4-1907.6
	WCDMA V 826.4-846.6
	LTE 2 1850.7-1909.3
	LTE 4 1710.7-1754.3
	LTE 5 824.7-846.5
	LTE 12 699.7-715.3
	LTE 13 779.5-784.5
	LTE 17 706.5-713.5
	2412-2462
	5180-5240
	5745-5825
	Bluetooth 2402-2480

Source: FCC

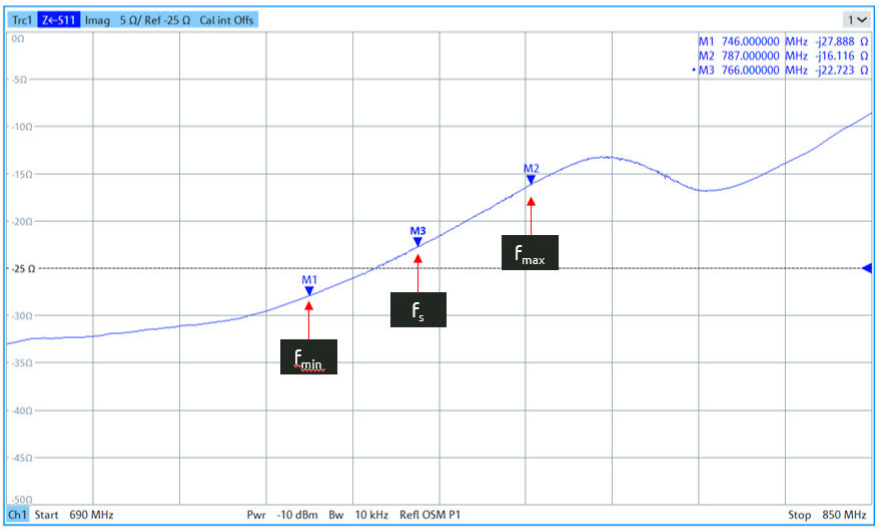
f. the at least one antenna element operates as a non-resonant antenna element for

frequencies that are not lower than the lower frequency limit (f_{min}) and not higher than the higher frequency limit (f_{max}) so that an imaginary part of an input impedance of the at least one antenna element is not equal to zero for any frequency that is not lower than the lower frequency limit (f_{min}) and not higher than the higher frequency limit (f_{max});



g. and the at least one antenna element is configured so that the imaginary part of the input impedance for any selected frequency not lower than the lower frequency limit (f_{min}) and not higher than the higher frequency limit (f_{max}) is closer to zero than the imaginary part of the input impedance for any frequency not lower than the lower frequency limit (f_{min}) and lower than the selected frequency.

[1g] The at least one antenna element is configured so that the imaginary part of the input impedance for any selected frequency f_s between f_{min} and f_{max} is closer to zero than the imaginary part of the input impedance for any frequency between f_{min} and f_s



44. In addition to directly infringing the ’908 Patent, Defendants indirectly infringe at least claim 1 of the ’908 Patent by active inducement under 35 U.S.C. § 271(b). Defendants have induced, caused, urged, encouraged, aided, and abetted their direct and indirect customers, and/or one or more business partners, to make, use, sell, offer for sale, and/or import Infringing Products. Defendants have done so by acts including but not limited to selling Infringing Products to their customers; marketing Infringing Products; and providing instructions and technical support (available via, e.g., https://www.verizon.com/connected-devices/hum-plus-gen-2/ [https://perma.cc/638X-HFXP] (last accessed 12/6/2024)) for the use of Infringing Products. Such conduct by Defendants was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

45. The acts of infringement by Defendants have caused damage to Fractus, and Fractus is entitled to recover from Defendants the damages sustained by Fractus as a result of Defendants’ wrongful acts in an amount subject to proof at trial. The infringement of Fractus’s exclusive rights

under the ’908 Patent by Defendants has damaged and will continue to damage Fractus, causing irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

INFRINGEMENT OF U.S. PATENT NO. 8,810,458

46. On August 19, 2014, the ’458 Patent was duly and legally issued for an invention entitled “Handheld Device with Two Antennas, and Method of Enhancing the Isolation Between the Antennas.” A true and correct copy of the ’458 Patent is attached as Exhibit 3.

47. The ’458 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

48. The ’458 Patent describes a wireless device comprising a first antenna arranged to operate in mobile communications and a second antenna arranged to operate in mobile communications and/or wireless connectivity services. The ’458 Patent also relates to enhancement of the isolation between first and second antennas in a wireless device.

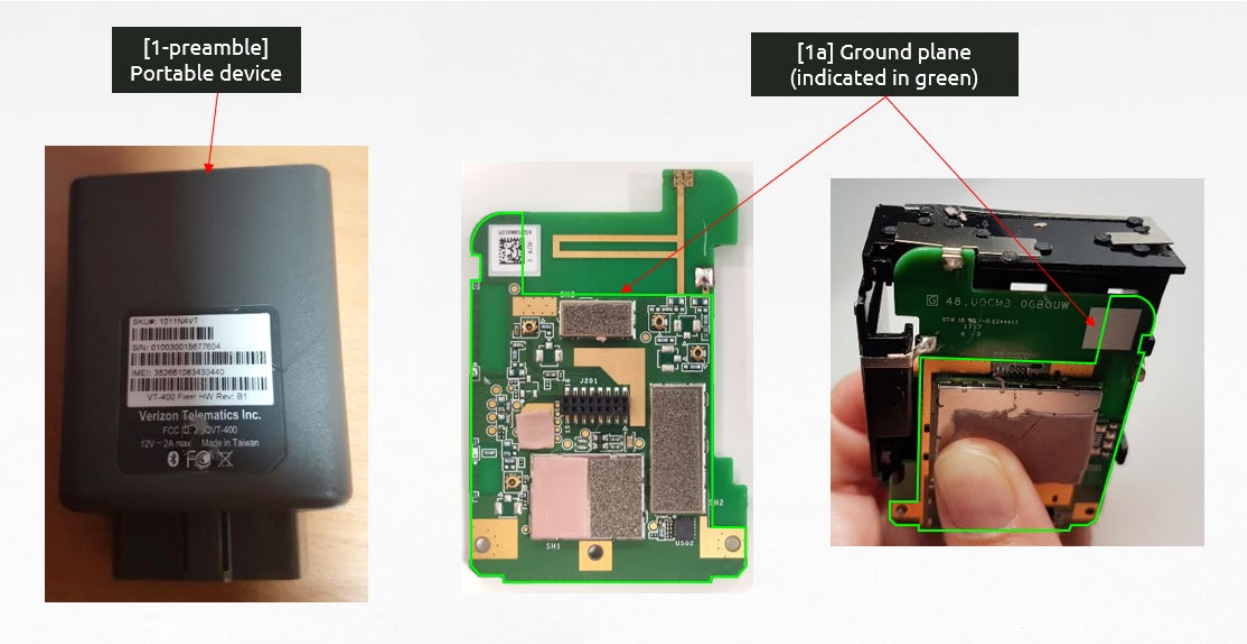
49. As one example, claim 1 of the ’458 Patent recites:

> A wireless handheld or portable device comprising:
>
> a ground plane;
>
> the ground plane is inscribed in a rectangular area comprising a first side and a second side, a length of the second side being greater than a length of the first side;
>
> a first antenna configured to transmit and receive electromagnetic waves corresponding to at least three frequency bands;
>
> the at least three frequency bands being used for mobile communication services;
>
> a second antenna configured to receive electromagnetic waves corresponding to at least one frequency band;
>
> the at least one frequency band being used for wireless connectivity services;
>
> the first antenna extends in a direction substantially parallel to the first side;
>
> the second antenna extends in a direction substantially parallel to the second side;
>
> the first antenna is arranged substantially close to the first side; and
>
> the first antenna and the second antenna are located internally within the wireless handheld or portable device.

50. Defendants have directly infringed and continue to infringe at least claim 1 of the ’458 Patent in violation of 35 U.S.C. § 271(a) by their manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to telematics devices. As detailed below, the Infringing Products meet every limitation of the relevant claims of the ’458 Patent literally or under the doctrine of equivalents.[5]

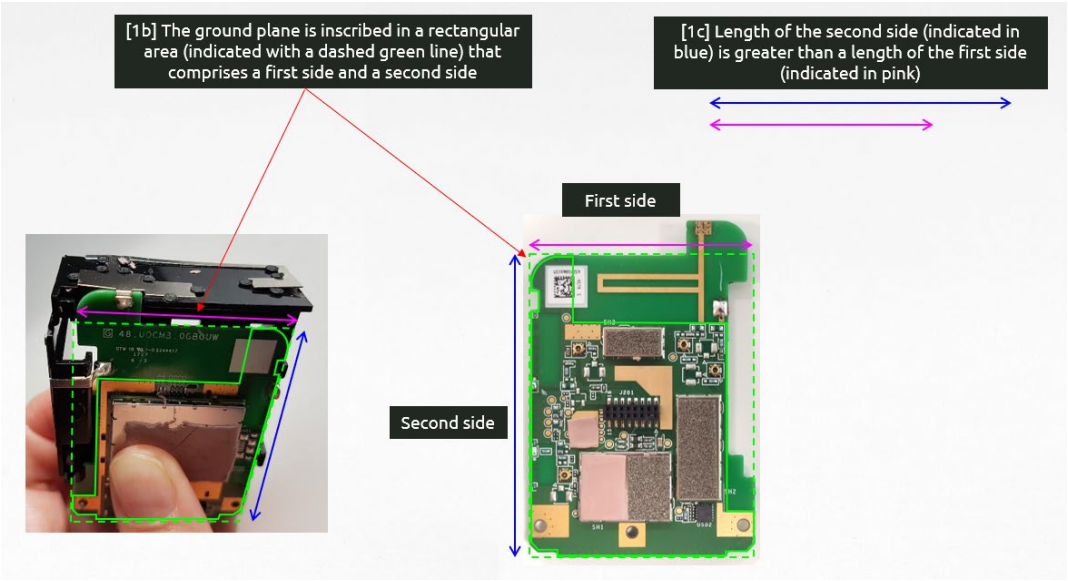
51. As an example, the VT-400 satisfies all claim limitations of at least claim 1 of the ’458 Patent.

a. A wireless handheld or portable device comprising: a ground plane;

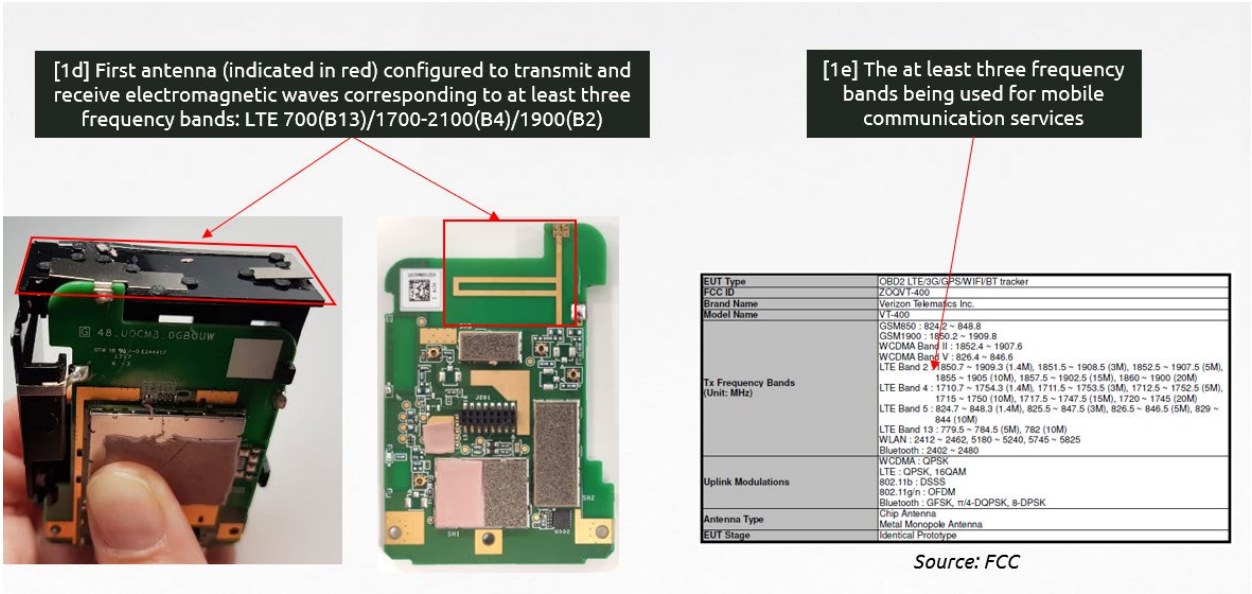


b. the ground plane is inscribed in a rectangular area comprising a first side and a second side, a length of the second side being greater than a length of the first side;

[5] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the ’458 Patent.

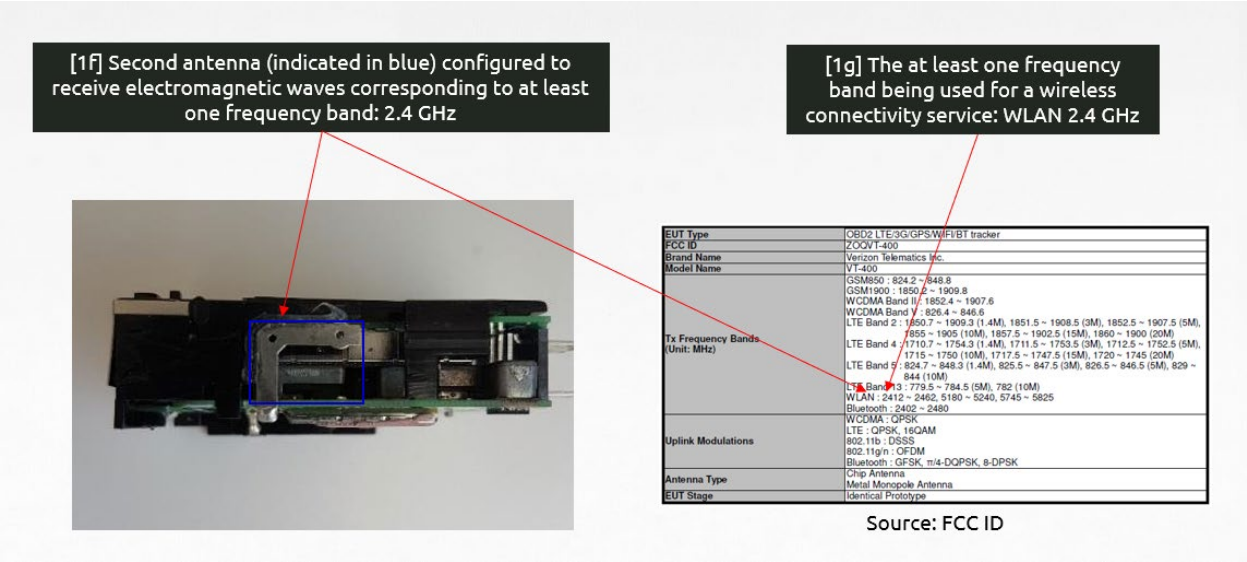


c. a first antenna configured to transmit and receive electromagnetic waves corresponding to at least three frequency bands; the at least three frequency bands being used for mobile communication services;

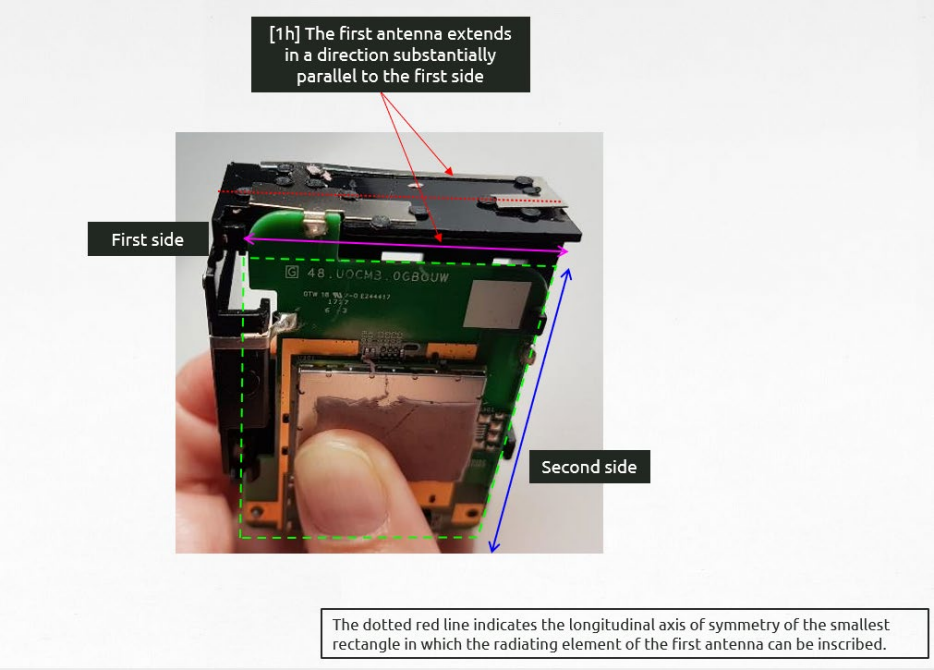


d. a second antenna configured to receive electromagnetic waves corresponding to at least one frequency band; the at least one

frequency band being used for wireless connectivity services;

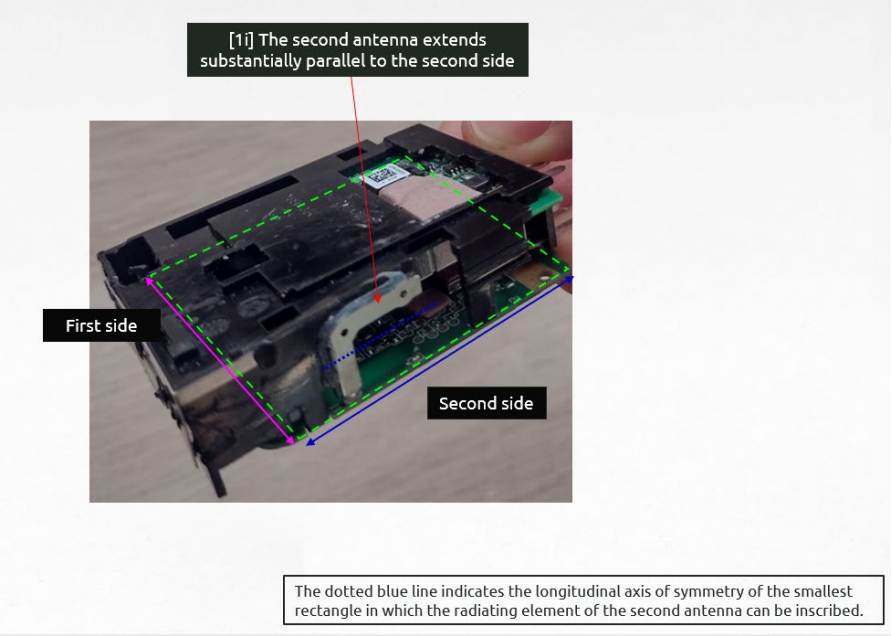


e. the first antenna extends in a direction substantially parallel to the first side;

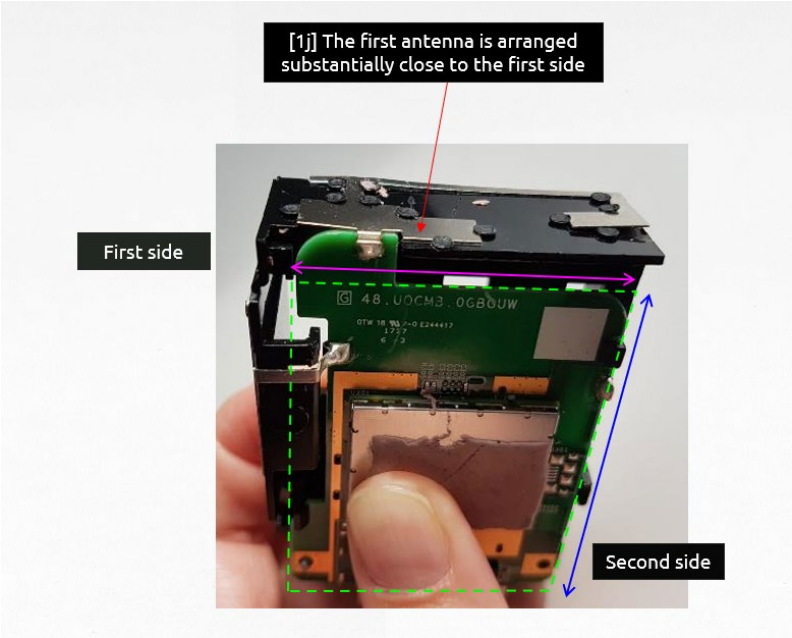


f. the second antenna extends in a direction substantially parallel to the

second side;

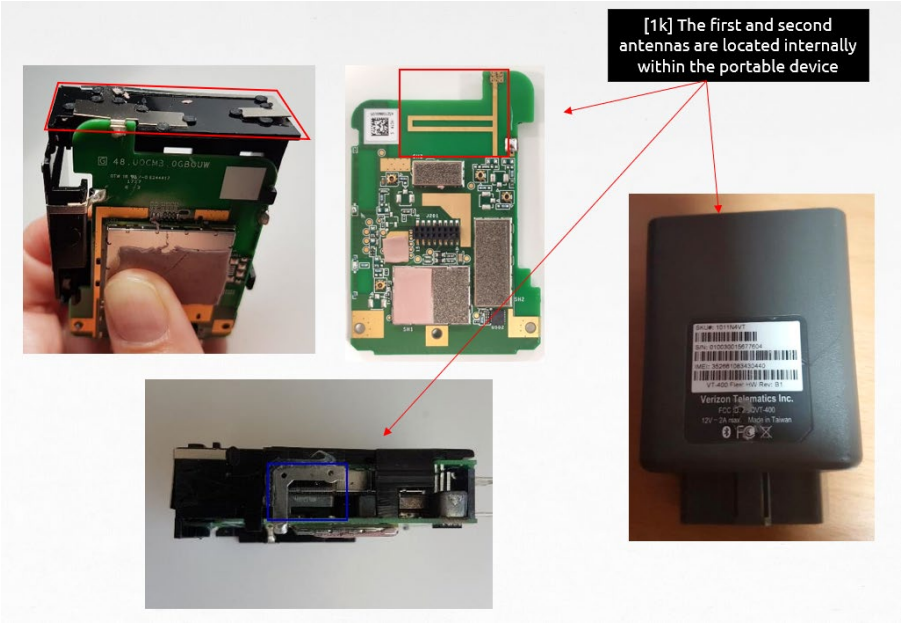


g. the first antenna is arranged substantially close to the first side;



h. and the first antenna and the second antenna are located internally

within the wireless handheld or portable device.



52. In addition to directly infringing the ’458 Patent, Defendants indirectly infringe at least claim 1 of the ’458 Patent by active inducement under 35 U.S.C. § 271(b). Defendants have induced, caused, urged, encouraged, aided, and abetted their direct and indirect customers, and/or one or more business partners, to make, use, sell, offer for sale, and/or import Infringing Products. Defendants have done so by acts including but not limited to selling Infringing Products to their customers; marketing Infringing Products; and providing instructions, technical support, and direct links to vendor websites (available via, e.g., https://install.verizonconnect.com/hc/en-us/articles/4989624421907-Installation-guide-VT-400-light-duty-vehicles [https://perma.cc/8LN5-F6N3] (last accessed 12/6/2024)) for the use of Infringing Products. Such conduct by Defendants was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

53. The acts of infringement by Defendants have caused damage to Fractus, and Fractus is entitled to recover from Defendants the damages sustained by Fractus as a result of Defendants’

wrongful acts in an amount subject to proof at trial. The infringement of Fractus's exclusive rights under the '458 Patent by Defendants has damaged and will continue to damage Fractus, causing irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

INFRINGEMENT OF U.S. PATENT NO. 11,031,677

54. On June 8, 2021, the '677 Patent was duly and legally issued for an invention entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices." A true and correct copy of the '677 Patent is attached as Exhibit 4.

55. The '677 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code.

56. The '677 Patent generally describes a wireless device which includes an antenna system.

57. For example, claim 1 of the '677 Patent recites:

A wireless device comprising:

an antenna system comprising:

a ground plane;

a first antenna within the wireless device and configured to support at least three frequency bands contained within first and second frequency ranges of the electromagnetic spectrum, the second frequency range being higher in frequency than the first frequency range and at least one of the three frequency bands being associated with a 4G communication standard, the first antenna being proximate to a first short side of a ground plane rectangle enclosing the ground plane and defining a first antenna contour comprising an entire perimeter of the first antenna, wherein the first antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and complexity factor F_{32} having a value less than 1.75; and

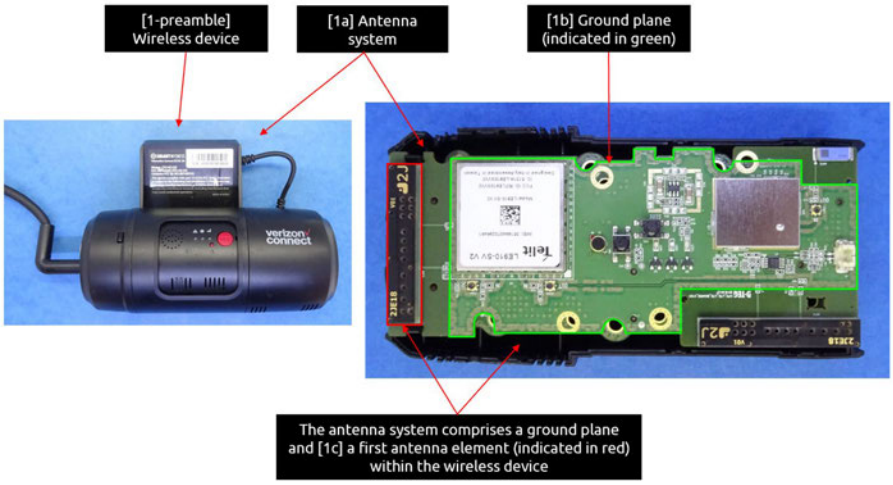
a second antenna within the wireless device and configured to support at least one frequency band different from the at least three frequency bands supported by the first antenna, the second antenna being arranged completely within the ground plane rectangle.

58. Defendants have directly infringed and continue to infringe at least claim 1 of the

’677 Patent in violation of 35 U.S.C. § 271(a) by their manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to telematics devices. As detailed below, the Infringing Products meet every limitation of the relevant claims of the ’677 Patent literally or under the doctrine of equivalents.[6]

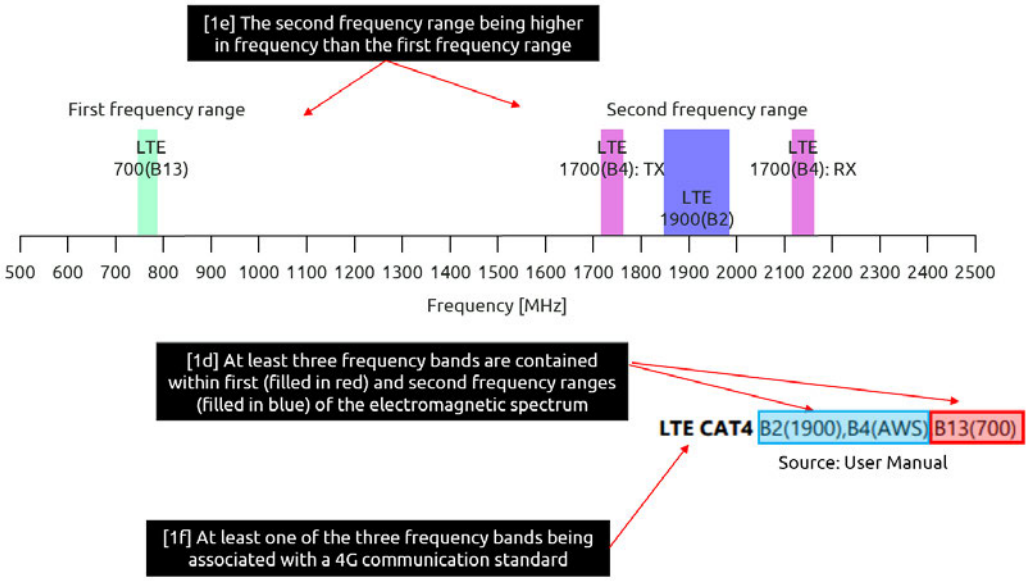
59. As an example, the SmartWitness CP2 (CP2-VZ-LTE) satisfies all claim limitations of at least claim 1 of the ’677 Patent.

a. A wireless device comprising: an antenna system comprising: a ground plane; a first antenna within the wireless device

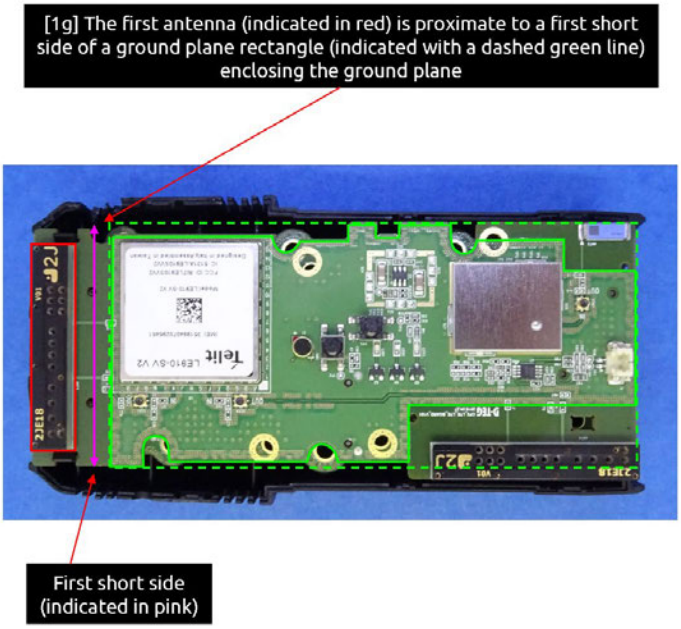


b. and configured to support at least three frequency bands contained within first and second frequency ranges of the electromagnetic spectrum, the second frequency range being higher in frequency than the first frequency range and at least one of the three frequency bands being associated with a 4G communication standard,

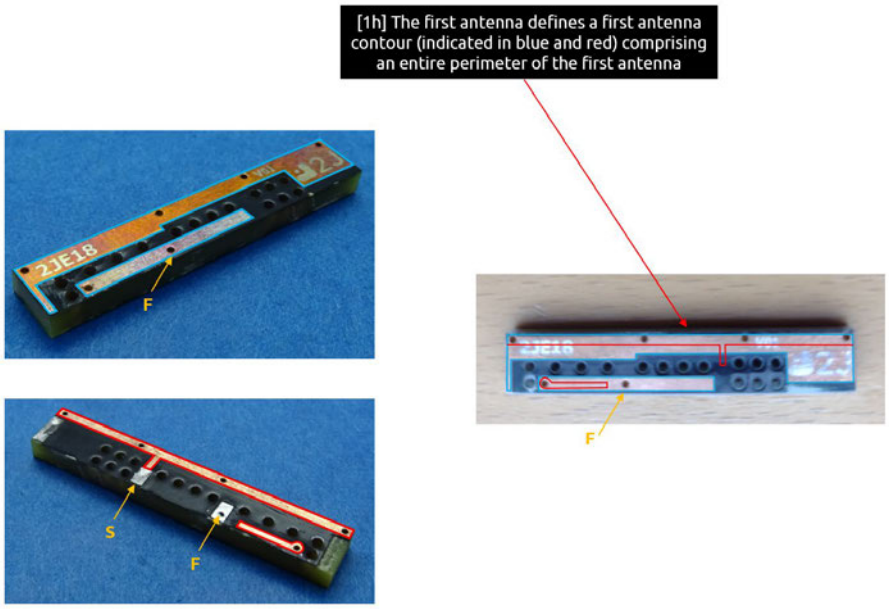
[6] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the ’677 Patent.



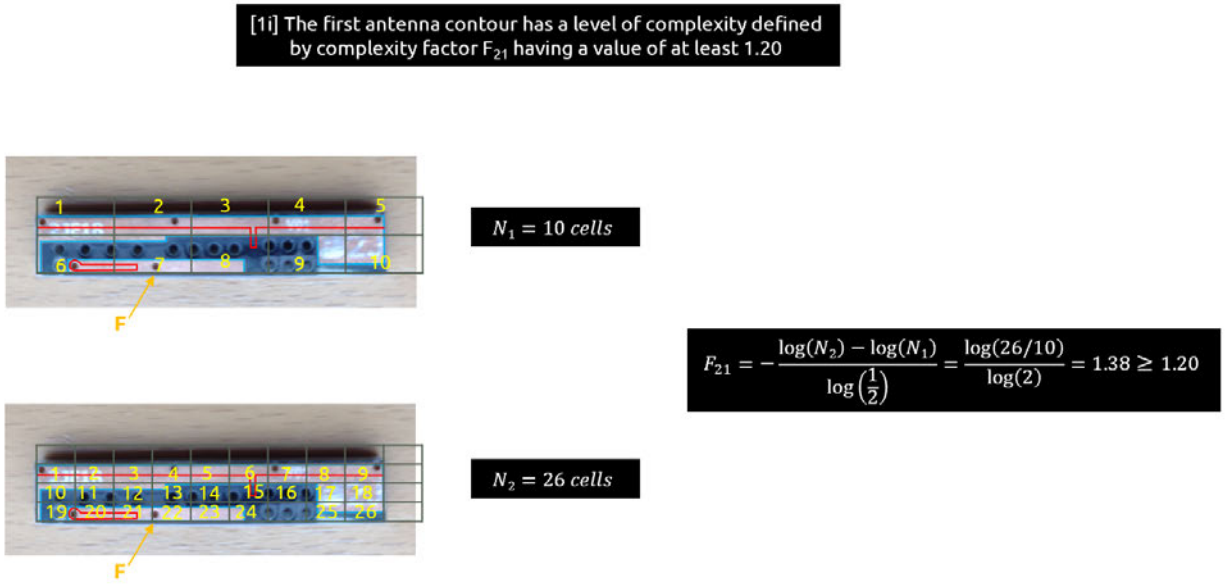
c. the first antenna being proximate to a first short side of a ground plane rectangle enclosing the ground plane and defining a first antenna contour comprising an entire perimeter of the first antenna,



d. defining a first antenna contour comprising an entire perimeter of the first antenna,

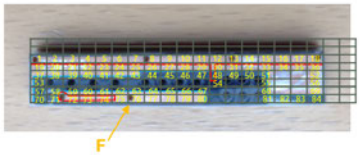


e. wherein the first antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and



f. complexity factor F_{32} having a value less than 1.75;

[1j] The first antenna contour has a level of complexity defined by complexity factor F_{32} having a value less than 1.75



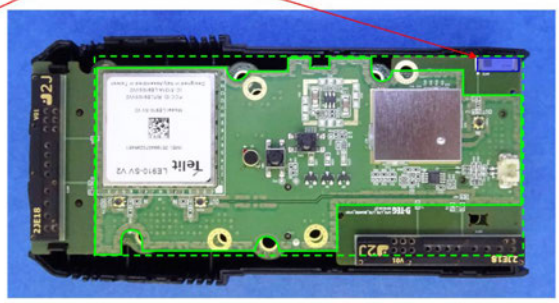
$N_3 = 84\ cells$

$$F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log\left(\frac{1}{2}\right)} = \frac{\log(84/26)}{\log(2)} = 1.69 < 1.75$$

$N_2 = 26\ cells$

g. and a second antenna within the wireless device and

[1k] The antenna system comprises a second antenna (indicated in blue) within the wireless device



h. configured to support at least one frequency band different from the at least three frequency bands supported by the first antenna, the second antenna being arranged completely within the ground plane rectangle.

[1l] The second antenna is configured to support at least one frequency band (2.4 GHz) different from the at least three frequency bands supported by the first antenna

[1m] The second antenna is arranged completely within the ground plane rectangle

TECHNICAL SPECIFICATIONS

Image sensor	2 Megapixel CMOS Sensor
Angle of View	150° (H : 121.1°, V : 62.4° ±5%)
Wireless	LTE CAT4 B2(1900),B4(AWS),B13(700) WiFi (802.11 b/g/n) and Bluetooth (4.2)
Max Data Rate	UL:5.76Mbps, DL : 7.2Mbps
Video resolution	1080p(1920x1080), 720p(1280x720), VGA(640x480) 2nd camera: D1(720x480)
Recording Speed	CH1: FHD (30fps) CH1 + CH2: FHD (15fps) +D1 (30fps)
Recording Mode	Continuous , Event, Dual Mode
Memory	Supports SD Cards up to 128GB (FAT32)
GPS/GLONASS	Internal GPS /GLONASS

Source: user manual

1.4. Description of EUT

Kind of Product	Vehicle Recorder
Model Name	CP2-VZ-LTE
Power Supply	DC 12 V, DC 24 V
Frequency Range	2 402 ㎒ ~ 2 480 ㎒ (Bluetooth, Bluetooth Low Energy) 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20) 2 422 ㎒ ~ 2 452 ㎒ (11n_HT40)

Source: FCC

60. In addition to directly infringing the ’677 Patent, Defendants indirectly infringe at least claim 1 of the ’677 Patent by active inducement under 35 U.S.C. § 271(b). Defendants have induced, caused, urged, encouraged, aided, and abetted their direct and indirect customers, and/or one or more business partners, to make, use, sell, offer for sale, and/or import Infringing Products. Defendants have done so by acts including but not limited to selling Infringing Products to their customers; marketing Infringing Products; and providing instructions and technical support (available via, e.g., https://opendevelopment.verizonwireless.com/device-showcase/device/9294 [https://perma.cc/V43V-5GYP] (last accessed 12/6/2024)) for the use of Infringing Products. Such conduct by Defendants was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

61. The acts of infringement by Defendants have caused damage to Fractus, and Fractus is entitled to recover from Defendants the damages sustained by Fractus as a result of Defendants’ wrongful acts in an amount subject to proof at trial. The infringement of Fractus’s exclusive rights under the ’677 Patent by Defendants has damaged and will continue to damage Fractus, causing

irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

INFRINGEMENT OF U.S. PATENT NO. 12,095,149

62. On September 17, 2024, the '149 Patent was duly and legally issued for an invention entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices." A true and correct copy of the '149 Patent is attached as Exhibit 5.

63. The '149 Patent is valid, enforceable, and was duly issued in full compliance with Title 35 of the United States Code. The '149 Patent is a continuation of U.S. Patent No. 11,349,200.

64. The '149 Patent describes a wireless device which includes an antenna system.

65. As one example, claim 7 of the '149 Patent recites:

A wireless device comprising:

> a ground plane;
>
> a first non-planar antenna proximate to a first side of a ground plane rectangle enclosing the ground plane, the first non-planar antenna being configured to support at least three frequency bands of the electromagnetic spectrum, a minimum-sized parallelepiped completely enclosing a volume of the first non-planar antenna, the minimum-sized parallelepiped having a face with a largest area;
>
> a second antenna proximate to a second side of the ground plane rectangle, and wherein the second antenna is configured to receive signals from at least two frequency bands of the at least three frequency bands;
>
> wherein the first non-planar antenna has a first contour defined as a perimeter of any portions of the first non-planar antenna arranged in the face, perimeters of any closed apertures of any portions of the first non-planar antenna arranged in the face, a perimeter of an orthogonal projection onto the face of any portions of the first non-planar antenna that are not arranged in the face, and perimeters of any closed apertures of the orthogonal projection;
>
> wherein the first contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and complexity factor F_{32} having a value of at least 1.35; and

wherein the complexity factors F_{21} and F_{32} are given by:

$$F_{21} = -\frac{\log(N_2) - \log(N_1)}{\log(1/2)} \quad F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log(1/2)}$$

where N_1 is a number of cells of a grid G_1 that include at least a point of the first contour, N_2 is a number of cells of a grid G_2 that include at least a point of the first contour, and N_3 is a number of cells of a grid G_3 that include at least a point of the first contour,

the grid G_2 divides the face into nine columns of equal width arranged along a long side of the face and an odd number of rows of equal height arranged along a short side of the face, wherein the number of rows results in the cells of grid G_2 being as square as possible,

the grid G_1 being aligned with a corner of the grid G_2 to cover the face, the cells of grid G_1 having widths and heights that respectively are double the widths and heights of the cells of the grid G_2, and

the grid G_3 being aligned with the grid G_2, the cells of the grid G_3 having widths and heights that respectively are half the widths and heights of the cells of the grid G_2, and

wherein the level of complexity of the first contour is configured to provide operation of the wireless device in the at least three frequency bands.

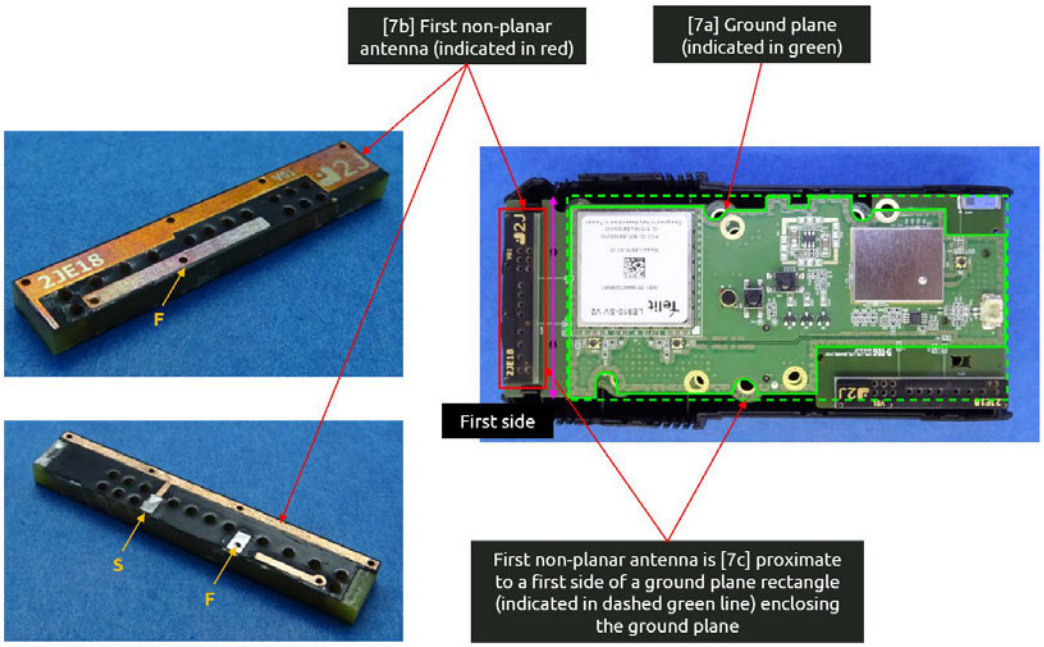
66. Defendants have directly infringed and continue to infringe at least claim 7 of the ’149 Patent in violation of 35 U.S.C. § 271(a) by their manufacture, use, sale, importation, and/or offer for sale of Infringing Products, including but not limited to telematics devices. As detailed below, the Infringing Products meet every limitation of the relevant claims of the ’149 Patent literally or under the doctrine of equivalents.[7]

67. As an example, the SmartWitness CP2 (CP2-VZ-LTE) satisfies all claim limitations of at least claim 7 of the ’149 Patent.

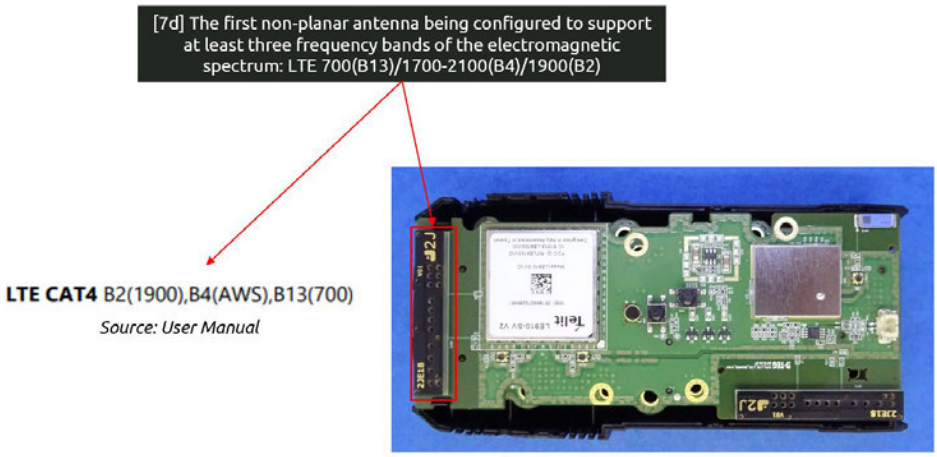
[7] This description is illustrative and is not intended to be an exhaustive or limiting explanation of every manner in which each Infringing Product infringes the ’149 Patent.

a. A wireless device comprising:

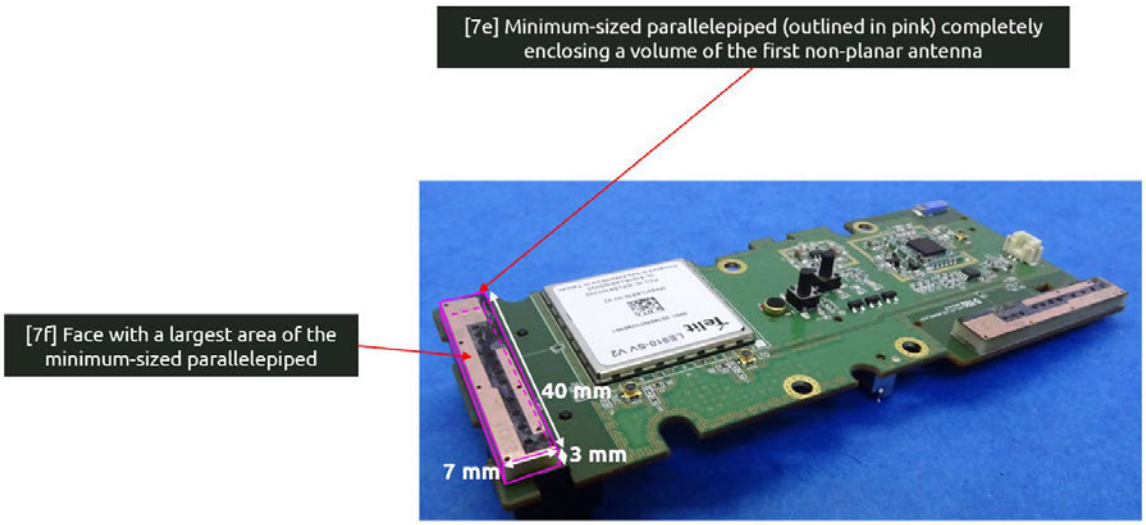
b. a ground plane; a first non-planar antenna proximate to a first side of a ground plane rectangle enclosing the ground plane;



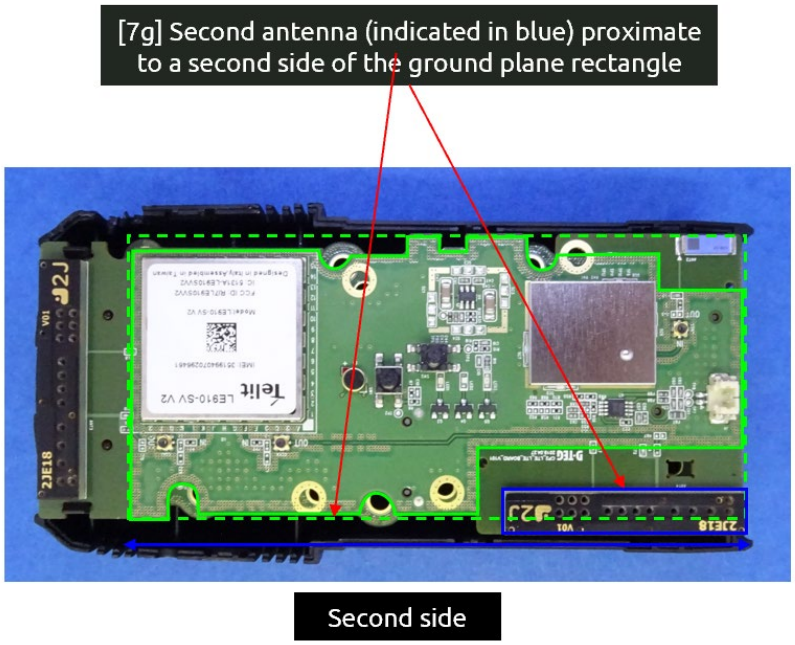
c. the first non-planar antenna being configured to support at least three frequency bands of the electromagnetic spectrum;



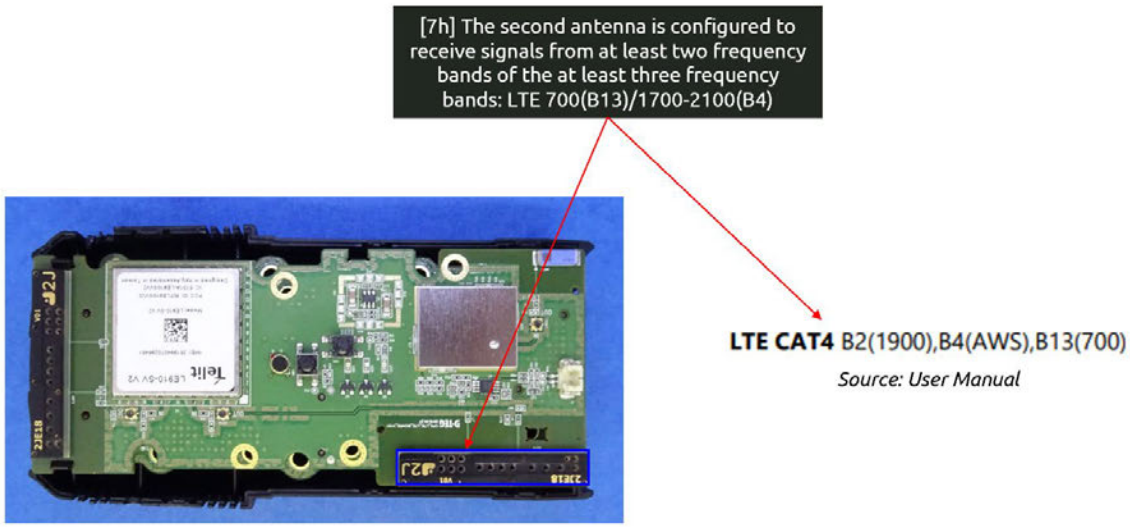
d. a minimum-sized parallelepiped completely enclosing a volume of the first non-planar antenna, the minimum-sized parallelepiped having a face with a largest area;



e. a second antenna proximate to a second side of the ground plane rectangle, and;

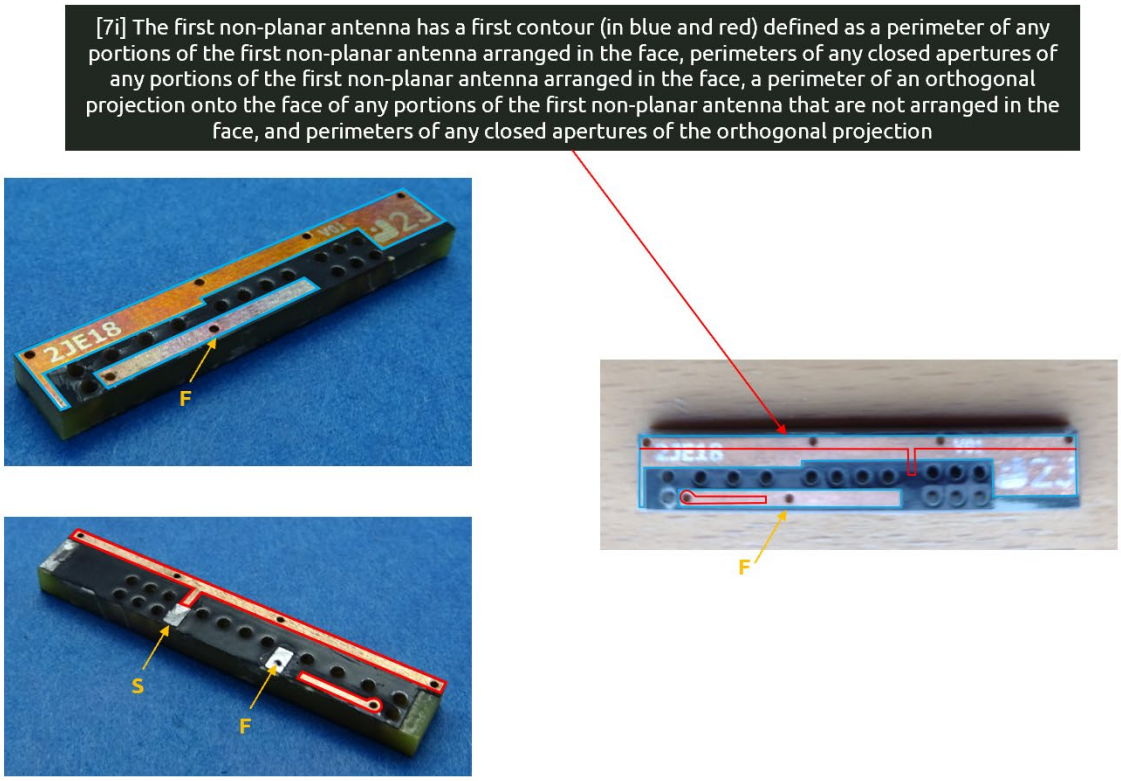


f. wherein the second antenna is configured to receive signals from at at least two frequency bands of the at least three frequency bands;



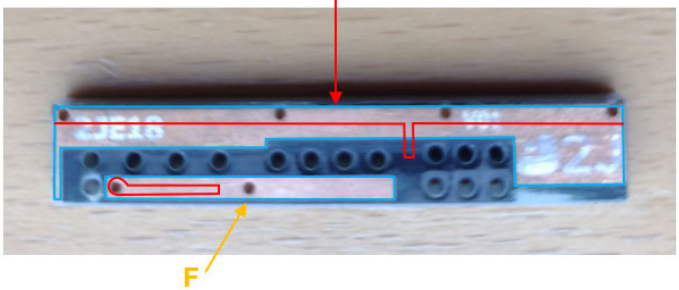
g. wherein the first non-planar antenna has a first contour defined as a perimeter of any portions of the first non-planar antenna arranged in the face, perimeters of any closed apertures of any portions of the first non-planar antenna arranged in the face, a

perimeter of an orthogonal projection onto the face of any portions of the first non-planar antenna that are not arranged in the face, and perimeters of any closed apertures of the orthogonal projection;



h. wherein the first contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and complexity factor F_{32} having a value of at least 1.35;

[7j] The first contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and [7k] complexity factor F_{32} having a value of at least 1.35



$$F_{21} = -\frac{\log(N_2) - \log(N_1)}{\log\left(\frac{1}{2}\right)} = \frac{\log(26/10)}{\log(2)} = 1.38 \geq 1.20$$

$$F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log\left(\frac{1}{2}\right)} = \frac{\log(84/26)}{\log(2)} = 1.69 \geq 1.35$$

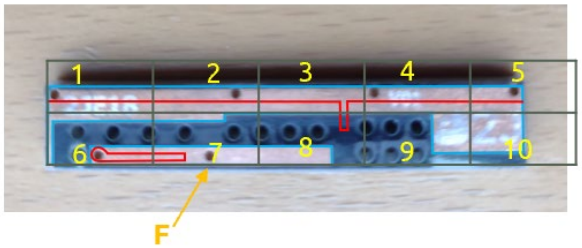
i. wherein the complexity factors F_{21} and F_{32} are given by:

$$F_{21} = -\frac{\log(N_2) - \log(N_1)}{\log(1/2)}$$

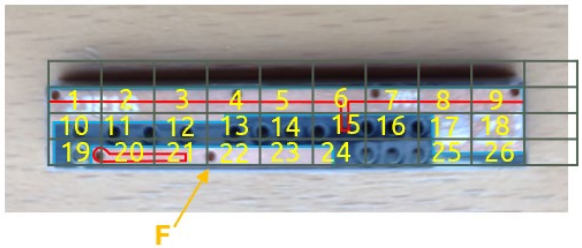
$$F_{32} = -\frac{\log(N_3) - \log(N_2)}{\log(1/2)}$$

where N1 is a number of cells of a grid G1 that include at least a point of the first contour, N2 is a number of cells of a grid G2 that include at least a point of the first contour, and N3 is a number of cells of a grid G3 that include at least a point of the first contour, the grid G2 divides the face into nine columns of equal width arranged along a long side of the face and an odd number of rows of equal height arranged along a short side of the face, wherein the number of rows results in the cells of grid

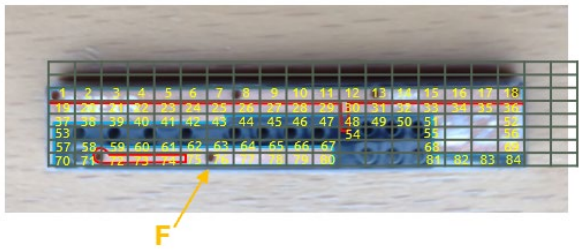
G2 being as square as possible, the grid G1 being aligned with a corner of the grid G2 to cover the face, the cells of grid G1 having widths and heights that respectively are double the widths and heights of the cells of the grid G2, and the grid G3 being aligned with the grid G2, the cells of the grid G3 having widths and heights that respectively are half the widths and heights of the cells of the grid G2, and



$N_1 = 10\ cells$

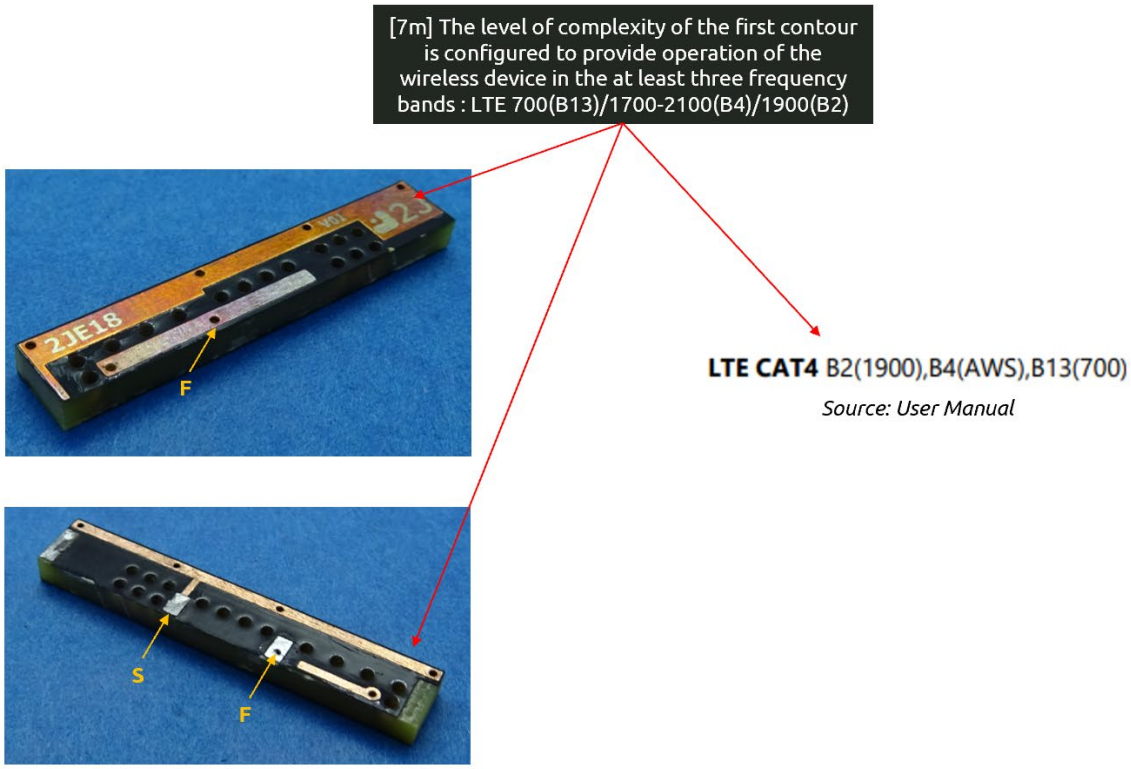


$N_2 = 26\ cells$



$N_3 = 84\ cells$

j. wherein the level of complexity of the first contour is configured to provide operation of the wireless device in the at least three frequency bands.



68. In addition to directly infringing the '149 Patent, Defendants indirectly infringe at least claim 7 of the '149 Patent by active inducement under 35 U.S.C. § 271(b). Defendants have induced, caused, urged, encouraged, aided, and abetted their direct and indirect customers, and/or one or more business partners, to make, use, sell, offer for sale, and/or import Infringing Products. Defendants have done so by acts including but not limited to selling Infringing Products to their customers; marketing Infringing Products; and providing instructions and technical support (available via, e.g., https://opendevelopment.verizonwireless.com/device-showcase/device/9294 [https://perma.cc/V43V-5GYP] (last accessed 12/6/2024)) for the use of Infringing Products. Such conduct by Defendants was intended to and actually resulted in direct infringement, including the making, using, selling, offering for sale, and/or importation of Infringing Products in the United States.

69. The acts of infringement by Defendants have caused damage to Fractus, and Fractus

is entitled to recover from Defendants the damages sustained by Fractus as a result of Defendants' wrongful acts in an amount subject to proof at trial. The infringement of Fractus's exclusive rights under the '149 Patent by Defendants has damaged and will continue to damage Fractus, causing irreparable harm, for which there is no adequate remedy at law, unless enjoined by this Court.

PRAYER FOR RELIEF

WHEREFORE, Fractus prays for judgment against Verizon as follows:

a. A judgment in favor of Fractus that Verizon has infringed and is infringing either literally and/or under the doctrine of equivalents, the Patents-in-Suit;

b. An Order permanently enjoining Verizon, its respective officers, agents, employees, and those acting in privity with it, from further direct and/or indirect infringement of the Patents-in-Suit;

c. An award of damages to Fractus arising out of (1) Verizon's past infringement of the Patents-in-Suit, (2) Verizon's on-going infringement of the Patents-in-Suit, and (3) enhanced damages pursuant to 35 U.S.C. § 284, together with prejudgment and post-judgment interest, in an amount according to proof;

d. An award of attorney fees pursuant to 35 U.S.C. § 285 or as otherwise permitted by law; and

e. Granting Fractus its costs and further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Federal Rule of Civil Procedure 38(b), Fractus hereby demands a trial by jury on all issues triable by jury.

Dated: December 6, 2024

Respectfully submitted,

By: */s/ Max L. Tribble*

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