EXHIBIT 1

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

FRACTUS, S.A.,	§	
	§	
	§	**Civil Action No. 2:22-cv-00412-JRG**
v.	§	**(Lead Case)**
	§	
ADT LLC d/b/a ADT SECURITY SERVICES	§	Jury Trial Requested
	§	

FRACTUS, S.A.,	§	
	§	
	§	**Civil Action No. 2:22-cv-00413-JRG**
v.	§	**(Member Case)**
	§	
VIVINT, INC.	§	Jury Trial Requested
	§	

EXPERT DECLARATION OF STUART A. LONG

I, Dr. Stuart A. Long, submit this Declaration pursuant to 28 U.S.C. § 1746 and declare as follows:

Introduction:

1. I have personal knowledge of facts stated in this Declaration, and if called upon as a witness, could and would testify competently thereto.
2. I have been retained as an expert in the above-captioned action on behalf Plaintiff Fractus, S.A. ("Fractus").
3. I am being compensated at my customary hourly rate, and my compensation is not contingent on the outcome of this proceeding. I have no other interest in this litigation or the parties.

Qualifications:

4. My qualifications for forming the opinions set forth in this Declaration are summarized here and explained in more detail in my *curriculum vitae*, which is attached hereto as Exhibit A. Exhibit A also includes a list of my publications.

5. I have studied, taught, and practiced electrical engineering for over 50 years. I hold degrees from Rice University (Bachelor of Arts in Electrical Engineering, *magna cum laude*, 1967, Master of Electrical Engineering, 1968) and Harvard University (Ph.D. in Applied Physics specializing in Applied Electromagnetics, 1974). I have been a registered Professional Engineer in the State of Texas since 1986.
6. I worked at Collins Radio Corporation in Dallas, Texas, in the amplifier design group during the summer of 1967, just after graduating with a Bachelor's degree from Rice University. After returning to Rice University and graduating with a Master's degree in 1968, I worked for General Dynamics in Fort Worth, Texas, in their antenna design group developing aircraft antennas until 1969. At that time, I enrolled in graduate school at Harvard University, where I was both a teaching assistant and a research assistant. During the summers of 1970 and 1971, I worked at the Los Alamos Scientific Laboratories in Los Alamos, New Mexico, designing and developing antennas and other sensing devices for the linear proton accelerator being constructed at the time. After receiving a Ph.D. from Harvard University in 1974, I joined the faculty of the Department of Electrical Engineering at the University of Houston, located in Houston, Texas, as an Assistant Professor. I was promoted to Associate Professor with tenure in 1979, and to Full Professor in 1985. I served as Acting Chair of the Department of Electrical Engineering from 1981–1983, and then as permanent Chair from 1983–1995. From 1995–1998, I served as Associate Dean of the College of Engineering, and then again as Interim Chair of the Department of Electrical and Computer Engineering from 1998–1999. I returned to serve as Associate Dean of Engineering from 2000–2008. I then served as Interim Dean of the Honors College from 2008–2009, and as Interim Vice Chancellor/Vice President for Research and Technology Transfer from 2010–2011. Since 2006, I have been Associate Dean for Undergraduate Research and the Honors College, and continue my academic duties as a Professor in the Department of Electrical and Computer Engineering.
7. During my career at the University of Houston, I have taught the following classes: Applied Electromagnetics, Electromagnetic Waves, Antenna Engineering, Microwave Engineering, Electromagnetics Laboratory, Scattering and Diffraction of Electromagnetic Waves, Microwave Methods of Nondestructive Evaluation, Advanced Topics in Electromagnetic Waves, and Fundamentals of Electrical Networks. Most recently, I have

concentrated on teaching the Electromagnetic Waves course and the Antenna Engineering course.

8. I have authored over 80 peer reviewed journal articles, have presented over 140 conference papers, and have contributed chapters to four books. I have served as a technical reviewer for books published by Harper & Row, John Wiley, Holt, Reinhart, & Winston, MacMillan, McGraw-Hill, Wadsworth, PWS, and Oxford University Press. In addition, I have reviewed journal articles for *IEEE Transactions on Antennas and Propagation; Electronics Letters; Radio Science; Electromagnetics; Archiv Fur Elektronik Und Uber Tragungstechnik; Journal of Electromagnetic Waves and Applications; IEEE Transactions on Electromagnetic Compatibility; IEEE Transactions on Vehicular Communications; IEE Proceedings-H Microwaves, and Antennas and Propagation; Microwave and Millimeter-Wave Computer-Aided Engineering; IEEE Antennas and Wireless Propagation Letters; Microwave and Wireless Components Letters;* and *IEEE Antennas and Propagation Magazine.*
9. I have served my professional society, the Institute of Electrical and Electronic Engineers (IEEE) in the following capacities: Chairman of Houston Chapter of the IEEE group on Antennas, Microwaves, Magnetics, and Electron Devices, 1976–1989; Meetings Chairman, IEEE Antennas and Propagation Society, 1980–1988; President of the IEEE Antennas and Propagation Society, 1996; IEEE Periodicals Review Committee, 1998–1999; Elected Member of IEEE Antennas and Propagation Society Administrative Committee, 1982–1985, 1990–1992, 1995–2000; Antennas and Propagation Society Awards Committee, 1989–2005; Chair, Joint Antennas and Propagation Society/URSI International Meetings Committee, 2002–2004; IEEE Women in Engineering Committee, liaison member, 2002–2005, Vice Chair, IEEE Fellows Committee, 2003; IEEE Board of Directors, Director Division IV, 2005–2006; IEEE Spectrum Editorial Board, 1999–2006; IEEE Fellows Committee, 2002–2007; IEEE Antennas and Propagation Society National Meetings Coordinator, 1988–2021; Chair, Houston IEEE Chapter AP-S, MTT, ED Societies, 2009–present; IEEE International Symposium on Antennas and Propagation, Technical Program Committee, 2009–2022.
10. I have been elected as a member to numerous prestigious societies, including: Phi Beta Kappa, 1966; Tau Beta Pi, 1966; and Sigma Xi, 1968. I was named a Member of the

Electromagnetics Academy in 1990, and became a Fellow of the IEEE in 1991 and a Life Fellow in 2011.

11. I have been recognized with the following awards from the University of Houston: Kittinger/Halliburton Award as Outstanding Teacher in the College of Engineering, 1983; University Teaching Excellence Award, 1991; Engineering Alumni Association Distinguished Engineering Faculty Award, 1992, IEEE-HKN Outstanding Electrical Engineering Teacher, 1994; College of Engineering Senior Research Award, 1995, University of Houston Alumni Organization Outstanding Faculty Award, 2002, Fluor-Daniel Faculty Excellence Award, 2006; Career Teaching Award, College of Engineering, University of Houston, 2008; University Career Teaching Excellence Award, 2009; Esther Farfel Award, 2010; John and Rebecca Moores Professor, 2020.

12. In addition, I have received the following awards from agencies outside the University of Houston: Hamilton Award as outstanding engineering graduate at Rice University, 1968; NSF Fellowship, 1968; IEEE Antennas and Propagation Society Distinguished Lecturer, 1992-94; IEEE Millennium Medal, 2000; IEEE Region 5 Educator of the Year, 2003; IEEE Antennas and Propagation Society Outstanding Service Award, 2007; IEEE Antennas and Propagation Society's John Kraus Award, 2014; and the IEEE Antennas and Propagation Society Chen-To Tai Distinguished Educator Award, 2018.

Information Considered:

13. All of the opinions stated in this declaration are based on my personal knowledge, professional judgment, and my study of the information available to me at the time of its writing. If allowed under the Local Rules, however, I may update, supplement, or amend this declaration if additional information becomes available.

14. I have reviewed the following U.S. Patents: U.S. Patents No. 7,471,246 (the "'246 Patent"), No. 7,907,092 (the "'092 Patent"), No. 8,456,365 (the "'365 Patent"), No. 8,674,887 (the "'887 Patent"), No. 8,738,103 (the "'103 Patent"), No. 8,994,604 (the "'604 Patent"), No. 10,135,138 (the "'138 Patent"), No. 10,468,770 (the "'770 Patent"), and No. 11,349,200 (the "'200 Patent") (collectively, the "Fractus patents" or the "Patents-in-Suit"). I have also reviewed the file histories involving these patents.

Scope of My Work:

15. I have been asked by Fractus to provide an opinion relative to Defendants' claim construction based on indefiniteness and their proposed constructions for other terms. In response, I have analyzed the Patents-In-Suit to determine how a person of ordinary skill in the art on or around the relevant point in time for the patents would, in light of the specification of the patents and their respective disclosures, understand the meanings of the terms in Defendants' Patent Rule 4-2 Disclosures.

Ordinary Skill:

16. I understand that a person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. He or she is a person of ordinary creativity who understands the scientific and engineering principles applicable to the pertinent art. I am familiar with the knowledge and capabilities of one of ordinary skill in the art in the field of the Fractus patents at the time of the effective filing date of each Patent-In-Suit, respectively: July 15, 2002 for both the '092 and '246 Patents; September 10, 2002 for the '604, '138, and '770 Patents; December 22, 2002 for the '887 Patent; January 30, 2004 for the '365 Patent; and July 18, 2006 for the '103 and '200 Patents.
17. I understand that the "relevant point in time" for analyzing the perspective of a person of ordinary skill in the art varies for each patent in suit: July 15, 2002, the filing date of Application No. PCT/EP02/07836, the PCT patent application from which the '092 and '246 Patents claim priority; September 10, 2002, the filing date of PCT Application No. PCT/EP02/11355, the PCT patent application from which the '604, '138, and '770 Patents claim priority; December 22, 2002, the filing date of Application No. PCT/EP02/14706, the PCT Application from which the '887 Patent claims priority; January 30, 2004, the filing date of Provisional Application No. 60/540,450 from which the '365 Patent claims priority; and July 18, 2006, the filing date of EP 06117352, the European patent application from which the '103 and '200 Patents claim priority.
18. I am familiar with a number of individuals having that level of education and experience prior to and within the relevant time frame for each patent family as well as the curricula used in accredited electrical and computer engineering programs at U.S. universities during these time frames.

19. I have also reviewed the parties' respective preliminary claim constructions and identifications of intrinsic and extrinsic evidence.

Interpretation of the Patent Claims:

20. In formulating my opinions and conclusions in this case, I have reviewed the materials mentioned above, and through my discussions with counsel, I have gained a general understanding of the prevailing principles of U.S. patent law that govern the issues of patent claim interpretation, and which provide the accepted methodology for construing patent claim terms. Although I am not an attorney, I have applied these patent law principles to the best of my ability with respect to my analysis for each disputed claim term.

21. Given my background, training, and experience, I am familiar with the perspective of those of ordinary skill in the art from July 15, 2002 through July 18, 2006, which I understand to be the range of priority dates for the patent claims in this case. I understand that "the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the invention." *Philips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005). Moreover, I understand that the effective filing date of the invention is the earliest priority date in accordance with 35 U.S.C. § 120. *See also Broadcast Innovation, L.L.C. v. Charter Communications, Inc.*, 420 F.3d 1364, 1367 (Fed. Cir. 2005). Because the '092 and '246 Patents claim priority from PCT Application No. PCT/EP02/07836, which was filed on July 15, 2002, I understand the effective filing date for the '092 and '246 Patents to be July 15, 2002. Because the '604, '138, and '770 Patents claim priority from PCT Application No. PCT/EP02/11355, which was filed on September 10, 2002, I understand the effective filing date for the '604, '138, and '770 Patents to be September 10, 2002. Because the '887 Patent claims priority from PCT Application No. PCT/EP02/14706, which was filed on December 22, 2002, I understand the effective filing date for the '887 Patent to be December 22, 2002. Because the '365 Patent claims priority from Provisional Application No. 60/540,450, which was filed on January 30, 2004, I understand the effective filing date for the '365 Patent to be January 30, 2004. Because the '103 and '200 Patents claim priority from European Patent EP 06117352, which was

filed on July 18, 2006, I understand the effective filing date for the '103 and '200 Patents to be July 18, 2006.

22. While I am not a lawyer, it has been explained to me that *Phillips*, 415 F.3d at 1312–13 states that the objective baseline for claim construction is the customary meaning of a claim term to a person of ordinary skill in the field at the time of the invention. I understand that under *Phillips*, the person of ordinary skill would construe the customary meaning of the terms in the context of the (a) claims themselves, (b) specification, and (c) file history. *Phillips*, 415 F.3d at 1313. I understand that the claim terms should not be assessed "in a vacuum," but must be looked at "in the context of the written description and prosecution history." *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005). I understand that the specification is to be consulted to discern how the person of ordinary skill would have understood the claim terms, but not to import limitations into the claim so as to limit it to disclosed embodiments. *Phillips*, 415 F.3d 1303 at 1323.

23. I understand that the Court may look to extrinsic evidence, such as dictionaries or treatises, to assist with the claim construction inquiry. *See Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996). That said, I also understand that intrinsic evidence is preferred: "extrinsic evidence may be useful to the court, but it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Phillips,* 415 F.3d at 1319.

24. I understand that the customary meaning to the person of ordinary skill should be the guideline for construing a term, unless a special definition is clearly stated and consistently followed in the specification such that the inventor is acting has his own lexicographer. *See Wright Medical Technology, Inc. v. Osteonics Corp.*, 122 F.3d 1440, 1443 (Fed. Cir. 1997).

25. It is my understanding that each of the claims in the '092 and '246 Patents is supported in PCT Application No. PCT/EP02/07836. Accordingly, the context of my analysis is what a person of ordinary skill in the art would have understood the terms to mean as of July 15, 2002.

26. It is my understanding that each of the claims in the '604, '138, and '770 Patents is supported in PCT Application No. PCT/EP02/11355. Accordingly, the context of my analysis is what a person of ordinary skill in the art would have understood the terms to mean as of September 10, 2002.

27. It is my understanding that each of the claims in the '887 Patent is supported in PCT Application No. PCT/EP02/14706. Accordingly, the context of my analysis is what a person of ordinary skill in the art would have understood the terms to mean as of December 22, 2002.

28. It is my understanding that each of the claims in the '365 Patent is supported in Provisional Application No. 60/540,450. Accordingly, the context of my analysis is what a person of ordinary skill in the art would have understood the terms to mean as of January 30, 2004.

29. It is my understanding that each of the claims in the '103 and '200 Patents is supported in European Patent EP 06117352. Accordingly, the context of my analysis is what a person of ordinary skill in the art would have understood the terms to mean as of July 18, 2006.

Method:

30. For each of the terms, I have analyzed the respective proposed constructions and the support cited for these respective constructions.

The Technical Field of the Fractus Patents:

31. The Fractus patents are generally directed to improvements in the field of advanced antenna technologies. By implementing the concepts disclosed in the Fractus patents, the inventions permit antennas to operate at increased numbers of frequency bands while simultaneously reducing their size, allowing greater performance within smaller spaces. To fully understand the Fractus patents, one should have general familiarity with small, multiple frequency antennas.

Level of Ordinary Skill as to the Fractus Patents:

32. In this declaration, I make reference to a person of ordinary skill in the art with regard to the Fractus patents. In my opinion, the person of ordinary skill in this area is a person with

at least a bachelor's degree in electrical engineering, computer science, or a similar degree and at least four years of experience in applied electromagnetics with an emphasis on antennas. Alternatively, the person of ordinary skill in the art would have a master's degree in electrical engineering (or similar discipline) and at least two years of similar experience. In determining who would be one of such ordinary skill, I considered at least the following criteria: (a) the type of problems encountered in the art; (b) prior art solutions to those problems; (c) the rapidity with which innovations are made; (d) the sophistication of the technology; and (e) the education level of active workers in the field.

Terms Claimed by Defendants to Be Indefinite:

33. With regard to the terms for which Defendants have proposed as indefinite, I provide in this section my own opinions as to how one of ordinary skill in the art would interpret the disputed terms. In general, it is my opinion that persons of ordinary skill would agree with Fractus' proposed construction that each of these terms should be given the plain and ordinary meaning for the reasons set forth below.

34. I do not believe it is necessary to construe "not similar/in shape/in size" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of "not similar in shape" I would say it refers to geometric shapes that have different geometric figures. If asked to define the ordinary meaning of "not similar in size" I would say it refers to geometric shapes that have different sizes. The figures of the '092 and '246 patents support this understanding by demonstrating shapes of different geometries and sizes. In light of the above, I disagree with the Defendants' view that the claim elements are indefinite. To date, Defendants have not yet explained why they believe this term is indefinite. If they do, I reserve the right to further explain this term.

35. I do not believe it is necessary to construe "hole(s) intersects the external perimeter" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of "hole(s) intersects the external perimeter," I would say it refers to the point where a hole, as defined by the patents, intersects the perimeter. This would include the understanding

of a hole as a gap, opening, or an aperture. Case 13 of Figure 3 of the '092 patent supports this understanding. In light of the above, I disagree with the Defendants' view that the claim elements are indefinite. To date, Defendants have not yet explained why they believe this term is indefinite. If they do, I reserve the right to further explain this term.

36. I do not believe it is necessary to construe "4G communication standard / communication standard(s)" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of a "communication standard" I would say it refers to technical specifications related to mobile or radio communication systems, including but not limited to GSM, UMTS, CDMA, W-CDMA, and LTE. 4G communication refers to Fourth Generation of broadband cellular network technology. In light of the above, I disagree with the Defendants' view that the claim elements are indefinite. To date, Defendants have not yet explained why they believe this term is indefinite. If they do, I reserve the right to further explain this term.

37. I do not believe it is necessary to construe "receive signals from a 4G communication standard" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of a "receive a signal" I would say it refers to the process by which an antenna interacts with a signal to obtain or receive electromagnetic energy—as opposed to transmitting a signal. In light of the above, I disagree with the Defendants' view that the claim elements are indefinite. To date, Defendants have not yet explained why they believe this term is indefinite. If they do, I reserve the right to further explain this term.

38. I do not believe it is necessary to construe "close proximity region" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of "close proximity region" I would say it refers to an area between two radiating arms where at least one portion of each arm is placed to allow electromagnetic fields in one arm to be transferred to another arm in a particular region and the distance between the arms is not constant between the entirety of the arms. In light of the above, I disagree with the Defendants' view that the

claim elements are indefinite. To date, Defendants have not yet explained why they believe this term is indefinite. If they do, I reserve the right to further explain this term.

Terms Proposed by Defendants with Proposed Constructions:

39. I do not believe it is necessary to construe "perimeter" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of "perimeter" I would say it means the boundary of a shape or object. I disagree with the construction offered by Defendants because it requires that the perimeter line be continuous while the patent itself does not require this. For example, in Figure 12a of the '103 patent, the perimeter includes parts 1201 and 1202. In the '092 patent, the hole "intersects the perimeter" which necessarily means that the perimeter is not a continuous line tracing the figure but rather extends to interact with the circular hole. '092 patent at 2:63-67.

40. I do not believe it is necessary to construe "wireless device," "handheld multifunction wireless device, "wireless portable device" or "mobile communication device" because a person of ordinary skill in the art would understand their plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of "wireless device" I would say it means capable of communicating via electromagnetic waves through the air. Similarly, I would define the ordinary meaning of "mobile communication device" as a device capable of communicating using mobile communication technology. I would define the ordinary meaning of "handheld multifunction" as a device capable of being moved, or being portable, and able to carry out multiple functions. I disagree with the constructions offered by Defendants because their proposed constructions seem to imply that the device must be completely free of any physical wires while I understand these terms to relate to the method of communication. That a device requires a power cable, for example, does not mean that is not wireless.

41. I do not believe it is necessary to construe "common conductor" because a person of ordinary skill in the art would understand its plain and ordinary meaning without the need for further elaboration. If asked to define the ordinary meaning of "common conductor" I would say it means the part of a conducting radiating structure coupled to the feeding point

that carries current to multiple portions (or arms or branches) of the radiator. I disagree with the construction offered by Defendants because the common conductor does not have first and second radiating arms.

42. I declare under penalty of perjury that the foregoing is true and correct. Executed on October 5, 2023 in Houston, Texas.

Stuart A. Long