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

FRACTUS, S.A.,	§	
	§	
Plaintiff,	§	
	§	
v.	§	NO. 2:22-CV-00412-JRG
	§	
ADT LLC d/b/a ADT SECURITY SERVICES,	§	
	§	
Defendant.	§	

CLAIM CONSTRUCTION ORDER

Fractus, S.A., alleges infringement by ADT LLC and Vivint, Inc., of claims from U.S. Patents 7,471,246, 7,907,092, 8,456,365, 8,674,887, 8,738,103, 8,994,604, 10,135,138, 10,468,770, and 11,349,200. Of these, Fractus asserts the '604 Patent, the '138 Patent, and the '770 Patent against only Vivint. Fractus asserts the remaining patents against both Vivint and ADT.

Generally, the patents relate to the shape of mobile-communication antennas. For example, the '246 Patent relates to antennas with holes in the radiating element, which allows the antenna to "feature a multifrequency behaviour with a smaller size with respect to other prior art antennas operating at the same frequency." '246 Patent at 1:60–62. The '887 Patent teaches a multi-band antenna with first and second radiating arms extending from a common conductor. One of the radiating arms "meanders" to form a "space filling curve" that allows a longer antenna to fit into a smaller space. '887 Patent at [57]. The '103 Patent is directed to antennas that have geometric shapes characterized by "complexity factors," which the patents define based on the antenna's geometry. '103 Patent at [57].

In their briefing and at the January 18, 2024 hearing, the parties collectively disputed the scope of 8 terms (and variations thereof). But since then Fractus and Vivint have asked the Court to stay their case pending settlement, including resolution of claim-construction issues for the three patents asserted only against Vivint. *See* Joint Mot. to Stay All Deadlines & Notice of Settlement, Dkt. No. 106; Notice of Effect of Stay on Asserted Patents & Cl. Constr., Dkt. No. 107. ADT has not disputed Fractus's representations about the effect of the stay, and the Court has since dismissed Fractus's lawsuit against Vivint. *See* Order, Dkt. No. 113. Having considered the parties' briefing, along with arguments of counsel during the hearing, the Court resolves the remaining disputes as follows.

I. BACKGROUND

A. U.S. Patents 7,471,246 and 7,907,092

These related patents[1] concern "[a] new type of multihole antenna." '092 Patent at [57]. The antenna's radiating element includes at least one hole, which "provides a broadband and multi-band performance, and hence it features a similar behaviour through different frequency bands." *Id.* "Also, the antenna features a smaller size with respect to other prior art antennas operating at the same frequency." *Id.* Using a single antenna for multiple bands "permits telecom operators to reduce their costs and to minimize the environmental impact" at the end of a device's useful life. *Id.* at 1:42–43.

Each of the independent claims recites an antenna with a hole that has at least 20% of the area within a radiating element's external perimeter. The claims also limit the shapes of the

[1] The '092 Patent issued from application no. 12/246,964, which is a continuation of application no. 11/036,509. '092 Patent at [63].

radiating element and hole. For example, Claim 1 of the '246 Patent recites:

> 1. A monopole antenna comprising:
>
> a radiating element defining an external perimeter;
>
> wherein the radiating element comprises at least one hole;
>
> *wherein the at least one hole has an area of at least 20% of an area included inside the external perimeter;*
>
> wherein the external perimeter of the radiating element is shaped as a polygonal element comprising at least four sides;
>
> wherein a perimeter of the at least one hole is shaped as a polygon comprising three or more sides;
>
> wherein the radiating element is shorter than a quarter of a longest operating wavelength of the monopole antenna;
>
> wherein the monopole antenna features a multiband behavior;
>
> *wherein the external perimeter of the radiating element and the perimeter of at least one of the at least one hole are not both circles; and*
>
> *wherein the external perimeter of the radiating element and the perimeter of at least one of the at least one hole are not both ellipses.*

'246 Patent at 4:33–52 (emphasis added); *see also* '092 Patent at 4:65–5:10 (reciting, in Claim 1, a radiating element having a conducting body with a hole, "wherein the radiating element defines an external perimeter [and] wherein the hole has an area of at least 20% of an area included inside the external perimeter"). Certain dependent claims then require the hole to intersect the perimeter of the radiating element, and the shape or size of the radiating element's perimeter to be "not similar" to the shape or size of the hole's perimeter. *See* '246 Patent at 5:19–21 (requiring, in Claim 13, the radiating element to have two holes that "are not similar in shape"); *id.* at 5:27–29 (requiring, in Claim 15, the radiating element to have two holes that "are not similar in size"); *id.*

at 6:28–29 (reciting, in Claim 28, that "at least one hole intersects the perimeter of the radiating element").

The parties dispute the scope of three terms from these patents' claims: (1) "wireless device"; (2) "not similar" in size or shape; and (3) "hole intersects the perimeter of the radiating element."

B. U.S. Patent 8,738,103 and 11,349,200

These related patents[2] generally concern multifunction wireless devices with an antenna contour having two "complexity factors" within certain ranges. '103 Patent at [57]. For example, Claim 1 of the '103 Patent recites:

> a second antenna element configured to receive signals from a 4G communication standard, wherein a perimeter of the second antenna element defines *an antenna contour having 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.*

'103 Patent at 41:41–46 (emphasis added).

The first step in computing the complexity factors is finding the antenna contour. To do this, one starts by determining an "antenna box" and an "antenna rectangle." The "antenna box" is the minimum-sized right prism "that completely encloses the antenna volume of space and wherein each one of the faces of the [prism] is tangent to at least one point of the volume." '103 Patent at 11:5–12; *see also id.* at 11:22–25 (noting "the antenna box itself will have the shape of a right prism (i.e., a parallelepiped with square or rectangular faces and with the inner angles between two faces sharing an edge being 90°)"). The "antenna rectangle" is "the orthogonal projection of the

[2] The '200 Patent issued from application no. 17/246,192, which claims priority to application no. 11/614,429. '200 Patent at [63]. The '103 Patent issued from the '429 Application.

antenna box along the normal to the face with [the] largest area of the antenna box." *Id.* at 13:56–58; *see also id.* at 26:23–26. Figure 3, for example, shows the antenna box 301 and antenna rectangle 351 for the antenna element 300. *See* '103 Patent at 27:9–18.

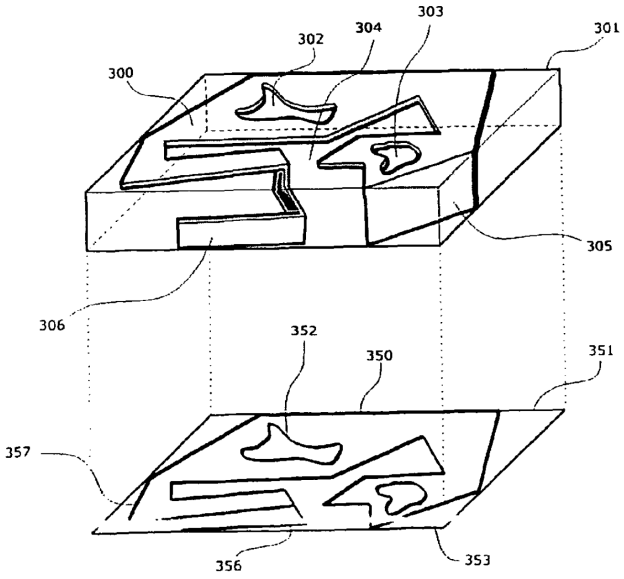


FIG. 3

Next, the complexity-factor calculation requires finding an "antenna contour." According to the specification:

> The antenna contour of the antenna system is a set of joint and/or disjoint segments comprising:
>
> the perimeter of one or more antenna elements placed in the antenna rectangle,
>
> the perimeter of closed slots *and/or* closed apertures defined within the antenna elements, *and/or* the orthogonal projection onto the antenna rectangle of perimeters of antenna elements, *or* perimeters of or parts of antenna elements that are placed in the antenna box but not in the antenna rectangle.

'103 Patent at 14:49–59 (emphasis added). The parties agree there may be multiple contours for a given antenna. *See* Dkt. No. 82 at 27 (identifying two methods for deriving the antenna contour); Hr'g Tr., Dkt. No. 112 at 93:12–19 (noting Fractus's position "that there are multiple methods" for finding the antenna contour).

> After determining an antenna contour, that contour is overlaid on
>
> a first, a second, and a third grid (hereinafter called grid G_1, grid G_2 and grid G_3 respectively) of substantially square or rectangular cells . . . . The three grids are adaptive to the antenna rectangle. That is, the size and aspect ratio of the cells of each one of said three grids *is determined by the size and aspect ratio of the antenna rectangle itself*. The use of adaptive grids is advantageous because it provides a sufficient number of cells within the antenna rectangle to fully capture the geometrical features of the antenna contour at differing levels of detail.

'103 Patent at 16:36–46 (emphasis added).

The starting point for constructing the three grids is grid G_2, for which "the size of a cell and its aspect ratio . . . are first chosen so that the antenna rectangle is perfectly tessellated with an odd number of columns and an odd number of rows." '103 Patent at 16:58–62; *see also id.* at 17:20–23 ("the number of columns and rows of cells of the second grid that tessellate the antenna rectangle are selected to produce a cell as square as possible"). Other parts of the specification suggest a grid G_2 with nine columns is preferred. *See id.* at 17:12–18 ("It has been found that setting to nine (9) the number of columns that tessellate the antenna rectangle provides an advantageous compromise, for the preferred sizes" of the devices); *see also id.* at 17:36 ("the antenna rectangle is tessellated perfectly with 9 by (2n+1) cells of grid G_2, wherein n is an integer larger than zero (0) and smaller than five (5)").

After constructing G_2, constructing G_1 and G_3 is straightforward. "A cell of grid size G_2 is half the size of a cell of grid G_1 [and] a cell of grid size G_3 is half the size of a cell of grid G_2, or one fourth the size of a cell of grid G_1." *Id.* at 16:48–52.

From there, F_{21} and F_{32} are computed by counting the number of cells N_1, N_2, and N_3, of the grids G_1, G_2, and G_3, respectively, that are at least partially inside the antenna rectangle and include at least a point of the antenna contour. After counting N_1, N_2, and N_3,

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

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

Id. at 18:36–50 (explaining the calculation of F_{21}); *id.* at 19:26–38 (explaining the calculation of F_{32}).

The parties dispute four terms from these patents. First, they dispute whether a "wireless device" is not just a device that communicates wirelessly, but one that requires operation without any physical wires, including a power cord. Second, they dispute the meaning of "perimeter." Finally, ADT asserts "4G communication standard" and "complexity factor" are indefinite.

C. U.S. Patents 8,456,365 and 8,674,887

These patents are not related but address common subject matter and use similar claim language. Each patent's independent claims require an antenna with a feeding point coupled to a common conductor and two radiating arms extending from that common conductor. For example, Claim 1 of the '887 Patent recites:

> 1. A mobile communication device comprising:
>
> . . .
>
> a multi-band antenna . . . comprising:
>
> a common conductor coupled to the feeding point; [and]
>
> first and second radiating arms coupled to and extending from the common conductor . . . .

'887 Patent at 6:45–58. The parties dispute the scope of "mobile communication device" and "common conductor."

II. GENERAL LEGAL STANDARDS

A. Generally

"[T]he claims of a patent define the invention to which the patentee is entitled the right to

exclude." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). As such, if the parties dispute the scope of the claims, the court must determine their meaning. *See, e.g.*, *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1317 (Fed. Cir. 2007) (Gajarsa, J., concurring in part); *see also Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996), *aff'g*, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc).

Claim construction, however, "is not an obligatory exercise in redundancy." *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). Rather, "[c]laim construction is a matter of [resolving] disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims . . . ." *Id.* A court need not "repeat or restate every claim term in order to comply with the ruling that claim construction is for the court." *Id.*

When construing claims, "[t]here is a heavy presumption that claim terms are to be given their ordinary and customary meaning." *Aventis Pharm. Inc. v. Amino Chems. Ltd.*, 715 F.3d 1363, 1373 (Fed. Cir. 2013) (citing *Phillips*, 415 F.3d at 1312–13). Courts must therefore "look to the words of the claims themselves . . . to define the scope of the patented invention." *Id.* (citations omitted). 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 patent application." *Phillips*, 415 F.3d at 1313. This "person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.*

Intrinsic evidence is the primary resource for claim construction. *See Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1348 (Fed. Cir. 2010) (citing *Phillips*, 415 F.3d at 1312). For certain claim terms, "the ordinary meaning of claim language as understood by a person of skill in

the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314; *see also Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) ("We cannot look at the ordinary meaning of the term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history."). But for claim terms with less-apparent meanings, courts consider "those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean . . . [including] the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Phillips*, 415 F.3d at 1314.

B. Indefiniteness

"[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 572 U.S. 898, 901 (2014). The claims "must be precise enough to afford clear notice of what is claimed" while recognizing that "some modicum of uncertainty" is inherent due to the limitations of language. *Id.* at 908. "Indefiniteness must be proven by clear and convincing evidence." *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017). "Clear and convincing evidence places in the fact finder 'an abiding conviction that the truth of [the] factual contentions are highly probable.'" *P&G v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009) (quoting *Colorado v. New Mexico*, 467 U.S. 310, 316 (1984); brackets by the Federal Circuit).

III. THE LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art is the skill level of a hypothetical person who is

presumed to have known the relevant art at the time of the invention. *In re GPAC*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In resolving the appropriate level of ordinary skill, courts consider the types of and solutions to problems encountered in the art, the speed of innovation, the sophistication of the technology, and the education of workers active in the field. *Id.* Importantly, "[a] person of ordinary skill in the art is also a person of ordinary creativity, not an automaton." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

Here, only Fractus offers a level of ordinary skill in the art for claim construction. Specifically, its expert declares a skilled artisan

> 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.

Long Decl., Dkt. No. 75-1 ¶ 32. Because ADT does not challenge this proposed level of skill, the Court adopts that level of skill for its analysis of the disputed terms.

IV. THE DISPUTED TERMS

A. "wireless device" ('092 Patent, all asserted claims; '103 Patent, all asserted claims; '200 Patent, all asserted claims)

Fractus's Construction	ADT's Construction
No construction necessary	"A device with the ability to transmit and receive voice, data, or video signals through the radio spectrum that does not require a physical wire to operate."

The preamble of each asserted claim from these patents recites a "wireless device." *See, e.g.*, '092 Patent at 4:64 (reciting, in Claim 1, "[a] wireless device"); '103 Patent at 41:22 (reciting, in Claim 1, "[a] handheld multifunction wireless device"); '200 Patent at 42:56 (reciting, in Claim 1, "[a] wireless device"). The parties dispute whether these "wireless devices" must operate

not just without communication wires, but without *any* external wires, such as a power cord.

According to ADT, Fractus's position wrongly limits the "wireless" nature of the devices to communications only. Dkt. No. 82 at 3. It points to excerpts from the patents that it says describe the devices and antenna designs as separate components. *Id.* at 3–4 (citing '103 Patent at 1:19–22; '200 Patent at 10:53–58). From there, ADT concludes "to give full meaning to both terms, a 'wireless device' must be 'wireless' in ways beyond simply wireless communication." *Id.* at 4.

Fractus counters that ADT's construction "would rule out whole classes of devices that are understood to be wireless devices such as routers and computers." Dkt. No. 75 at 3–4. Regardless, the patents clarify that "wireless" refers to connectivity. *Id.* at 4 (citing '103 Patent at 4:65–66 ("One problem to be solved by the present invention is therefore to provide an enhanced wireless connectivity.")).

The Court agrees with Fractus. The ordinary meaning of "wireless device" in this context refers to the nature of the communication, not whether the devices might require wires for other purposes. *See* Long Decl., Dkt. No. 75-1 ¶ 40 ("That a device requires a power cable, for example, does not mean [it] is not wireless."). For the notion that "wireless" in these patents means something narrower, ADT points only to the reference describing the "present invention" as relating to "a multifunction wireless device and antenna designs thereof." At best for ADT, that is ambiguous on the question, which is not enough to alter the ordinary meaning of the term. *See Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1367–68 (Fed. Cir. 2012) (noting both lexicography and disclaimer "require a clear and explicit statement by the patentee"). The Court will therefore give these terms a "plain and ordinary meaning" construction. To clarify, however, the Court rejects that the ordinary meaning of "wireless" characterizes something other than the nature of the communication.

B. "mobile communications device" ('887 Patent, all asserted claims; '365 Patent, all asserted claims)

Fractus's Construction	ADT's Construction
No construction necessary	"A device with the ability to transmit and receive voice, data, or video signals through the radio spectrum that does not require a physical wire to operate."

Given amendments made by ADT to its originally proposed construction, *see* Dkt. No. 82 at 2, this dispute is somewhat nebulous. To the extent there *is* a dispute, it is similar to the dispute over "wireless device" in that it concerns whether the device can operate without external wires. ADT urges the same construction as it does for "wireless device," arguing "the claimed 'mobile' device is a device that can be operated without wires." *Id.* at 5 (citing '365 Patent at 9:67–10:3, figs.12–14). Fractus seems to agree, noting "a mobile device does not require a wire to operate." Dkt. No. 89 at 1. Given the similarity between the parties' positions and the lack of a clear dispute, the Court will give this term a "plain and ordinary meaning" construction.

C. "common conductor" ('887 Patent, Claims 1, 14; '365 Patent, Claims 1, 37)

Fractus's Construction	ADT's Construction
No construction necessary. Alternatively, "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." (Dkt. No. 75 at 7 n.3)	"A contiguous conductive element having at least a first and second radiating arm each originating from discrete points along the perimeter of the contiguous conductive element."

Generally, these claims require an antenna with first and second radiating arms connected to and extending from a common conductor that is coupled to a feeding point. For example, Claim 1 of the '887 Patent recites a "multi-band antenna comprising: *a common conductor* coupled to the feeding point [and] first and second radiating arms coupled to and extending from the *common conductor*[.]" '887 Patent at 6:53–58 (emphasis added).

ADT argues "common conductor" has no ordinary meaning. As such, it says, the specification shows its structure. It points to six figures from the two specifications and argues that in each example each radiating arm "originates from a distinct position on the outside perimeter of the common conductor." Dkt. No. 82 at 7. "Thus," concludes ADT, "the common conductor has a specific shape that 'extends horizontally' as shown in the Figures" that accommodates folding and bending. *Id.* at 7–8.

Fractus calls ADT's construction nonsensical and contrary to the specifications for two reasons. First, it confusingly modifies "conductive element" with "contiguous" without explaining what that means. Dkt. No. 75 at 5. Second, ADT's construction wrongly includes the two radiating arms and conflates "common conductor" with "antenna element." *Id.* at 6. In contrast, Fractus's expert explains a "common conductor" is just "part of a conducting radiating structure coupled to the feeding point that carries current to multiple portions of (or arms or branches) of the radiator." *Id.* at 7.

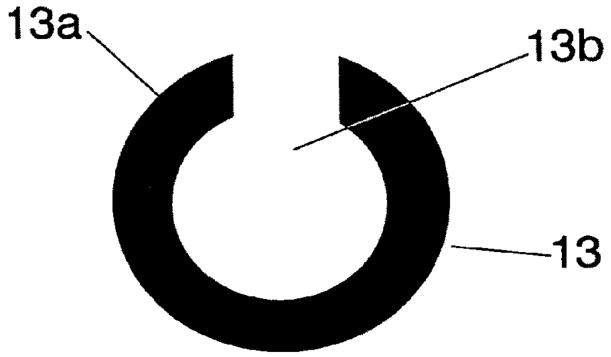
ADT's construction is too narrow. First, the Court disagrees that "common conductor" has no ordinary meaning in the art. At a minimum, "conductor" means something that carries current or a signal. From the context of the use of the term in the claims, a skilled artisan would understand that "common" refers to the conductor being common to, or in contact with, both radiating arms. *See* Dkt. No. 82 at 7 ("The modifying word 'common' refers to the conductor being shared or combined with each of the radiating arms and the feeding point."). Because "common conductor" is recited by the claims as connected to the feeding point, the conductor simply provides the path for the signal from the feeding point to the radiating arms. Accordingly, the Court construes this

term as "a conductor common to two or more radiating arms."[3]

D. "perimeter" ('092 Patent, Claims 1, 11, 12, 26; '103 Patent, Claims 12; '200 Patent, Claims 1, 3, 6, 9, 11)

Fractus's Construction	Defendants' Construction
No construction necessary. Alternatively, "the boundary of a shape or object." (Dkt. No. 75 at 9 n.5)	"The continuous line forming the boundary of a closed geometric figure"

The parties dispute how to determine the perimeter of an "open" figure, such as the figure shown as Case 13 of Figure 3 in the '092 Patent (below). Fractus asserts ADT's construction wrongly limits "perimeter" to a "closed geometric figure" formed by a continuous line. Instead, it argues, "perimeter refers to the boundary of the shape or object." Dkt. No. 75 at 9 n.5. Fractus calls a "perimeter" "the extension of the outside of the radiating element to complete the circular shape." *Id.* at 8. ADT, which derives its construction from a dictionary definition, *see* Dkt. No. 82 at 9 (citing Pocket Oxford English Dict., Dkt. No. 82-3 at 667), counters that Fractus's position allows one to arbitrarily decide the "perimeter." *Id.* at 10.



Case 13 of FIG. 3 of the '092 Patent

[3] At the hearing, the Court proposed this language as its preliminary construction, and the parties agreed with that construction. *See* Hr'g Tr., Dkt. No. 112 at 8:13–9:2.

Specifically, Fractus makes three arguments. First, it says, ADT's construction would exclude the embodiments of Cases 13 and 14 of Figure 3 of the '092 Patent. Dkt. No. 75 at 8. Second, Fractus points to the claim language, suggesting it doesn't make sense under ADT's position because "there would be *no intersection at all* between the hole and the external perimeter" as recited in the claims. *Id.* at 9. Third, Fractus points to its expert declaration and testimony to support the notion that "the external perimeter is defined to make the hole the minimum area." Dkt. No. 89 at 3 (citing Long Depo. Tr., Dkt. No. 75-10 at 51:25–52:7).

Despite those arguments, the Court agrees with ADT. To start, the intrinsic evidence best supports ADT's position. In particular, the '103 Patent describes perimeters of two antenna elements 1201, 1202 shown in FIG. 12a (below). The first perimeter (shown in red) includes 48 different segments and the second perimeter (shown in blue) includes 26 different segments. The perimeters define various slots 1230–1233 in each of the elements. *See* '103 Patent at 31:65–32:10.

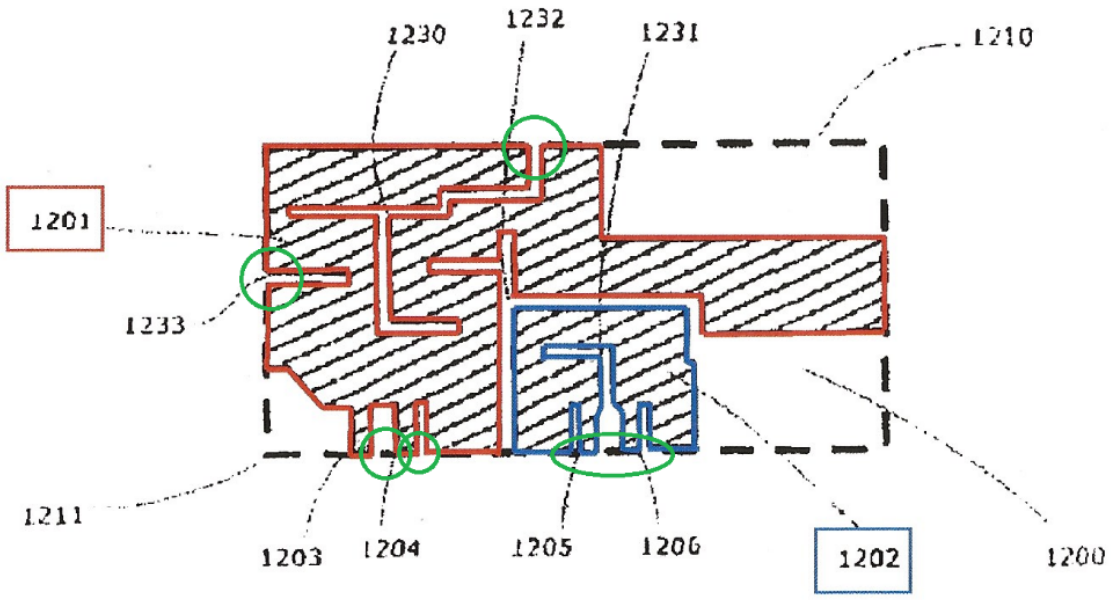


FIG. 12a of the '103 Patent (red and blue annotations by ADT)

Given its position with respect to Case 13 of the '092 Patent, Fractus fails to adequately

explain why the "perimeters" of Figure 12a do not extend across the slots' openings (circled in green). In fact, Fractus fails to proffer any evidence the ordinary meaning of "perimeter" includes "following the shape of the radiating element and extending it as necessary to complete the boundary." Dkt. No. 75 at 9–10. Instead, it points to Long's testimony that the patent doesn't require the perimeter of an antenna contour in the '103 Patent to be "continuous," *id.* at 9 (citing Long Decl., Dkt. No. 75-1 ¶ 39), but that testimony addresses a different issue.[4] Moreover, Fractus's assertion that only its position is consistent with the claim language puts the cart before the horse, as courts do not determine the ordinary meaning of a term based on whether that meaning renders the claim indefinite. Finally, regarding the notion that ADT's construction might exclude certain disclosed embodiments, "in a case such as this, where the patent describes multiple embodiments, every claim does not need to cover every embodiment." *Pacing Techs., LLC v. Garmin Int'l*, Inc., 778 F.3d 1021, 1026 (Fed. Cir. 2015).

Having concluded the ordinary meaning of "perimeter" best aligns with ADT's position, the question becomes whether the applicants defined the term to mean something else. Fractus's position suggests Cases 13 and 14 of the '092 Patent implicitly do so, but the Court struggles to reconcile the use of "perimeter" and "hole" in the description of those cases with how the intrinsic records use those terms elsewhere. Given that lexicography must be clear and unambiguous, the Court holds the ordinary and customary meaning of "perimeter" applies, which is "boundary of an object." Given that both parties proffer language similar to this phrase as their construction, the

[4] Long uses Figure 12a to show a perimeter need not be "continuous." *See* Long Decl., Dkt. No. 75-1 ¶ 39. At most, however, that figure shows an *antenna contour* need not be continuous. Figure 12a shows two perimeters, one for each antenna element 1201, 1202, and each perimeter *is* continuous. *See* '103 Patent at 32:58–67.

Court clarifies that its construction excludes any notion of "following the shape of the radiating element and extending it as necessary to complete the boundary," as urged by Fractus.

E. "not similar [in shape/in size]" ('092 Patent, Claim 1; '246 Patent, Claims 13, 15, 30)

Fractus's Construction	ADT's Construction
Not indefinite. No construction necessary. Alternatively, "not similar in shape" means "geometric shapes that have different geometric figures," and "not similar in size" means "geometric shapes that have different sizes." (Dkt. No. 75 at 13 n.6)	Indefinite

This dispute concerns the relationship of the shape and size of a hole in the radiating element to either another hole or the element's external perimeter. Claim 1 of the '092 Patent recites a radiating element with an external perimeter in the shape of a first polygon and a hole in the shape of a second polygon, "wherein the first polygonal shape and the second polygonal shape are not similar." '092 Patent at 5:16–17. In the '246 Patent, the claims limit the size and shape relationships between two holes. *See* '246 Patent at 5:20–22 (reciting, in Claim 13, a radiating element with at least two holes that "are not similar in shape"); *id.* at 5:28–30 (reciting, in Claim 15, a radiating element with at least two holes that "are not similar in size"); *id.* at 6:60–62 (reciting, in Claim 30, a radiating element comprising at least two holes that "are not similar in shape").

ADT asserts "not similar" is an indefinite term of degree for both shape and size because the patents provide no objective boundaries for skilled artisans to understand the scope of these terms. Dkt. No. 82 at 11 (citing *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370–71 (Fed. Cir. 2014)). For "not similar in shape," ADT alleges Dr. Long offers three different responses as to how to determine whether two shapes are similar, which "underscores the absence of any objective criteria" for the term. *Id.* at 12–13. For "not similar in size," ADT points to Long's statement that "I don't think I can quantify what would make something different in size . . . . I don't think

there's a way to determine similarity and size by some arbitrary value." *Id.* at 13 (quoting Long Depo. Tr., Dkt. No. 75-10 at 35:3–11).

Fractus relies primarily on Dr. Long's declaration, which addresses these terms in one paragraph:

> 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.

Long Decl., Dkt. No. 75-1 ¶ 34. Fractus also points to various figures from the specification, arguing "it hardly takes an expert to determine that these various sizes and shapes are not similar[.]" Dkt. No. 75 at 13. In its reply, Fractus also points to Long's testimony that "two shapes are similar, first of all geometrically if they have the same number of sides, and they have the same angles." Dkt. No. 89 (quoting Long Depo. Tr., Dkt. No. 75-10 at 36:23–25).

Regarding "not similar in shape," the Court agrees with Fractus. In geometry, "similar" means "not differing in shape but only in size or position." *See similar*, https://www.merriam-webster.com/dictionary/similar (referring to "similar triangles" and "similar polygons"). This comports with Dr. Long's testimony that two shapes are similar if they have the same number of sides and the same angles between those sides. *See* Long Depo. Tr., Dkt. No. 75-10 at 36:23–25. And because that meaning has objective boundaries for what are and are not "similar" shapes, the term is not indefinite. The Court construes "not similar in shape" as "differing in shape."

"Not similar in size" is a different matter. Because similarity of shape is related to scaling, the same definition makes no sense in the context of size. Accordingly, the "ordinary meaning" must be the more colloquial use of the term, such as "alike in substance or essentials." *similar*, https://www.merriam-webster.com/dictionary/similar. That use, however, has no objective

boundaries for how "alike" two "similar" sizes must be. Nor do the specification or Dr. Long supply such boundaries. The Court therefore holds "not similar in size" in Claim 15 of the '246 Patent is indefinite.

F. "hole[s] intersects the [external] perimeter" ('092 Patent, Claims 11, 32; '246 Patent, Claims 18, 28)

Fractus's Construction	ADT's Construction
Not indefinite. No construction necessary	Indefinite

Each of these dependent claims requires a radiating element having a conducting body with a hole that intersects the perimeter of the radiating element. But according to ADT, "there is no objective boundary to what is a 'hole,' what is not a 'hole,' what the size of a 'hole[]' might be, or how a 'hole intersects a perimeter,'" which renders the term indefinite. Dkt. No. 82 at 19. Fractus again points to Case 13 of Figure 3, which the patent describes as having a circular hole intersecting a perimeter. Dkt. No. 75 at 16. *See* '092 Patent at 2:63–67 ("Case 13 shows a multihole antenna with a circular hole, wherein the hole intersects the perimeter of the radiating element . . .").

ADT's challenge to this term stems mainly from the dispute about "perimeter." *See* Dkt. No. 82 at 18 ("If a 'perimeter' comprises any dotted line that can be drawn to connect the edges of the actual shape, it is unclear which . . . of the dashed lines is the perimeter, and therefore what would be considered the size and shape of the imaginary hole(s) .l . ."). Having resolved that dispute in ADT's favor, the Court holds this phrase is not indefinite, and no construction is necessary beyond that given to "perimeter" in Part IV.D. *supra*.

G. "4G communication standard" / "communication standard(s)" ('103 Patent, Claims 12, 16, 19, 20); "receive signals from a 4G communication standard" ('200 Patent, Claim 1)

Fractus's Construction	ADT's Construction
Not indefinite. No construction necessary. Alternatively, "communication standard"	Indefinite

This dispute centers on the ordinary meaning, if any, of "4G communication standard" on July 18, 2006, which was the effective filing date of the applications from which these patents issued. ADT contends that, because a final 4G standard was not published until 2008, "any meaning attributable to the term in 2006 would have evolved as '4G' technologies evolved and standards bodies continued to modify communication standards." Dkt. No. 82 at 21. It alleges Fractus uses the term "to define what frequencies are covered by its claims in 2013; but there is simply no way that a POSITA could have foreseen those frequencies in 2006." *Id.* Moreover, says ADT, because there was no 4G standard that existed on the effective filing date, "the identification of possible 4G *standards* remained undefined and unlimited in scope." *Id.* at 22. Finally, ADT questions what it means to "receive signals from a 4G communication standard," as recited in Claim 1 of the '200 Patent. *Id.* at 23.

Fractus, however, says the patent provides sufficient guidance as to the meaning of these phrases. Dkt. No. 75 at 19 (citing '103 Patent at 9:59–10:23, 24:22–30). Fractus also points to extrinsic evidence from 2006 that it says informed skilled artisans as to the scope of the claims. *Id.* at 20 (citing Mobile Communications Worldwide (Apr. 2006), Dkt. No. 75-12; A Framework Design for the Next-Generation Radio Access System (Mar. 2006), Dkt. No. 75-13).

This term is not indefinite. First, when speaking of whether an antenna is configured to "receive signals" from a particular standard, in the context of these claims a skilled artisan would

understand that as "configured to receive the frequencies" associated with that standard. The other aspects of a particular standard—error correction, timing, etc.—are irrelevant to the antenna. Second, a skilled artisan interpreting these terms in 2006 would have known there was not a finalized 4G standard at the time, and would have therefore interpreted this language in light of the then-proposed standards.

ADT cites *Icon Health & Fitness, Inc., Inc. v. Polar Electro Oy*, 656 F. App'x 1008 (Fed. Cir. 2016), for the proposition that "terms cannot be moving targets by claiming a technology that is evolving or unfixed." Dkt. No. 82 at 22. But *Icon Health* is distinguishable because the terms at issue—"in-band communication" and "out-of-band communication"—only had meanings "in a given context with a defined reference, such as a frequency, a channel, a protocol, time slots and data streams." *Icon Health*, 656 F. App'x at 1015. In fact, Icon Health argued the terms' scope "could vary from day-to-day and from person-to-person" because "[t]he inventors were prescient . . . and recognized that what is prohibitively expensive or complex today may be rudimentary tomorrow." *Id.* at 1016 (quoting App. Br. 40–41) (brackets and ellipses in original). Here, however, ADT has not shown there is a moving target. Instead, ADT has simply shown the lack of a finalized 4G standard as of the effective filing date. It has not, however, shown by clear and convincing evidence that a skilled artisan would have two different understandings as to which frequencies compose a "4G communication standard" in 2006 and 2008, respectively.

A party asserting a term is indefinite must make that showing by clear and convincing evidence. *See Sonix Tech.*, 844 F.3d at 1377. In the context of this dispute, that requires ADT to show some material difference concerning the frequencies between the proposed standard on the effective filing date and the standard as it ultimately issued. ADT makes no such showing here, and has therefore not carried its burden. As such, the Court will give this term a "plain and ordinary

meaning" construction.

H. "complexity factor" ('103 Patent, Claims 16; '200 Patent, Claims 6, 11)

Fractus's Construction	ADT's Construction
Not indefinite. No construction necessary. Alternatively: "a numerical value calculated using a formula that parametrizes the level of complexity of an antenna that captures and characterizes certain aspects of the geometrical details of the antenna contour"	Indefinite

According to these claims, "a perimeter of the second antenna element defines an antenna contour having 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." '103 Patent at 41:42–46 (Claim 16); *see also* '200 Patent at 43:50–53 (reciting, in Claim 6, a wireless device with a first contour that "has a level of complexity defined by the 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"). F_{21} and F_{32} "capture and characterize certain aspects of the geometrical details of the antenna contour (such as for instance its edge-richness, angle-richness and/or discontinuity-richness) when viewed at different levels of scale." '103 Patent at 16:31–35.

Relying on *Ball Metal Beverage Container Corp. v. Crown Packaging Tech., Inc.*, 838 Fed. App'x 538 (Fed. Cir. 2015), ADT urges that multiple methods for calculating a complexity factor lead to materially different results. Under *Ball Metal*, which is non-precedential but concisely summarizes the applicable law,

> a claim may be invalid as indefinite when (1) different known methods exist for calculating a claimed parameter, (2) nothing in the record suggests using one method in particular, and (3) application of the different methods result in materially different outcomes for the claim's scope such that a product or method may infringe the claim under one method but not infringe when employing another method.

Ball Metal, 838 Fed. App'x at 542.

Applying that test here, ADT says there are two independent reasons why "complexity factor" is indefinite. First, the specification provides multiple methods for deriving the antenna contour, and nothing in the record suggests which method to use. Dkt. No. 82 at 24. Thus, a skilled artisan "could validly derive two antenna contours that are fundamentally different in size and shape, simply by following the teachings of the specification." *Id.* at 27. Second, the specification provides multiple methods for selecting the number of columns and rows for grid G_2 and, again, nothing in the record suggests which method to use. *Id.* at 24. Fractus replies "the patents provide clear guidance regarding measurement methods and Defendants fail to demonstrate material differences in outcomes." Dkt. No. 89 at 9.

1. Determining the antenna contour

Fractus does not dispute there are at least two ways of determining an antenna contour of an antenna. *See* Hr'g Tr., Dkt. No. 112 at 93:12–19 ("I don't dispute that there are multiple methods."). Under one method, the antenna contour is "the perimeter of the planar elements (and aperture) [intersecting the antenna rectangle] and/or . . . the orthogonal projection of the non-planar elements [onto the rectangle]." Dkt. No. 82 at 27. For example, in the antenna rectangle 351 of Figure 3 (below):

> The antenna contour 350 comprises three disjointed subsets of segments: (a) a first subset [shown in red] is formed by the segments of the perimeter 357 (which includes both external segments of the antenna element 300 and those segments added to said antenna element by the opening 304) and the group of segments 356 corresponding to the orthogonal projection of part 306 of the antenna element 300 [shown in blue]; (b) a second subset is formed by the segments 352 associated to the perimeter of aperture 302; and (c) a third subset is formed by the segments 353 associated to the perimeter of aperture 303.

'103 Patent at 27:9–18.

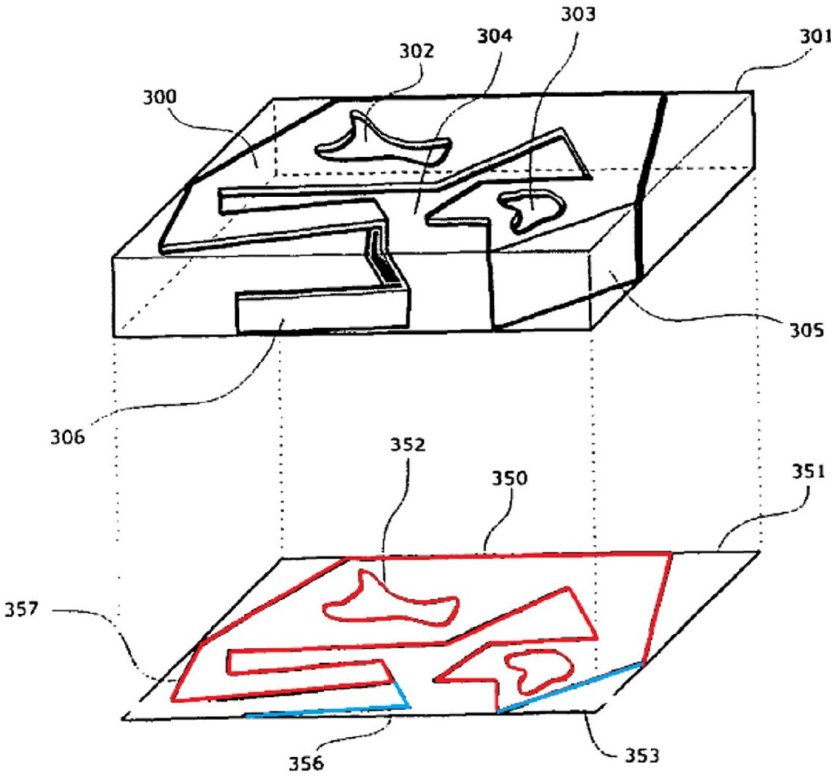


FIG. 3 of the '103 Patent (annotations by ADT)

Alternatively, the contour may be "the perimeter of the planar elements (and aperture) [intersecting the antenna rectangle] and/or . . . the external perimeter of the non-planar elements." Dkt. No. 82 at 27. ADT calls this "unfolding the antenna," Hr'g Tr., Dkt. No. 112 at 106:21, and points to Figure 4, which shows how to form the antenna element 300 of Figure 3, Dkt. No. 82 at 26; *see also* '103 Patent at 27:23–26 (characterizing FIG. 4 as "show[ing] how the structure of an antenna system such as the one presented in FIG. 3 can be obtained"). Given that Fractus does not dispute there are multiple methods for arriving at the antenna contour, the first prong of *Ball Metal*'s test is satisfied.

Regarding the third part of that test, ADT argues that the choice of "orthogonal projection" or "unfolding" "leads to material different outcomes." Dkt. No. 82 at 27. In its reply, Fractus does not directly address the issue, but instead notes what it calls ADT's lack of "any expert testimony

or other evidence" supporting that contention. Dkt. No. 89 at 10. Asked at the hearing whether there is a material difference in the results if one properly applies the two methods, Fractus responded it does not have a "direct position" on that question. Hr'g Tr., Dkt. No. 112 at 97:12–18.

While it is, of course, ADT's burden to show materially different results from the two methods, that does not require the Court to ignore the patents' teachings or the logical inferences from those teachings. Here, the Court does not see how there could *not* be materially different results for at least some possible antennas. In Figure 3, for example, if part 305 of the antenna element 300 were hypothetically extended further "downward" to the maximum possible length without changing the antenna rectangle,[5] the orthogonal projection into the antenna rectangle would not change because part 305 "has an orthogonal projection that completely matches a segment of the perimeter 357." '103 Patent at 27:19–22. But under ADT's "unfolding" approach, the perimeter of the extended part 305 would "touch" a number of additional grid cells, assuming grid G_2 is expandable beyond the antenna rectangle.[6]

[5] Because the "antenna rectangle" is "the orthogonal projection of the antenna box along the normal to the face with largest area of the antenna box," '103 Patent at 13:56–58, the maximum length without changing the size of the antenna rectangle would be the length that the larger of the antenna rectangle's length or width. Otherwise, the antenna rectangle 301 would be different than that shown in FIG. 3.

[6] Because the grids "are adaptive to the antenna rectangle," determining the antenna rectangle must happen before the construction of the grids. *See* '103 Patent at 16:36–46. In other words, the cell size of the grids is chosen based on antenna rectangle, not the profile of the unfolded antenna. In fact, the Court sees no way in which an unfolded antenna would *not* exceed the boundaries of the antenna rectangle given that the rectangle is based on the "orthogonal projection" of the antenna.

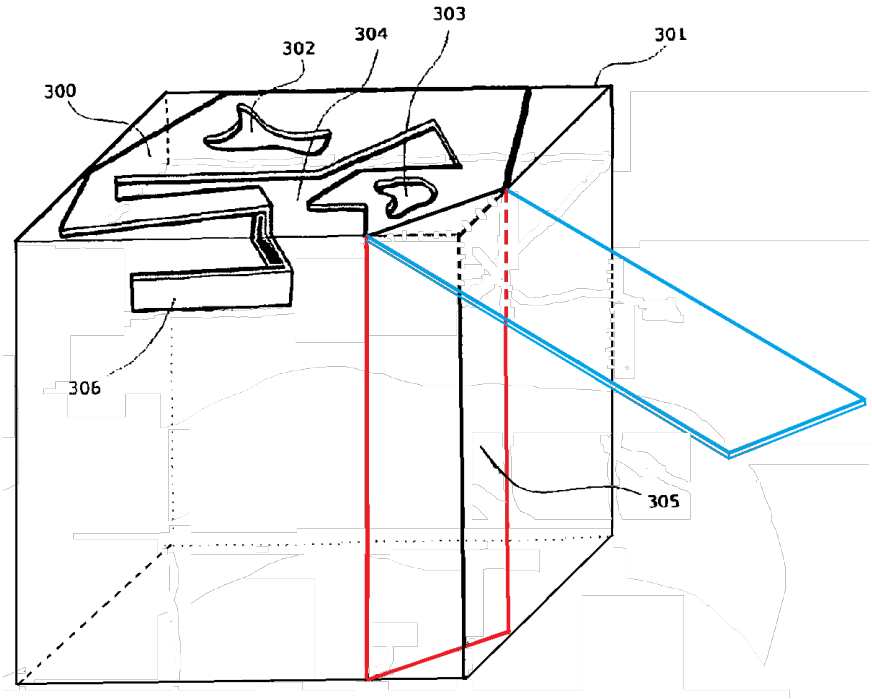


FIG. 3 of the '103 Patent modified to extend part 305 (red) until the antenna box 301 is a cube. Using the "unfolding" approach, part 305 (blue) extends outside of the "antenna rectangle," which is the top face of the cube.

That leaves *Ball Metal*'s second prong—whether the record suggests one method of deriving the antenna contour over others. According to Fractus, the claims themselves recite that the antenna contour is determined by a perimeter, and "the patents never describe or refer to the orthogonal projection as a "perimeter." Dkt. No. 89 at 9. Moreover, notes Fractus, other claims measure the complexity of the antenna contour without reference to a perimeter. *Id.* (pointing to Claims 3, 5, 8, 10, and 12 of U.S. Patent 9,899,727).

The claim language, however, is not so clear. It is not unreasonable, for example, to interpret the relevant claim language to mean the contour is derived *at least partially* from the perimeter. To a certain extent, this is a question of the meaning of that phrase using typical claim-construction principles, but neither party directly addresses that issue. Thus, the Court is not yet

convinced the claim language excludes the "orthogonal projection" method, especially given that the "unfolding" approach is not described with respect to any figure nor clearly taught.

2. Selecting the number of columns and rows for grid G_2

ADT argues "[t]he specification does not provide reasonable certainty as to the preferred method for selecting the grid overlay." Dkt. No. 82 at 28. At best, suggests ADT, the specification teaches that the number of columns for grid G_2 is *preferably* 9, but a skilled artisan could select any number of columns or rows as long as those numbers are odd. And that selection affects the choice of the three grids, which in turn affects N_1, N_2, and N_3, and therefore the computation of F_{21} and F_{32}. Fractus, on the other hand, considers using 9 columns for G_2 a requirement. *See* Hr'g Tr., Dkt. No. 112 at 100 (noting "Defendants take issue with the nine-column requirement and characterize it as an option").

Here, too, the first and third prongs of *Ball Metal*'s test are satisfied. Regarding the first prong, a skilled artisan would not understand the patent to *require* G_2 to be constructed using 9 columns. To the contrary, the patents expressly contemplate use of a different number of columns. For example, rather than simply saying "G_2 always has 9 columns," the patent teaches "the size of a cell and its aspect ratio . . . are first chosen so that the antenna rectangle is perfectly tessellated with an odd number of columns and an odd number of rows." '103 Patent at 16:58–62. The specification describes selecting the number of columns and cell aspect ratio with the usual "exemplary embodiment" language. *See id.* at 17:12–15 (explaining "setting to nine (9) the number of columns that tessellate the antenna rectangle provides an advantageous compromise, for the preferred sizes of an [multifunction wireless device]," but omitting any measurements for those "preferred sizes").

As for *Ball Metal*'s third prong—whether there are materially different results—Exhibit K to ADT's response persuasively walks through two different methodologies for constructing G_2

that show as much. *See* Dkt. No. 81-11 at 2. At the end of that process, ADT calculates $F_{21} \geq 1.20$ using the 9-columns approach and $F_{21} \leq 1.20$ using the other method. *Id.* at 3. Because the claims require $F_{21} \geq 1.20$, the two methodologies have materially different results.

In a single sentence from its reply, Fractus concludes Exhibit K's grid G_2 "does not properly cover the antenna contour—in direct contradiction of the patents' teachings." Dkt. No. 89 at 11. Expounding on that point at the hearing, Fractus accused ADT of "miscount[ing] the number of cells that enclose a perimeter," as ADT counted "only 41 cells that enclose the perimeter" when "[t]here's actually 42. When you plug that into the F_{21} calculation, you get a 1.22 value, again, in excess of the threshold set out in the patents." Hr'g Tr., Dkt. No. 112 at 98:1–4. But that argument misses the forest for the trees. If that same antenna were slightly modified such that the proper count were, in fact, 41 cells, that still makes ADT's point, regardless of whether such an hypothetical antenna is an accused instrumentality.[7]

As with the Court's consideration of the various methods for deriving the antenna contour, that leaves the second prong of *Ball Metal*'s test. According to ADT, the patent provides "no guidance as to when 9 columns for grid G2 would be an appropriate choice." Dkt. No. 82 at 29. Fractus replies that the patents give "substantial guidance" and that G2 "should have 9 columns and an odd number of between 3–9 rows." Dkt. No. 89 at 10. Because Fractus takes the position that the patent requires (rather than permits) 9 columns in G2, it's briefing does not address whether, if there are multiple methods for constructing G_2, the patents suggest one method or the other under

[7] Fractus better details its position in a sealed exhibit used at the hearing. *See* Dkt. No. 88-2 at 3. Specifically, it asserts (1) ADT failed to count Cell 27, and (2) "there is a gap on the right-hand side between the grid and the antenna contour." *Id.* If those assertions are correct, an antenna contour that *excludes* Cell 27 (or any other one cell) and *extends* the right side of the antenna to fill the gap would render ADT's calculations correct.

certain conditions.

ADT's position is appealing, but the current record does not satisfy ADT's burden on the second prong of *Ball Metal*'s test. The Court will therefore consider the matter further if it is raised at the summary judgment stage. For now, however, the Court holds that ADT has not yet carried its burden to show that the term is indefinite.

V. CONCLUSION

Disputed Term	The Court's Construction
"wireless device" ('092 Patent, all asserted claims; '103 Patent, all asserted claims; '200 Patent, all asserted claims)	Plain and ordinary meaning
"mobile communication device" ('887 Patent, all asserted claims; '365 Patent, all asserted claims)	Plain and ordinary meaning
"common conductor" ('887 Patent, Claims 1, 14; '365 Patent, Claims 1, 37)	"a conductor common to two or more radiating arms"
"perimeter" ('092 Patent, Claims 1, 11, 12, 26; '103 Patent, Claims 12; '200 Patent, Claims 1, 3, 6, 9, 11)	"boundary of an object"
"not similar [in shape/in size]" ('092 Patent, Claim 1; '246 Patent, Claims 13, 15, 30)	**"not similar in shape":** "differing in shape" **"not similar in size":** indefinite
"hole(s) intersects the (external) perimeter" ('092 Patent, Claims 11, 32; '246 Patent, claims 18, 28)	No construction necessary beyond the construction of "perimeter"

Disputed Term	The Court's Construction
"4G communication standard / communication standard(s)" ('103 Patent, Claims 12, 16, 19, 20) "receive signals from a 4G communication standard" ('200 Patent, Claim 1)	Plain and ordinary meaning.
"complexity factor" ('103 Patent, Claims 16, 20; '200 Patent, Claims 6, 11)	Not indefinite.

The Court **ORDERS** each party not to refer, directly or indirectly, to its own or any other party's claim-construction positions in the presence of the jury. Likewise, the Court **ORDERS** the parties to refrain from mentioning any part of this opinion, other than the actual positions adopted by the Court, in the presence of the jury. Neither party may take a position before the jury that contradicts the Court's reasoning in this opinion. Any reference to claim construction proceedings is limited to informing the jury of the positions adopted by the Court.

SIGNED this 25th day of February, 2024.

ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE