

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
TYLER DIVISION**

**FRACTUS, S.A.,**

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**Plaintiff,**

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**vs.**

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**CIVIL ACTION No. 6:09cv00203**

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**SAMSUNG ELECTRONICS CO., LTD.;**

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**et. al.**

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**Defendants,**

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**MEMORANDUM ORDER AND OPINION**

This claim construction opinion construes the disputed terms in U.S. Patent Nos. 7,015,868 (the ‘868); 7,123,208 (the ‘208); 7,394,432 (the ‘432); 7,397,431 (the ‘431); 7,528,782 (the ‘782); 7,148,850 (the ‘850); 7,202,822 (the ‘822); 7,312,762 (the ‘762); 7,411,556 (the ‘556) (collectively “patents-in-suit”). The parties have presented their claim construction positions with Defendants diverging on some terms and filing separate oppositions.<sup>1</sup> (Doc. Nos. 423, “PL.’s BR.,” 428 “PKU DEF. RESP.,” 430, “DEF.’S RESP.,” 439, “PL.’S REPLY”). On September 2, 2010, the Court held a claim construction hearing and heard further argument (Doc. No. 455). The Court issued a provisional claim construction order on November 9, 2010. (Doc. No. 475). For the reasons stated herein, the Court adopts the constructions set forth below.

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<sup>1</sup> Defendants Palm, Inc., Kyocera Wireless, Inc., Kyocera Communications, Inc., and UTStarcom, Inc. (“PKU”) filed a separate opposition with regard to the terms “multilevel structure,” “first radiating arm” and “second radiating arm.” Otherwise, the PKU Defendants joined the other Defendants, HTC, RIM, Samsung, LG and Pantech (“RIM”) opposition.

## CLAIM CONSTRUCTION PRINCIPLES

“It is a ‘bedrock principle’ of patent law that ‘the 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) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). The Court examines a patent’s intrinsic evidence to define the patented invention’s scope. *Id.* at 1313-1314; *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). Intrinsic evidence includes the claims, the rest of the specification and the prosecution history. *Phillips*, 415 F.3d at 1312-13; *Bell Atl. Network Servs.*, 262 F.3d at 1267. The Court gives claim terms their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention. *Phillips*, 415 F.3d at 1312-13; *Alloc, Inc. v. Int’l Trade Comm’n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003).

Claim language guides the Court’s construction of claim terms. *Phillips*, 415 F.3d at 1314. “[T]he context in which a term is used in the asserted claim can be highly instructive.” *Id.* Other claims, asserted and unasserted, can provide additional instruction because “terms are normally used consistently throughout the patent.” *Id.* Differences among claims, such as additional limitations in dependent claims, can provide further guidance. *Id.*

“[C]laims ‘must be read in view of the specification, of which they are a part.’” *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995)). “[T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). In the specification, a patentee may define his own terms, give a claim term

a different meaning that it would otherwise possess, or disclaim or disavow some claim scope. *Phillips*, 415 F.3d at 1316. Although the Court generally presumes terms possess their ordinary meaning, this presumption can be overcome by statements of clear disclaimer. *See SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343-44 (Fed. Cir. 2001). This presumption does not arise when the patentee acts as his own lexicographer. *See Irdeto Access, Inc. v. EchoStar Satellite Corp.*, 383 F.3d 1295, 1301 (Fed. Cir. 2004).

The specification may also resolve ambiguous claim terms “where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone.” *Teleflex, Inc.*, 299 F.3d at 1325. For example, “[a] claim interpretation that excludes a preferred embodiment from the scope of the claim ‘is rarely, if ever, correct.’” *Globetrotter Software, Inc. v. Elam Computer Group Inc.*, 362 F.3d 1367, 1381 (Fed. Cir. 2004) (quoting *Vitronics Corp.*, 90 F.3d at 1583). But, “[a]lthough the specification may aid the court in interpreting the meaning of disputed language in the claims, particular embodiments and examples appearing in the specification will not generally be read into the claims.” *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988); *see also Phillips*, 415 F.3d at 1323.

The prosecution history is another tool to supply the proper context for claim construction because a patentee may define a term during prosecution of the patent. *Home Diagnostics Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1356 (Fed. Cir. 2004) (“As in the case of the specification, a patent applicant may define a term in prosecuting a patent”). The well established doctrine of prosecution disclaimer “preclud[es] patentees from recapturing through claim interpretation specific meanings disclaimed during prosecution.” *Omega Eng’g Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir.

2003). The prosecution history must show that the patentee clearly and unambiguously disclaimed or disavowed the proposed interpretation during prosecution to obtain claim allowance. *Middleton Inc. v. 3M Co.*, 311 F.3d 1384, 1388 (Fed. Cir. 2002). “Indeed, by distinguishing the claimed invention over the prior art, an applicant is indicating what the claims do not cover.” *Spectrum Int’l v. Sterilite Corp.*, 164 F.3d 1372, 1378-79 (Fed. Cir. 1988) (quotation omitted). “As a basic principle of claim interpretation, prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public’s reliance on definitive statements made during prosecution.” *Omega Eng’g, Inc.*, 334 F.3d at 1324.

Although, “less significant than the intrinsic record in determining the legally operative meaning of claim language,” the Court may rely on extrinsic evidence to “shed useful light on the relevant art.” *Phillips*, 415 F.3d at 1317 (quotation omitted). Technical dictionaries and treatises may help the Court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but such sources may also provide overly broad definitions or may not be indicative of how terms are used in the patent. *Id.* at 1318. Similarly, expert testimony may aid the Court in determining the particular meaning of a term in the pertinent field, but “conclusory, unsupported assertions by experts as to the definition of a claim term are not useful.” *Id.* Generally, extrinsic evidence is “less reliable than the patent and its prosecution history in determining how to read claim terms.” *Id.*

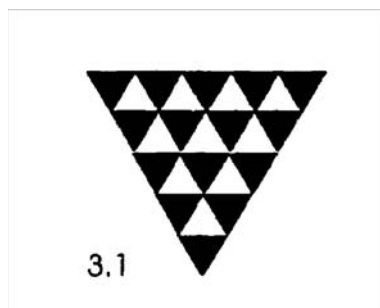
## **DISCUSSION**

### **A. Overview of Patents-in-Suit**

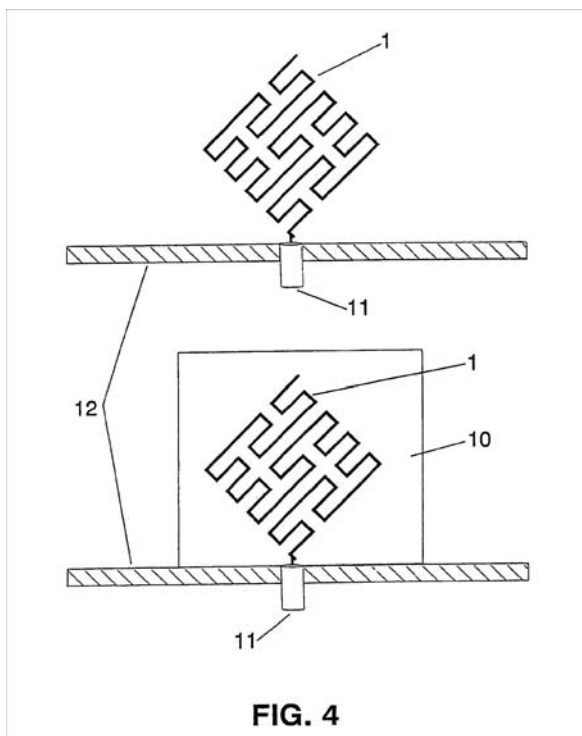
The patents-in-suit can be categorized into four patent families: (1) the “multilevel” family (“MLV”) which includes the ‘868, ‘208, ‘432, ‘431 and ‘782; (2) the “space-filling” antenna family

(“SFC”) which includes the ‘850 and ‘822; (3) the “loaded” antenna patent which is the ‘762; and (4) the “multiband monopole” patent which is the ‘556.

The MLV patent family generally claims antennae made up of “multilevel structures.” The term “multilevel” was coined by the inventors to describe the structural configuration of the claimed antennae. The ‘432 derived from a divisional application, in which the parent application issued as the ‘431. The ‘432 is a continuation of the ‘208, which in turn, is a continuation of the ‘868. The ‘782 is a continuation of the ‘431. The patents explain that MLV structures are generally characterized by their shape. ‘868 at 2:32-33. The claimed invention relates to a specific geometric design of antennae which facilitates two main advantages: multiband operation and/or small size. *Id.* at 1:13-16. One configuration of a multilevel structure is depicted in figure 3.1:



The SFC patent family generally claim antennae based on a specific geometry known as “space-filling curves.” ‘850 at 1:13-15. The patent explains that by using space-filling curves, the antennae can be reduced in size compared with prior existing antennae. *Id.* at ABSTRACT. The ‘822 is a continuation of the ‘850, thus they consist of a common specification but include different claim language. Figure 4 of the patent provides a depiction of a particular SFC antenna consisting of a monopole antenna:



The loaded antenna patent claims antennae in which the radiating element consists of two different parts: a conducting surface and a loading structure. ‘762 at ABSTRACT. The conducting surface is described as consisting of a “polygon, space-filling or multilevel shape” and the loading structure consists of “a conducting strip or set of strips” connected to the conducting surface. *Id.* at 2:41-43.

The multiband monopole patent claims antennae designed for a mobile communications device. ‘556 at ABSTRACT. The design of a multiband monopole antenna is described to include a “common conductor coupled to both a first radiating arm and a second radiating arm.” *Id.* at 1:36-38.

**B. Disputed Terms**

“Multilevel structure” [‘868, cl. 1, 6, 12, 14; ‘208, cl. 1, 15, 29, 48; ‘431, cl. 1, 22, 24-27, 31; ‘432, cl. 1; ‘762, cl. 1, 15, 21] and “a structure” [‘782, cl. 1, 2] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
<p>“A structure for a non-fractal antenna operating at multiple frequency bands with at least two overlapping levels of detail. Each level of detail includes elements that have the same shape or the same number of sides or faces, electromagnetically coupled and grouped to form a larger structure, where most of the elements have an area of contact, intersection or interconnection with other elements that is less than 50% of the perimeter or area.”</p> <p>Ordinary meaning: “an arrangement of parts”</p>	<p><b>For HTC, RIM, Samsung, LG, Pantech:</b> “a symmetrical arrangement presenting at least two levels of detail: 1) polygons(or polyhedrons) of the same type with the same number of sides (or faces),most of which are clearly visible and individually distinguishable; and 2) an ordered structure formed by grouping the polygons (or polyhedrons), which can be further grouped into higher order structures similar to the way the polygons (or polyhedrons) are grouped.”</p> <p><b>For Kyocera, Palm, and UTStarcom:</b>“a symmetrical arrangement presenting at least two levels of detail: 1) polygons(or polyhedrons) of the same type with the same number of sides (or faces),most of which are clearly visible and individually distinguishable; and 2) an ordered structure formed by grouping the polygons (or polyhedrons), which can be further grouped into higher order structures similar to the way the polygons (or polyhedrons) are grouped, the arrangement having radioelectric behavior that can be similar in several frequency bands such that its impedance and radiation diagrams remain similar across frequency bands and wherein the number of bands is proportional to the number of levels”</p>

All parties agree that the “multilevel structure” must have at least two levels of detail. DEF.’S RESP. at 4; PL.’S REPLY at 1. Otherwise, there a number of issues in dispute.

Plaintiff contends that the inventors disclaimed “fractal” antennae and includes such a limitation in its construction. PL.’S BR. at 6. Defendants counter than such a limitation is “meaningless and vague.” DEF.’S RESP. at 11-13. Defendants contend that the multilevel structure must be symmetrical. DEF.’S RESP. at 7-9. Plaintiff disagrees. *Id.* at 12-13; PL.’S REPLY at 4-5.

Plaintiff also argues that the specification dictates overlap between the two levels of detail that make up the multilevel structure. PL.’S BR. at 6-7. Defendant contends that such a construction is unsupported and would read out embodiments. DEF.’S RESP. at 13-14. Defendants’ construction limits the levels of detail to “polygons” or “polyhedrons” of the same type with the same number sides or faces. *Id.* at 4-6. Plaintiff asserts that the construction should include the generic term “element” because it is inclusive of claims using the phrase “geometric element.” PL.’S BR. at 7. The parties also disagree whether a multilevel structure must support “a higher order structure.” DEF.’S RESP. at 6-7; PL.’S BR. at 10-12; PL.’S REPLY at 2-4.

The PKU Defendants contend that a multilevel structure must operate in multiple bands and have similar radioelectric behavior. PKU DEF. RESP. at 1-2. The RIM Defendants and Plaintiff disagree. PL.’S BR. at 13-14; DEF.’S RESP. at 14-15. The parties also disagree whether “structure” should be construed the same as “multilevel structure.” PL.’S BR. at 14-15; DEF.’S RESP. at 9-11.

The term “multilevel structure” was coined by the inventors, thus, the term’s meaning must be discerned from the intrinsic evidence. *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 338 F.3d 1295, 1303 (Fed. Cir. 2004). The inventor’s lexicography regarding the meaning of “multilevel structure” should control. *Phillips*, 415 F.3d at 1316. Generally, when a patent “describes the features of the present invention as a whole, this description limits the scope of the invention.” *Verizon Services Corp. v. Vonage Holdings Corp.*, 509 F.3d 1295, 1308 (Fed. Cir. 2007). However, “such [present invention] language must be read in context of the entire specification and prosecution history.” *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081, 1094-95 (Fed. Cir. 2003).

Particular portions of the MLV patent family specifications (“MLV specifications”) provide



the definition for a multilevel structure. Specifically, the MLV specifications use signals such as “the present invention consists of” (‘868 at 2:32-56) to highlight the most relevant features of the multilevel structure. *See also id.* at 1:8-19 (“the present invention relates to”); *id.* at 3:20-33 (“the main characteristic of”); *id.* at 4:42-5:5 (“[t]he present invention relates to”); *id.* at 6:19-34 (“[t]he most relevant properties of”). Thus, the Court looks to these portions of the MLV specifications for the construction of “multilevel structure,” in context of the entire specification and prosecution history. *Rambus Inc.*, 318 F.3d at 1094-95.

*Multilevel Structure vs. Structure*

As an initial matter, the Court finds that “multilevel structure” and “structure” require the same construction. The term “structure” appears in independent claims 1, 2 and 3 of the ‘782. ‘782 at 9:61-11:15. As Plaintiff concedes, the MLV specifications are virtually identical. PL.’s BR. at 5, fn. 1. While the ‘782 patent uses “structure” as opposed to “multilevel structure” within its claim language, the MLV specifications provide little support for construing the more generic term “structure” differently. Plaintiff’s supporting citations to the MLV specifications are not to the contrary. For example, Plaintiff cites the following language: “[i]n addition to their multiband behavior, multilevel structure antennae usually have a smaller than usual size as compared to other antennae of a simpler structure.” ‘868 at 3:5-8. The cited portion does not support Plaintiff’s argument that “structure” used without the modifier “multilevel” is used to describe the claimed antenna. In fact, the cited portion refers to “simpler structures” in the prior art – not the claimed invention.

Further, the MLV specifications use the terms “multilevel structure” and “structure” interchangeably. *See* ‘782 at ABSTRACT; *id.* at 2:46-61; *id.* at 4:67-5:2; *id.* at 7:51-59. Additionally,

all sixty-six (66) disclosed embodiments are described as including a multilevel structure. ‘782 at 4:10-45. The MLV specifications establish that the entire essence of the invention pertains to *multilevel* structures. See ‘782 at 4:54-56 (“The present invention relates to an antenna which includes at least one construction element in multilevel structure form.”); see also *id.* at 1:20-25; *id.* at 2:46-62. Indeed, the entire intrinsic record of the multilevel antenna is consistently clear that the basic geometry of the invention is based on “multilevel structures” not generic “structures.” Accordingly, the Court provides the same construction for “multilevel structure” and “structure.”<sup>2</sup>

#### *Non-fractal*

Plaintiff proposes a construction that explicitly disclaims “fractal” antennae. PL.’S BR. at 6. The MLV specifications do appear to teach away from “fractal antennae,” but the MLV specifications do not provide any meaningful definition of “fractal antennae” within the context of the patent. The MLV specifications merely state that “strictly fractal antennae” cannot be constructed in the real world. ‘868 at 1:47-49. Thus, while the claimed invention is inherently “non-fractal,” because strictly fractal antennae are a scientific impossibility, the MLV specifications do not explicitly use the term “non-fractal” to describe multilevel antennae nor do they define “fractal.” Put simply, without a definition of what is meant by “fractal,” there is no way of determining the parameters of “non-fractal” antennae.

The MLV specifications explain that antennae may be constructed “with a form based on said fractal objects, incorporating a finite number of iterations.” *Id.* at 1:49-51. However, while the

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<sup>2</sup> The Court notes that the specification is fundamentally drawn to multilevel structures. Thus, if the terms “multilevel structure” and “structure” were construed different from one another, it would raise the possibility that the ‘782 patent would not be entitled to a priority date earlier than its own filing date of July 20, 2007. See *Anascape, Ltd. v. Nintendo of Am. Inc.*, 601 F.3d 1333, 1340 (Fed. Cir. 2010) (finding that broadening the scope of a later filed patent would preclude entitlement to filing date of earlier filed parent application).

claimed antennae may be based on fractal objects, the antennae is only “non-fractal,” because, as the patent and parties agree, purely fractal antennae are a scientific impossibility. Thus, including the negative limitation “non-fractal” adds nothing to the construction because all antennae are strictly non-fractal. Accordingly, the Court will not include the term “non-fractal” in its construction.<sup>3</sup>

### *Symmetrical*

Defendants contend that a multilevel structure is “symmetrical” by claiming that all 66 figures in the MLV specifications exhibit symmetry. DEF.’S RESP. at 7-9. Contrary to Defendants’ assertions, Figure 5.8 in the MLV specifications does not exhibit symmetry. Defendants’ attempt to characterize Figure 5.8 as a meta-structure with three axes of symmetry is unpersuasive. Moreover, symmetry is never mentioned in the MLV specifications to describe multilevel structures. The most relevant portions of the MLV specifications do not emphasize symmetry. For example, symmetry is not mentioned in the MLV specifications where the “main characteristics” of multilevel geometry are described. ‘868 at 3:20-33. As such, the Court does not adopt Defendants’ proposed “symmetrical” construction.

### *Useable at Multiple Frequency Bands*

The MLV specifications repeatedly describe multiband behavior as a highly relevant property of multilevel antennae. For example, the MLV specifications explain that the geometry

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<sup>3</sup> Plaintiff provides citations to the MLV specifications and other references purporting to define “fractal antenna,” but those citations merely support a finding that while antennae may be based on fractal objects, all antennae are inherently non-fractal. The Court recognizes the existence of references that refer to “fractal antenna,” as well as the examiner’s statements in the *inter partes* reexamination of the ‘868 stating that the inventors disclaimed “fractal antenna.” See (Doc. No. 452; DEF’S SUMMARY JUDGMENT EXHIBIT DDD). However, the Court is hesitant to define something as a “non-fractal antenna” without a clear understanding of what entails a “fractal antenna.” If necessary, the Court may choose to construe the term “fractal antenna” at a later date to aid the jury in understanding the nature of what is claimed in the patents-in-suit.

of multilevel antennae, *i.e.* the multilevel structure, provides the most relevant properties of multilevel antennae including the “possibility of simultaneous operation in several frequency bands” *i.e.* multiband behavior. *Id.* at 6:19-34; *see also id.* at 2:26-31 (“[multilevel antennae] provide a multiband behavior and/or a small size.”); *id.* at 3:29-33 (“multilevel antennae can present a multiband behavior (identical or similar frequency bands) and/or operate at a reduced frequency.”) Moreover, the possibility of multiband behavior is described as the essence of the invention. *See id.* at 2:26-31 (describing that the “origin of the name” of multilevel antennae lies in the multiband property). As such, the multilevel structure of the claimed antennae provides for the possibility of operation in multiple frequency bands.

The Court notes that generally it is “improper to determine [structural terms] as having functional requirements,” unless the function is a necessary limitation of the claim term. *Schwing GmbH v. Putzmeister Aktiengesellschaft*, 305 F.3d 1318, 1324 (Fed. Cir. 2001) (citing *Toro Co. v. White Consol. Indus., Inc.*, 266 F.3d 1367, 1371 (Fed. Cir. 2001)). As explained above, the concept of multiband operation is intertwined into the essence of the multilevel structure, *i.e.* the multilevel geometry which provides the basis of the multilevel antennae. In fact, the name “multilevel antenna” is derived from the multiband nature of the antennae. ‘868 at 2:26-31. Thus, this is an instance when a structural term does not resist a functional limitation due to the essential nature of the multilevel structure’s multiband operation. *Toro*, 305 F.3d at 1371.

Plaintiff’s construction, however, requires the claimed antenna to “operate” at multiple frequency bands. Such a construction is too narrow because the specification provides only that the antenna may operate at multiple bands. Accordingly, the Court modifies Plaintiff’s proposal to

“useable at multiple frequency bands.”<sup>4</sup>

*Overlapping Levels of Detail*

The parties agree that a multilevel structure is made up of at least two levels of detail. Plaintiff, however, adds the limitation that the levels of detail must overlap. PL.’S BR. at 6-7. Defendants are correct that “overlap” is only used in the MLV specifications to describe the sides of polygons contacting each other. DEF.’S RESP. at 13-14. On the other hand, Plaintiff is correct that the MLV specifications describe the two levels of detail consisting of the overall structure and the individual elements that make up the overall structure. ‘868 at 2:48-52. Therefore, the Court adopts the concept of one level of detail making up another level of detail by construing the multilevel structure as consisting of “at least two levels of detail, wherein one level of detail makes up another level.”

*Polygons and Polyhedrons*

The parties also disagree whether the levels of detail that compose the multilevel structure are made up of “elements” (PL.’S BR. at 7-10) or “polygons”<sup>5</sup> (DEF.’S RESP. at 5-6). Defendants’ construction is correct. The MLV specifications explicitly describe the “main characteristics” of the multilevel structure to include “multilevel geometry comprising polygon or polyhedron of the same class.” ‘868 at 3:20-23; *see also id.* at 2:32-35; *id.* at 2:48-52; *id.* at 4:44-46. Plaintiff’s generic “elements” are not independently supported in the MLV specifications. Any mention of “elements” either implicitly or explicitly refers to polygons and/or polyhedrons. Plaintiff’s citation

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<sup>4</sup> The Court’s provisional order (Doc. No. 475) included Plaintiff’s proposed construction which read “operating at multiple frequency bands.” After further review, the Court clarifies the previous order by changing “operating” to “useable.”

<sup>5</sup>Or polyhedrons

to Claim 1 of the '431 is unavailing. PL.'S BR. at 9. The Court agrees that the '431 appears to claim broader "geometric elements." '431 at 9:53-10:8. However, the MLV specifications explicitly demonstrate that the "geometric elements" are understood to be "polygons or polyhedrons," not broader "elements." '431 at ABSTRACT. Accordingly, the Court construes the multilevel structure as composed of polygons or polyhedrons.

*Same Type with Same Number of Sides or Faces*

Defendants also contend that the polygons and polyhedrons must be of the same type with the same number of sides or faces. DEF.'S RESP. at 5-6. Plaintiff agrees that the "elements" must be of the "same shape." Plaintiff concedes that the "individual elements" must have the same number of sides or faces. PL.'S REPLY at 1.

Initially, the distinctions between "same type," "same class" and "same shape" are without difference. Thus the Court adopts Defendants' "same type" as it is used in the MLV specifications. '868 at 2:24-25. Moreover, the MLV specifications explicitly require the multilevel structures to be formed by polygons or polyhedrons with the same number of sides or faces. '868 at 4:67-5:2. As such, the Court adopts Defendants' proposed construction that the multilevel structure is composed of polygons (polyhedrons) of the same type with the same number of sides (faces).

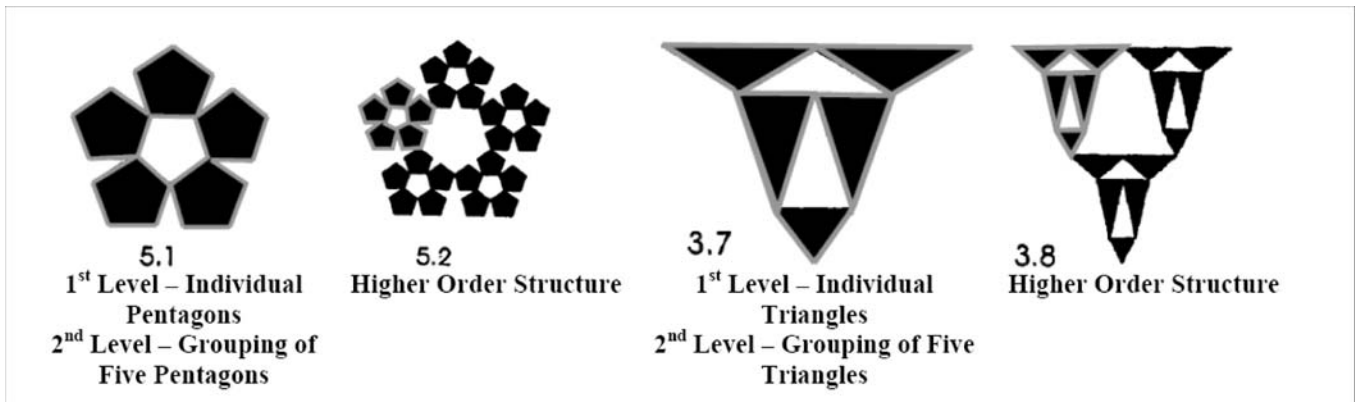
*Clearly Visible and Individually Distinguishable*

Defendants are also correct that most of the polygons or polyhedrons must be clearly visible and individually distinguishable. The MLV specifications explain that the polygons and polyhedrons must remain individually distinguishable in the multilevel structure. '868 at 4:58-60 ("in a multilevel structure it is easy to identify geometrically and individually distinguish most of its basic component elements."); *see also id.* at 1:8-10 (describing the present invention as an

antenna formed by polygons or polyhedrons such that each of the basic elements may be distinguished); *id.* at ABSTRACT (same). The MLV specifications also describe as a “main characteristic” that most of the polygons and polyhedrons must remain clearly visible. *Id.* at 3:33-41 (“[i]n a multilevel geometry most of [the polygons or polyhedrons] are clearly visible.”). Therefore, the Court adopts Defendants’ proposed construction that the polygons or polyhedrons must be clearly visible and individually distinguishable.

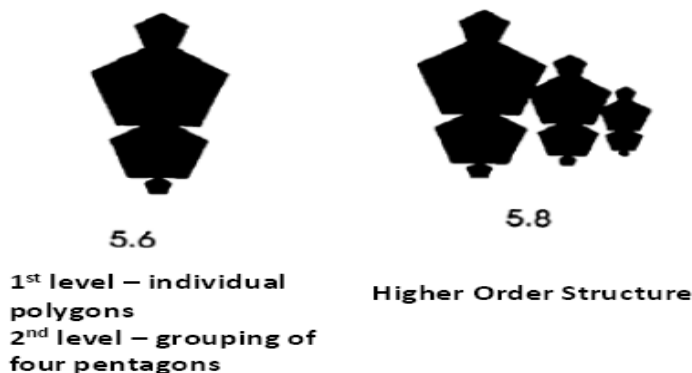
*Higher Order Structures*

Defendants contend that a multilevel structure can be grouped into “higher order structures” similar to the way the polygons or polyhedrons are grouped in the first and second levels of detail. DEF.’S RESP. at 6-7. Defendants provide the following annotated figures from the MLV specifications to demonstrate support for their construction:



Defendants further rely on a statement within the MLV specifications that a multilevel structure “can be grouped in higher order structures in a manner similar to the basic elements.” ‘868 at 2:32-48.

The Court first notes that the MLV specifications provide that higher order structures are permissive, not mandatory. ‘868 at 2:32-48 (stating that elements *can* be grouped in higher order structures). Moreover, the Court agrees that the polygons or polyhedrons may be grouped into higher order structures in a manner similar to the basic elements. ‘868 at 2:32-48. However, the Court finds that Defendants’ reading of the cited passage is too restrictive. Grouping the higher order structure “in a manner similar” to the basic elements does not absolutely require that the higher order structure replicate the exact shape of the lower order polygons or polyhedrons. For example, Plaintiff’s annotated Figures 5.6 and 5.8 from the MLV specifications demonstrate that the basic polygons in Figure 5.6 can be grouped in a “similar” manner to form the higher order structure in Figure 5.8, despite the fact that 5.8 does not embody the exact shape of the lower level polygons:



Other embodiments of multilevel structures do not meet Defendants restrictive reading of the MLV



specification, including Figures 3.6, 3.13, 4.9, 5.7 and 6.9.

In addition to Defendants' restrictive reading of the MLV specifications, the Court finds that the basic principle of higher order structures is not a necessary element to include in the construction of multilevel structure. "Multilevel structure" already requires an exceedingly complicated construction and adding this permissive and unnecessary element will only lead to jury confusion and potential gamesmanship by the parties. Accordingly, the Court declines to adopt Defendants' construction.

*Area of Contact, Intersection or Interconnection*

Defendants argue that the last portion of Plaintiff's construction is incorrect because it excludes embodiments comprising polyhedrons. DEF.'S RESP. at 14. While Defendants are correct that Plaintiff's proposed construction would exclude polyhedrons, the MLV specifications require most of the polygons or polyhedrons to have a "an area of contact or intersection (if it exists) between the majority of elements forming the antenna." '868 at 2:52-56; *see also id.* at 3:24-28 ("[i]n multilevel geometry most of these [polygons or polyhedrons] are clearly visible as their area of contact, intersection or interconnection (if these exists) with other [polygons or polyhedrons] is always less than 50% of their perimeter."). Also, Plaintiff addressed the issue by modifying its construction including "area" at the end of the proposed construction. PL.'S REPLY at 1, fn. 1.

The MLV specifications explain that "[i]n a multilevel structure at least 75% of its component elements have more than 50% of their perimeter (for polygons) not in contact with any other elements of the structure." *Id.* at 4:55-58. Because the inventor's lexicography controls, such a characteristic it is an important feature of the "multilevel structure". *See Verizon Services Corp.*, 509 F.3d at 1308. Therefore, the Court's adopts Plaintiff's modified construction which includes polyhedrons: "most

of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons)<sup>6</sup> that is less than 50% of the perimeter or area.”

*PKU Defendants’ Proposal*

The PKU Defendants contend that an essential property of a multilevel structure is the capability of providing similar radioelectric behavior across several frequency bands where the number of bands is proportional to the number of levels of detail. PKU DEF. RESP. at 1-2. The RIM Defendants and Plaintiff disagree. The PKU Defendants’ proposed construction appears to agree with Plaintiff’s construction that a multilevel structure must support multiband operation. As explained above, the Court’s construction includes this essential feature by including the language “useable at multiple frequency bands.”

On the other hand, the PKU Defendants’ construction further requires that the impedance and radiation diagrams remain similar across frequency bands and the number of bands be proportional to the number of levels of detail. While the concept of multiband operation is an essential feature of the multilevel structure, PKU’s additional limitations include functional elements not essential to the operation of the multilevel antennae. The origin of the name “multilevel” is derived directly from the multiband operational possibility. PKU’s construction, however, impermissibly imports functional limitations that are not necessary limitations of the structural term. *Schwing GmbH*, 305 F.3d at 1324 (citing *Toro*, 266 F.3d at 1371).

Based on the foregoing, the Court construes both terms, “multilevel structure” and “structure” as, “a structure for an antenna useable at multiple frequency bands with at least two levels of detail,

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<sup>6</sup> To avoid any potential confusion, the Court modifies the provisional construction by adding a parenthetical after “elements” to ensure that the parties understand that elements refers to the previously mentioned polygons or polyhedrons.

wherein one level of detail makes up another level. These levels of detail are composed of polygons (polyhedrons) of the same type with the same number of sides (faces) wherein most of the polygons (polyhedrons) are clearly visible and individually distinguishable and most of the polygons (polyhedrons) having an area of contact, intersection or interconnection with other elements (polygons or polyhedrons) that is less than 50% of the perimeter or area.”

“Polygon” [‘868, cl. 1, 3, 6; ‘208, cl. 1, 5, 15, 18, 29, 33, 37, 48; ‘762, cl. 1, 21] as:

Plaintiff’s Proposed Construction	Defendant’s Proposed Construction
“a closed figure having a number of sides”	“a closed plane figure bounded by straight lines”

Plaintiff argues that polygons are not limited to a perimeter with straight lines. PL.’S BR. at 15 -17; PL.’S REPLY at 7-8. Plaintiff contends that Defendants’ requirement that polygons be bounded by straight lines contradicts the claim language in various dependent claims and that the MLV specifications support circles and ellipses as “polygons.” *Id.* Defendants assert that the plain and ordinary meaning of polygon should control because the term is not defined in the MLV specifications. DEF. RESP. at 15-16. Defendants also argue that the intrinsic evidence supports a construction that polygons are bounded by straight lines. *Id.* at 16-17. Plaintiff further contends that the MLV specifications do not support a construction that polygons are planar when used to form specific embodiments of the antennae. PL.’S BR. at 17-19; PL.’S REPLY at 8. Defendants counter that the embodiments cited by Plaintiff consist of individual polygons which are in a single plane. DEF. RESP. at 17-18.

The Federal Circuit has “frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’ *Phillips*, 415 F.3d at 1312 (citing *Vitronics*, 90 F.3d at 1582).

Moreover, the Federal Circuit has authorized district courts to consult dictionaries to assist in “determining the meaning of particular [terms].” *Id.* at 1318 (citing *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002)). The MLV specifications do not provide an explicit definition of “polygon.” Thus, the Court construes “polygon” according to its plain and ordinary meaning.

The parties have cited various technical and general dictionaries to support their constructions. *See* PL.’S BR. at 17; DEF. RESP. at 15-16. All of the dictionaries support a finding that the independent term “polygon” is best described by Defendants’ construction, “a closed plane figure bounded by straight lines.” The Court notes that Plaintiff’s dictionary citations are to “curvilinear polygons,” which allow for the possibility of curved sides as opposed to the strict requirement of straight line segments. *See* PL.’S EXHIBITS 13, 14. However, the dictionaries also demonstrate that if the inventors of the MLV patents intended to claim curvilinear polygons, they would have used the technical term. Indeed, nothing before the Court establishes that a person of ordinary skill in the art would read “polygons” to include “curvilinear polygons.”

On the other hand, the MLV specifications specifically identify circles or ellipses as a special limiting case of polygons. ‘868 at 2:32-37 (“[t]he present invention consists of an antenna . . . compris[ing] for example, triangles . . . or even circles and ellipses as a limiting case of a polygon with a large number of sides.”); *id.* at 4:42-48 (“[t]he present invention relates to an antenna . . . that is formed by gathering several polygon or polyhedron of the same type (for example, triangles, . . . even circles or ellipses as special limiting cases of a polygon with a large number of sides.”)). Additionally, the inventors of the MLV patents explicitly claimed embodiments allowing some sides of “polygons” formed with portions of circles and ellipses. *See e.g.* ‘208 at 10:17-19 (“4. The multi-

band antenna as set forth in claim 1, wherein at least some polygons have perimeter regions comprising portions of circles or ellipses). As such, the Court construes “polygon” as, “a closed plane figure bounded by straight lines, further including circles and ellipses.”

“Polyhedron” [‘868, cl. 9] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“a closed solid figure bounded by polygons”	“a closed solid figure bounded by polygons”

The parties agreed to the construction of this term prior to the September 2, 2010 claim construction hearing and the Court adopts the agreed construction, “a closed solid figure bounded by polygons.”

“Polygonal element” [‘868, cl. 1, 3, 6; ‘208, cl. 1, 5, 15, 18, 29, 33, 37, 48; ‘762, cl. 1, 21] and “polyhedral element” [‘868, cl. 1, 3; ‘208, cl. 1, 5, 29, 48] as

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“polygon-like figure”	“a closed plane figure bounded by straight lines”
“polyhedral-like figure”	“polyhedron”

The Court finds that these terms do not require construction, other than those already construed.

“Geometric elements” [‘782, cl. 1, 2, 22-28; ‘432, cl. 1-3; ‘431, cl. 1, 4, 5, 7, 8, 22] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“closed figure made up of or formed by lines, curves, or surfaces”	“polygons or polyhedrons”

The term “geometric elements” appears in the claims of the ‘431, ‘432 and ‘782 patents. The

earlier filed '868 claims use the narrower terms "polygon" and "polyhedron" as opposed to "geometric elements." Plaintiff contends that because some claims use polygon and polyhedron, under the doctrine of claim differentiation, the claims that use "geometric elements," create a strong implication that the terms have different meanings. PL.'S BR. at 20-22. Plaintiff proposes a dictionary definition for "geometric element," because it is not otherwise defined within the MLV specifications. PL.'S BR. at 21. Plaintiff further contends that if Defendants' are correct that a polygon requires straight sides (*see* Defendants' proposed construction for polygon), then "geometric elements" must be broader to encompass claims in the '431 and '432 which recite curved sides. PL.'S BR. at 21-22; PL.'S REPLY at 8-9.

Defendants' contend that "geometric elements" must be construed as "polygons or polyhedrons" because the terms are used interchangeably in the MLV specifications. DEF. RESP. at 19-20. Defendants further assert that Plaintiff's construction is incorrect to the extent that it ignores the intrinsic evidence in favor of extrinsic "non-technical dictionaries." DEF. RESP. at 20.

The doctrine of claim differentiation provides that "different words or phrases used in separate claims are presumed to indicate that the claims have different meaning and scope." *Seachange Intl. Inc., v. C-COR, Inc.*, 413 F.3d 1361, 1368 (Fed. Cir. 2005) (citing *Karlin Tech. Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 971-72 (Fed. Cir. 1999)). However, the doctrine "only creates a presumption that each claim in a patent has a different scope; it is not a hard and fast rule of construction." *Id.* at 1369 (quoting *Kraft Foods, Inc. v. Int'l Trading Co.*, 203 F.3d 1362, 1368 (Fed. Cir. 2000)). "[C]laims that are written in different words may ultimately cover substantially the same subject matter." *Id.* (quoting *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1480 (Fed. Cir. 1998)).

The MLV specifications demonstrate that the multilevel antennae are based on a geometry composed of polygons and polyhedrons, not broader “geometric elements.” The MLV specifications describe the “main characteristic[s]” of a multilevel antennae are based on “multilevel geometry comprising polygon or polyhedron.” ‘782 at 3:33-36; *see also id.* at 2:46-49 (“[t]he present invention consists of an antenna . . . characterised (sic) by its geometrical shape, which basically comprises several polygons or polyhedrons.”); *id.* at 4:54-57 (“[t]he present invention relates to an antenna . . . characterized in that it is formed by gathering several polygon or polyhedron.”).

Also, the terms “geometric elements,” “elements” and “polygon and polyhedron” are used interchangeably in the MLV specifications. For example, the “Object of the Invention” section explains that “[t]he present invention relates to antennae formed by sets of similar geometrical elements (polygons, polyhedrons).” ‘782 at 1:22-23; *see also id.* at 2:62-65 ([i]ts designation as multilevel antenna is precisely due to the fact that [the body consists of two levels of detail:] that of the overall structure and that of the majority of elements (polygons or polyhedrons)); *id.* at 2:67-5:2 (“said polygons and polyhedrons” referring back to “elements”); *id.* at 3:12-14 (“it remains possible to identify in the antenna the majority of basic elements (same type of polygons or polyhedrons)); *id.* at 3:35-38 (“elements” referring back to “polygon or polyhedron”); *id.* at 4:63-65 (“[a] multilevel structure [is distinguished from another figure because of the interconnection] between its component elements (the polygon or polyhedron)); *id.* at 5:11-13 (“[i]n a multilevel structure all the component elements are polygons . . . or polyhedron.”)

Accordingly, the Court construes “geometric elements” as “polygons or polyhedrons.”

“Similar impedance level/level of impedance . . . of said antenna are similar” [‘782, cl. 1, 2, 7, 8; ‘208, cl. 7, 21, 40, 54] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
<p>“impedance levels that are related in appearance or nature”</p> <p><b>impedance level:</b> “the combined amount of resistance and reactance”</p>	<p>“impedance level” and “level of impedance” should be construed as:</p> <p>“the combined amount of resistance and reactance presented by antenna at its terminals”</p> <p>No construction for remaining terms</p>

The parties agree that “impedance level” and “level of impedance” should be construed as “the combined amount of resistance and reactance.” PL.’S BR. at 23; DEF. RESP. at 21. The parties also agree that the impedance level is “measured at the input/output connector.” DEF. RESP. at 21; PL.’S BR. at 24; PL.’S REPLY at 9. The parties, however, disagree on the construction of “similar” when referring to impedance levels.

Plaintiff contends that “similar” impedance levels require them to be “related in appearance or nature.” PL.’S BR. at 25. Defendants contend that such a general definition “disembodied from” impedance level is unhelpful and confusing in relation to a technical term. DEF. RESP. at 21-22.

“Similar” is not a technical term and the Court finds that its plain and ordinary meaning should control. *Phillips*, 415 F.3d at 1312 (citing *Vitronics*, 90 F.3d at 1582). As such, the Court construes “impedance level” as “the combined amount of resistance and reactance measured at the input/output connector.” The Court construes “similar” according to its plain and ordinary meaning.



“Substantially similar . . .radioelectric behavior” /“basically the same radio-electric characteristics and functionality” [‘208, cl. 7, 21, 40, 54; ‘431, cl. 1; ‘432, cl. 1] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“impedance levels and radiation patterns that are related in appearance or nature”	No construction

Defendants contend that these terms are indefinite and cannot be construed. DEF. RESP. at 22; (Doc. No. 429 at 13, “DEF. MSJ.”). Defendants contend that it is impossible to determine the boundaries of the phrases because numerous parameters can be used to describe an antenna’s characteristics and functionality and it is unclear which of those parameters must be “basically the same.” DEF. MSJ. at 13. Defendants further contend that the phrase “radio-electric characteristics and functionality” is not supported in the specification. *Id.*

Plaintiff contends the specification supports the construction of “radioelectric behavior.” PL.’S BR. at 25; (Doc. No. 440 at 22-23, “PL.’S RESP. MSJ”). Plaintiff further contends that persons of ordinary skill in the art would understand that “radio-electric characteristics and functionality” in the relevant claims refers to “radioelectric behavior.” PL.’S RESP. MSJ at 22. Plaintiff asserts that the MLV specifications identify the importance of the similarity of two characteristics in the relevant claims: the “radiation diagram and impedance.” *Id.* at 22-23; PL.’S BR. at 25.

*Radioelectric Behavior*

The MLV specifications demonstrate the “radioelectric behavior,” in the context of the MLV patents, refers to impedance and radiation pattern. The MLV specifications explain that a particular property of MLV antennae is “that their radioelectric behavior can be similar in several frequency bands.” ‘868 at 2:57-59. The next sentence in the MLV specifications explains that the antenna

input parameters “impedance and radiation diagram,” “remain similar for several frequency bands.” *Id.* at 2:59-64. The antenna input parameters, *i.e.* impedance and radiation diagram, is a reference back to the “radioelectric behavior” in the previous sentence in the paragraph. Also, the MLV specifications describe Figures 9 and 10 as showing “typical radioelectric behavior” for a specific embodiment of a MLV antenna. *See* ‘868 at 8:27-29. Figure 9 depicts a function of impedance and Figure 10 depicts radiations patterns. *Id.* at 4:22-25. Moreover, Plaintiff’s construction changing “diagram” to “pattern” is merely linguistic. As such, the Court construes “radioelectric behavior” as the “level of impedance and radiation pattern.”

#### *Radioelectric Characteristics and Functionality*

Defendants concede that the MLV specifications identify “radiation diagram and impedance” as two radioelectric characteristics of an antenna. (Doc. No. 452 at 6 “DEF. REPLY MSJ”). Defendants, however, assert that the claims refer to an antenna’s “radio-electric characteristics and functionality,” not just radioelectric characteristics. *Id.* Defendants contend that Plaintiff is reading “and functionality” out of the claim language. *Id.* However, as Plaintiff’s expert explains in his declaration, for a mobile communications device to function properly, both the proper impedance and radiation pattern must be present at each desired frequency band of operation. (Doc. No. 440-1 at ¶ 68); *see Phillips*, 415 F.3d at 1318 (a court may use expert testimony to aid in determining the correct construction of a particular term). Based on the foregoing, the Court construes “radio-electric characteristics and functionality” as “the level of impedance and radiation pattern.”

#### *Substantially Similar; Basically the Same*

Defendants contend that “substantially similar” “radio electric behavior” (‘431, claims 1-32; ‘432, claims 1-6) and “similar” radiation patterns and “basically the same radio-electric

characteristics and functionality” (‘208, claims 7, 21, 40, 54) are indefinite. DEF. MSJ. at 13. Defendants contend that there is no accepted standard for determining whether two radiation patterns are “similar.” *Id.* at 12-13. Plaintiff counters that the MLV specifications provide a person of ordinary skill in the art the understanding of what it means for radiation patterns to be similar. PL.’S RESP. MSJ at 20-22.

A person of ordinary skill in the art, reading the MLV specifications, would understand what it means for radiation patterns to be similar. *See Seattle Box Co., Inc. v. Indus. Crating & Packing, Inc.*, 731 F.2d 818, 826 (Fed. Cir. 1984) (district court must determine whether terms of degree would be understood by a person of ordinary skill in the art in light of the specification). Plaintiff is correct that the MLV specifications describe that characteristics such as “omnidirectionality or directivity” make two radiation patterns similar. *See* ‘868 at 8:37-42; *id.* at 9:30-36. Moreover, Defendants own exhibits and patents demonstrate that the term “similar radiation patterns” is a phrase used in the field of antenna design. *See* DEF. REPLY MSJ at Ex. YY (“Similar radiation pattern has been obtained throughout the operating frequency band”); (Doc. No. 459, Ex. AH at 4:14-15 “PL.’S SURREPLY MSJ”) (“[t]he graphs of FIGS. 3B and 3C, when compared with each other, demonstrate substantially similar radiation patterns”). As such, the Court construes “substantially similar” and “basically the same” according to their plain and ordinary meaning.

“communication service(s)” [‘868, cl. 23; ‘208, cl. 7,14, 21, 28, 40, 47, 54, 61; ‘431, cl. 17]

as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“a network operating at a particular frequency band”	No construction  <u>In the alternative:</u> “communication service”

“Communication service” appears in the dependent claims of the ‘868, ‘208 and ‘431. Plaintiff contends that the term appears in “two varieties.” PL.’S BR. at 25-26. Plaintiff describes claim 23 of the ‘868 as one variety which claims antenna “shared by several communication services.” *Id.* Plaintiff describes claim 14 of the ‘208 as a second variety which claims multiband antennae where at least one of the frequency bands is used by a “GSM communication service.” *Id.* Plaintiff further contends that a “communication service” includes both a protocol and a frequency band. *Id.* at 26; PL.’S REPLY at 10-11.

Defendants assert that the term does not require construction because it is easily understood. DEF. RESP. at 22-23. Defendants also assert that there is no basis for Plaintiff’s construction limiting the term to a “network,” “system” or to “a particular frequency band.” *Id.* In particular, Defendants argue that Plaintiff’s proposal, “at a particular frequency band” should be rejected because, for example, a “GSM communication service” operates in at least two frequency bands. *Id.* Plaintiff counters that the term requires construction because a jury may confuse a service provider, like AT&T, for a communication service. PL.’S BR. at 26.

Initially, the Court finds that the differences among “network,” “system” and “service” are without distinction because the MLV specifications use the terms interchangeably. For the sake of consistency, the Court will use the term “service” within its construction. However, the Court

recognizes Plaintiff's concern that the jury may confuse a service provider with a communication service. Should such a situation arise, the Court reserves the right to instruct the jury or strike any argument that may lead to such confusion.

The MLV specifications explain that the MLV antennae may operate in several frequency bands, thus allowing a multilevel antenna to integrate several communications services. '868 at 6:26-30. The MLV specifications describe each communication service as composed of a protocol and frequency combination. For example, the GSM 900MHz communication service is composed of the GSM protocol operating in the 900Mhz frequency band. '868 at 6:64-65; *see also* PL.'s BR. at Ex. 17 (describing GSM 900 band as operating in the 890 - 915MHz and 935 - 960MHz frequency band). On the other hand, the MLV specifications describe the GSM 1800MHz (or DCS) communication service as composed of the GSM protocol, but operating at the 1800MHz frequency band. *Id.*; *see also* PL.'s BR. at Ex. 17 (describing GSM 1800 band as operating in the 1710 - 1785MHz and 1805 - 1880MHz frequency band). Accordingly, Plaintiff's construction is correct to the extent that it describes a single communication service as "operating at a particular frequency band." While the GSM protocol may operate in several frequency bands, the term communication service is used in the patent to describe a particular protocol operating in a distinct frequency band.

Based on the foregoing, the Court construes this term as "a service operating at a particular frequency band."

“Frequency band” [‘868, cl. 34, 35; ‘208, cl. 7, 12, 14, 21, 26, 28, 40,45, 47, 54, 59, 61; ‘850, cl. 22, 47, 70; ‘432, cl. 1; ‘431, cl. 1, 14, 17, 30;‘782, cl. 1, 2, 7, 8, 15] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“the frequency allocation that has been made available by a regulatory body for the transmission and reception of signals in a communication system”	No construction necessary  <u>In the alternative</u> : “a continuous range of frequencies extending between two limiting frequencies”

The term “frequency band” appears in the MLV and SFC patents. Plaintiff contends that “frequency band” is a term of art in the field of mobile communications. PL.’s BR. at 27. Plaintiff asserts that a frequency band entails a range of frequencies broken into distinct transmit and receive ranges. *Id.* at 28-29. Plaintiff argues that Defendants’ construction is too vague and would allow for a later argument that an antenna operating in a “single frequency band” is “multiband” because of the distinct transmit and receive ranges used within a single frequency band. *Id.* at 29.

Defendants argue that no construction is necessary, but offer an alternative construction. DEF. RESP. at 24. Defendants contend that Plaintiff’s construction is limited to cellular communication services, while the patent is directed to broader embodiments. *Id.* at 24-25.

Plaintiff is correct that a “frequency band” is a “frequency allocation” that may be broken into transmit and receive ranges. For example, the GSM Technical Specification explicitly demonstrates that the “Standard GSM 900 Band” extends between 890 - 960MHz. PL.’s BR. at Ex. 17. The GSM specification also notes that within the GSM 900 Band, the frequencies from 890 - 915MHz are for “mobile transmit, base receive,” while the frequencies 935 - 960MHz are for “base transmit, mobile receive.” *Id.* Therefore, an antenna operating solely in the GSM 900 frequency band is not a multiband antenna.

However, Plaintiff’s proposed construction is unhelpful to the extent that it recites a generic “regulatory body.” Further, by citing a “communication system,” Plaintiff’s construction may cause confusion with the term “communication service.” On the other hand, Defendants’ alternative construction is improper to the extent that it requires “a continuous range of frequencies.” As explained above, while a frequency band is bounded by two limiting frequencies, addition of the term “continuous” may allow for the improper understanding that the receive and transmit ranges demarcated within a single frequency band are in fact “multiband” because they are not continuous within the frequency range. As such, the Court modifies Defendants’ construction and construes the term as “a range of frequencies extending between two limiting frequencies.”

“Multiband” / “multi-band” [‘868, cl. 1; ‘208, cl. 1, 5, 7, 15, 18, 21, 29, 33, 37, 40, 48, 54; ‘431, cl. 1, 4, 5, 7, 8, 14, 17, 21, 22, 24–27, 29–31; ‘432, cl. 1, 2, 3, 6; ‘762, cl. 11; ‘556, cl. 23, 26, 28–30, 32, 36, 39] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“capable of simultaneous operation with identical or similar behavior (impedance and radiation diagram) throughout a plurality of frequency bands”	When used in preamble of claim: No construction necessary  When used in body of claim: “useable at more than one frequency band”

The terms “multi-band” and “multiband” appear in the MLV patents and the ‘556 patent. Plaintiff proposes the same construction for all uses of the terms. PL.’S BR. at 30. Defendants contend that the terms are not limiting when used in the preamble of a claim, but propose a construction for when the terms are used in the body of a claim. DEF. RESP. at 25.

Defendants assert that in all the claims where multiband appears in the preamble<sup>7</sup>, the body of the claim recites a structurally complete invention such that a functional limitation is improper. *Id.* at 25-27. Defendants further contend that for the claims where multiband appears in the body of the claims,<sup>8</sup> the terms should be construed according to the ordinary meaning. *Id.* at 27-28. Plaintiff counters that multiband operation is a fundamental characteristic of the claimed antennae, thus the preamble terms are limiting. PL.’S BR. at 30-31; PL.’S REPLY at 12-13. Plaintiff further asserts that the patent specifications define multiband to mean similar impedance and radiation diagrams. *Id.*

#### *Preamble*

“[A] preamble is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.” *Catalina Mktg. Int’l Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 807-11 (Fed. Cir. 2002). Every claim where “multiband” appears in the preamble, the body recites a structurally complete invention. Claim 1 of the ‘868, which is exemplary for the purpose of this discussion regarding the MLV patents, recites:

A multi-band antenna including  
at least one multilevel structure wherein  
the multilevel structure comprises a set of polygonal or polyhedral  
elements heaving the same number of sides or faces, wherein  
each of said elements is electromagnetically coupled to at least one  
other of said elements either directly through at least one point of  
contact or through a small separation providing coupling, wherein  
for at least 75% of said polygonal or polyhedral elements, the  
region or area of contact between said polygonal or polyhedral  
elements is less than 50% of the perimeter or area of said elements,

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<sup>7</sup> ‘868, cl. 1; ‘208, cl. 1, 5, 7, 18, 21, 29, 33, 37, 40, 48, 54; ‘431, cl. 1, 4, 5, 7, 8, 14, 17, 21, 22, 24-27, 29-31; ‘432, cl. 1-3, 6; ‘556, cl. 23, 26, 28-29.

<sup>8</sup> ‘762, cl. 11; ‘556, cl. 30, 32, 36, 39



and wherein

not all the polygonal or polyhedral elements have the same size and the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure.

‘868 at 9:53-65. In other words, Claim 1 claims among other things, “a multiband antenna including” (*id.* at 9:52): (1) at least one multilevel structure comprising (*id.*); (2) a set of polygonal or polyhedral elements (*id.* at 9:54); (3) electromagnetically coupled together (*id.* at 9:55-56). The claim body describes a structurally complete invention. Thus, the “multiband” preamble does not “give life, meaning, and vitality to the claims.” *Kropa v. Robie*, 187 F.2d 150, 152 (C.C.P.A. 1951).

Claim 23 of the ‘556, which is also exemplary for resolving this dispute, recites:

A multi-band monopole antenna for a mobile communications device, comprising:

a common conductor having a feeding port for coupling the antenna to circuitry in the mobile communications device;

a first radiating arm coupled to the common conductor and having a section comprising a space-filling curve extending from the common conductor in a first direction and a contiguous extended substantially straight section extending from the section comprising a space-filling curve in a second direction, the contiguous extended substantially straight section extending in a substantially opposite direction as the section comprising a space-filling curve; and

a second radiating arm coupled to the common conductor.

‘556 at 8:18-32. In other words, Claim 23 claims “a multi-band monopole antenna” (*id.* at 8:18-19) comprising: (1) a common conductor (*id.* at 8:20-22); (2) a first radiating arm (*id.* at 8:23-31); and (3) a second radiating arm (*id.* at 8:32). Much like claim 1 of the ‘868, the claim body describes a structurally complete invention and the preamble does not “give life, meaning, and vitality to the claims.” *Kropa v. Robie*, 187 F.2d 150, 152 (C.C.P.A. 1951).

Additionally, the Court has already construed the term “multilevel structure” to be “useable

at multiple frequency bands,” *i.e.* multiband, for the MLV patents. As such, while Plaintiff is correct that the possibility of multiband operation is a fundamental characteristic of the MLV patents, the concept has already been infused into the Court’s claim construction via “multilevel structure.” Every claim of the MLV patents which recites “multiband” in the preamble also recites a “multilevel structure.” Requiring the term “multiband” to be limiting in the preamble of the claims reciting a “multilevel structure” is redundant.

Moreover, the preamble phrases do not provide relevant antecedent bases for any claim elements nor are they necessary for understanding the limitations of the claims. Relying on these “guideposts,” (*Catalina*, 289 F.3d at 808) the Court finds these preamble terms are not limiting and do not require construction.

*Body of Claim*

The terms “multi-band” and “multiband” are used in the claim body of claims within the ‘556 and ‘762 patents. Plaintiff contends that its proposed construction embodies the meaning of the term as explained in the MLV patents. PL.’S BR. at 30-31. Plaintiff further contends the MLV specifications are part of the intrinsic record of the ‘556 and ‘762 because the MLV patents are cited on the face of each patent. PL.’S REPLY at 13-14.

The Plaintiff is correct that the MLV specifications describe “multiband” as embodying similar impedance and radiation diagrams. *See* ‘868 at 3:29-33; *id.* at 6:19-23; *id.* at 6:57-58. However, the Court finds that the inventors did not clearly define the term “multiband.” Moreover, the Court finds that the inventors did not define the term in the ‘556 and ‘762 to the extent necessary to overcome the ordinary meaning. Even assuming that the inventors had specifically defined multiband in the MLV specifications, simply because the MLV specifications are part of the intrinsic

record of the ‘556 and ‘762 does not mean that the same meaning for the term should control. For example, if the inventors intended that a term specially defined in the MLV patents should apply in the ‘556 and ‘762 patents, they could have incorporated the MLV patents by reference. Indeed, the ‘556 patent incorporates a different patent (the ‘850) by reference for concepts related to “space-filling curve”, thus gaining the benefit of specially defined terms from the other patent. ‘556 at 2:57-61. The inventors did not incorporate the MLV patents by reference in a similar way. Indeed, the ‘556 and ‘762 patents use “mutliband” generally, not according to a special definition. *See* ‘556 at 3:12-24; ‘762 at 1:8-10; *id.* at 2:50-60. As such, the ordinary and customary meaning of the terms “multiband” and “multi-band” should control.

The Court finds that “multi-band” and “multiband” are not limiting when used in the preamble of a claim. When the terms are used in the body of the claim, the Court construes the terms as “useable at more than one frequency band.”

“Electromagnetically coupled” [‘868, cl. 1; ‘208, cl. 1, 15,29, 48; ‘431, cl. 1; ‘432, cl. 1; ‘762, cl. 1, 21] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“direct or proximate linking of two or more elements in such away that electromagnetic power is exchanged from one element to another at the antenna radiating frequencies”	“direct or proximate linking of two or more distinct components in such a way that electromagnetic power is exchanged from one component to another”

The parties are close to agreement regarding the meaning of “electromagnetically coupled,” save two differences. Defendants contend the “distinct components” must be directly or proximately linked within the meaning of the term. DEF. RESP. at 28-29. Plaintiff disagrees. PL’S BR. at 33; PL’S REPLY at 14-15. Plaintiff asserts that the electromagnetic power that is exchanged between the elements must be “at the antenna radiating frequencies.” PL’S BR. at 33. Defendants disagree. DEF.

RESP. at 29.

Defendants' requirement that all the components or elements be "distinct" is incorrect. Plaintiff concedes that the MLV specifications require that *most* of the components or elements that make up a multilevel structure must be clearly visible and individually distinguishable. PL'S BR. at 33. However, Defendants' construction requires *all* of the components or elements to be "distinct," *i.e.* individually distinguishable. Accordingly, the Court does not adopt Defendants' "distinct components" requirement.

Plaintiff provides little support from the specifications to support a construction including "at the antenna radiating frequencies." Plaintiff is correct that the MLV specifications distinguish MLV antennae from "arrays of antennae" which are "electromagnetically decoupled." *See* '868 at 7:11-24. Nonetheless, the MLV specifications do not explicitly support the concept that the linked elements must exchange power "at the antenna radiating frequencies." Therefore, the Court construes this term as, "direct or proximate linking of two or more elements in such a way that electromagnetic power is exchanged from one element to another."

“Said first and second portions defining empty spaces in an overall structure”

[‘431, cl. 1] and “said first, second, and third portions defining empty spaces in an overall structure”

[‘432, cl. 1] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“said first and second portions defining areas without conductive material in an overall structure”	“two or more open spaces without conductive material and which are each enclosed within conductive material of the first and second portions of the overall structure”
“said first, second, and third portions defining areas without conductive material in an overall structure”	“two or more open spaces without conductive material and which are each enclosed within conductive material of the first, second, and third portions of the overall structure”

The parties dispute whether the claimed “empty spaces” must be completely bounded and enclosed by the conductive material of the antennae. Defendants’ argue that the empty spaces must always be enclosed within the conductive material of the antennae. DEF. RESP. at 30-32. Plaintiff counters that Defendants’ construction is inconsistent with the specifications and contrary to the function of the empty spaces. PL’S REPLY at 15.

The MLV specifications demonstrate that the empty spaces exist “between the various polygon or polyhedron elements” to force the current on a longer path. ‘868 at 3:5-15. The function of these empty spaces does not require them to be completely enclosed within the polygons or polyhedrons which make up the multilevel antenna. While Defendants are correct that some embodiments show empty spaces completely enclosed (*see id.* at Figure 1), other embodiments show unbounded empty spaces that could force the current on a longer path. (*see id.* at Figures 4.4, 4.8, 6.6 and 7.4). As such, the Court construes these terms respectively as, “said first and second portions

defining areas without conductive material in an overall structure” and “said first, second and third portions defining areas without conductive material in an overall structure.”

“Monopole antenna”/“monopole configuration” [‘850, cl. 6, 40, 53; ‘782, cl. 12;

‘868, cl. 12] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“a type of antenna comprising a radiating element and a ground plane, wherein the projection of the antenna footprint on the plane of the circuit board intersects the metalization of the ground plane by less than fifty percent”	“an antenna including a conductor constructed above a ground plane, and which produces a radiation pattern approximating that of an electric dipole in the half-space above the ground plane”

The parties briefing regarding these terms is, at best, confusing and unhelpful. Neither party provides satisfactory support for their proposed construction, choosing instead to discuss problems with the other party’s construction. Plaintiff contends that its construction derives from the ‘556 patent. PL’S BR. at 35. Defendants counter that the ‘556 patent is extrinsic evidence. DEF. RESP. at 33. Defendants’ also contend that the ‘556 is directed solely at mobile communication devices, while the MLV and SFC patents are broader. *Id.* Defendants argue that Plaintiff’s construction excludes all monopole embodiments in the MLV and SFC patents. *Id.* Plaintiff counters that Defendants misunderstand Plaintiff’s construction because the MLV and SFC monopole antennae have no footprint overlapping the ground plane. PL’S REPLY at 16.

The parties agree that a monopole antenna includes “a radiating element” or “conductor” and a “ground plane.” Defendants’ are correct that the inventors did not act as their own lexicographer regarding “monopole” for the MLV and SFC patent families. DEF. RESP. at 33. Defendants’ are also correct that Plaintiff’s construction is directed at mobile phones, while the MLV and SFC patent families are broader. *Id.* at 33, fn. 50. Plaintiff concedes that Defendants’ construction is the classic

definition for a monopole antenna, but is also correct that such a theoretical embodiment is impossible to implement because it would require a perfectly conducting, infinite ground plane. PL’S BR. at 36-38.

As such, the Court adopts the agreed requirements of a “radiating element” and a “ground plane.” While Defendants’ construction may be a practical impossibility, the Court’s construction recognizes the classic definition of a monopole antennae by allowing for a monopole configuration such that if the ground were infinite, the antenna would produce a radiation pattern approximating that of an electric dipole in the half-space above the ground plane. The Court construes this term as, “an antenna comprising a radiating element and a ground plane, wherein a practical application, the ground plane is not infinite, and further where the antenna would produce a radiation pattern approximating that of an electric dipole in the half-space above the ground plane if the ground plane was infinite.”

“Multiband monopole antenna” / “multiband antenna” [‘556, cl. 23, 26, 28–30,32, 36, 39]

as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
See constructions for “antenna,” “multiband” and “monopole antenna.” No further construction necessary.	“a multiband antenna including a conductor constructed above a ground plane, which produces a radiation pattern approximating that of an electric dipole in the half-space above the ground plane, and which is a different type of antenna than an inverted-F antenna”

Defendants’ contend that the ‘556 patent excludes “inverted F-antennas.” DEF. RESP. at 34-35. However, the specification citations Defendants rely upon do not constitute a “clear and unmistakable” surrender of claim scope. *Elbex Video, Ltd. v. Sensormatic Elecs. Corp.*, 508 F.3d

1366, 1371 (Fed. Cir. 2007). Indeed, as Plaintiff demonstrates, an inverted F-antenna is a type of monopole antenna. *See* PL’S REPLY at 16-17. As such, the Court finds that the these terms do not require further construction, other than those already construed.

“Patch antenna” / “patch antenna configuration”[‘868, cl. 14; ‘431, cl. 24; ‘782, cl. 11; ‘822, cl. 22–24] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“the patch antenna comprises a conducting or super conducting ground-plane or ground counterpoise and a conducting or super conducting patch that is generally parallel to the ground-plane or ground-counterpoise, with spacing between the patch and the ground typically below (but not restricted to) a quarter wavelength”	“an antenna including a conducting (or superconducting) ground-plane or ground counterpoise, a conducting (or superconducting) patch which is parallel to and entirely overlapped by the ground plane or ground counterpoise, and a dielectric separating the patch and ground plane or ground counterpoise”

According to the SFC specifications, patch antenna were well known in the prior art. ‘822 at 6:40-7:10. Plaintiff’s construction is derived from the SFC specifications with minor additions. *Id.* Defendants’ construction is also generally derived from the SFC specifications with minor additions. The four primary disputes relate to (1) the Plaintiff’s inclusion of “general” with respect to the “patch” being parallel to the ground; (2) Plaintiff’s use of permissive language regarding “typically below (but not restricted to) a quarter wavelength; (3) Defendants’ requirement that the patch entirely overlap the ground plane; and (4) Defendants’ requirement that a “dielectric” separate the patch and the ground plane.

Defendants’ contend that Plaintiff’s addition of “generally parallel” is unsupported by the specification, thus it should be rejected. DEF. RESP. at 37-38. None of the citations by the Defendants support a construction that the patch be exactly parallel to the ground plane as opposed to generally parallel. However, every claim that uses “parallel” specifically uses the phrase



“substantially parallel.” See ‘868 at 10:30-32 (“14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration”); ‘822 at 9:34-35 (“a conducting patch substantially parallel to the ground plane”); *id.* at 9:42-43 (same). Accordingly, the Court finds that with regard to a patch antenna, the patch is “generally parallel” to the ground plane. *Phillips*, 415 F.3d at 1314 (claim language guides the Court’s construction of claim terms).

The Court does not adopt Plaintiff’s proposal “typically below (but not restricted to) a quarter wavelength.” Plaintiff’s permissive language adds little value to the construction and may cause jury confusion. See *i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 844 (Fed. Cir. 2010).

The parties appear to be agree that the figures disclosed in the MLV and SFC specifications show the patch element overlapping the ground plane. DEF. RESP. at 38; PL’S BR. at 41. Plaintiff, however, demonstrates that other manufacturing techniques exist which do not require complete overlap between the patch and the ground plane. PL’S REPLY at 17-18. As such, the Court finds that the patch need not completely overlap the ground plane.

Defendants’ requirement that a dielectric separate the patch and the ground plane is improper. The SFC specifications explain that the addition of the dielectric is an optional feature in patch antennae. ‘822 at 6:53-56. Defendants’ construction would improperly make an optional feature a requirement.

Based on the foregoing, the Court construes these terms as, “the patch antenna comprises a conducting or superconducting ground-plane or ground counterpoise and a conducting or superconducting patch that is generally parallel to the ground-plane or ground-counterpoise with spacing between the patch and the ground.”

“Space-filling curve” / “SFC” [‘850, cl. 1, 6, 16, 35, 40,48, 53, 57; ‘762, cl. 12, 14; 556, cl. 23, 30] and “multi-segment curve” [‘822, cl. 1, 4, 12, 13, 15,18, 23, 24, 29, 31, 44, 46,52, 53] and “substantially non-periodic curve”[‘822, cl. 35, 48] and “substantially non-periodic multi-segment curve” [‘822, cl. 52, 53] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
<p>“<u>space-filling curve</u>”: “a curve for the shaping of part of a small antenna element composed by at least ten segments which are connected in such a way that each segment forms an angle with their neighbors, that is, no pair of adjacent segments define a larger straight segment, and wherein the curve can be optionally periodic along a fixed straight direction of space if and only if the period is defined by a non-periodic curve composed by at least ten connected segments and no pair of said adjacent and connected segments define a longer straight segment; the space filling curve can only intersect with itself, if at all, at its initial and final point; and each segment must be shorter than a tenth of at least one free-space operating wavelength”</p> <p>“<u>multi-segment curve</u>”: “a curve comprised of multiple segments”</p> <p>“<u>substantially non-periodic curve</u>”: “a curve that is comprised of a largely non-repeating pattern”</p> <p>“<u>substantially non-periodic multi-segment curve</u>”: “a multi-segment curve that is comprised of a largely non-repeating pattern”</p>	<p>“a curve that meets each of the following qualifications:1. The curve must be composed by at least ten straight segments which are connected in such a way that each segment forms an angle with their neighbors, that is, no pair of adjacent segments define a larger straight segment, and wherein the curve can be optionally periodic along a fixed straight direction of space if and only if the period is defined by a non-periodic curve composed by at least ten connected segments and no pair of said adjacent and connected segments define a straight longer segment2. The curve can never intersect with itself at any point except the initial and final point3. The segments of the curve must be shorter than a tenth of the free-space operating wavelength.”</p>

The term “space-filling curve” (“SFC”) is used in the SFC patents (‘850 and ‘822), the ‘762 and the ‘556. The SFC patent specifications (“SFC specifications”) provide the following definition

for SFC:

the following definition is taken in this document for a space-filling curve: a curve composed by at least ten segments which are connected in such a way that each segment forms an angle with their neighbours, that is, no pair of adjacent segments define a larger straight segment, and wherein the curve can be optionally periodic along a fixed straight direction of space if and only if the period is defined by a non-periodic curve composed by at least ten connected segments and no pair of said adjacent and connected segments define a straight longer segment. Also, whatever the design of such SFC is, it can never intersect with itself at any point except the Initial and final point (that is, the whole curve can be arranged as a closed curve or loop, but none of the parts of the curve can become a closed loop). A space-filling curve can be fitted over a flat or curved surface, and due to the angles between segments, the physical length of the curve is always larger than that of any straight line that can be fitted in the same area (surface) as said space-filling curve. Additionally, to properly shape the structure of a miniature antenna according to the present invention, the segments of the SFC curves must be shorter than a tenth of the free-space operating wavelength.

‘850 at 2:32-54. The ‘556 incorporates the ‘850 by reference.<sup>9</sup>

The ‘762 patent specification provides the following definition for SFC:

[i]n the publication WO 01/54225 a space-filling miniature antenna was defined as an antenna havinf (sic) at least one part shaped as a space-filling-curve (SFC), being defined said SFC as a curve composed by at least ten connected straight segments, wherein said segments are smaller than a tenth of the operating free-space wave length and they are spacially arranged in such a way that none of said adjacent and connected segments from another longer straight segment.

‘762 at 1:54-61.

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<sup>9</sup> The ‘556 incorporates U.S. Patent Application No. 11/110,052 (“the ‘052 application”) by reference. ‘556 at 2:57-61. The ‘052 application matured into the ‘850 patent.

The '850 is a continuation of U.S. Patent Application No. 10/182,635 ('635 application).<sup>10</sup> See '850 at RELATED U.S. APPLICATION DATA; DEF. RESP. at 43. The '635 application included the same specification as the '850 and contained claims which required "ten connected straight segments." See DEF. RESP., EXHIBIT 45 at FRACTUSFH 040213, 042656. Subsequently, the patentee filed a continuation of the '635 application (which ultimately issued as the '850) and explicitly removed the word "straight" from the claims. See *id.* at 43; *id.* at EXHIBIT 43 at FRACTUSFH 011083. For example, one new claim recited, "the [SFC] including at least ten connected segments" as opposed to "the [SFC] including at least ten connected straight segments." *Id.* The patentee then abandoned the '635 application and continued to prosecute the application that resulted in the '850 and subsequently the '822. See '850 at RELATED U.S. APPLICATION DATA; DEF. RESP. at 43. The '850 patent also issued with dependent claims which call for antennae "wherein the corners formed by each pair of adjacent segments are curved." '850 at 9:34-35, 10:25-26. The '762 was filed before the '850, '822 and '556.

The parties agree that the patentee's lexicography should govern the meaning of "space-filling curve" ("SFC"). DEF. RESP. at 39; PL'S BR at 43. Plaintiff contends that its proposed construction makes two changes to "provide proper context." PL'S BR. at 43. Plaintiff first explains that the definition of space-filling curve requires the addition of "a curve for the shaping of part of a small antenna element," to avoid any confusion regarding the practical application of SFCs. PL'S BR. at 44. Plaintiff also contends that "the" should be changed to "at least one" in the phrase "the free-space operating wavelength" for proper context as provided by the claims. *Id.* Plaintiff further argues that the broader "curve" terms must be construed differently than the term SFC. *Id.* at 45-47.

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<sup>10</sup> The WO 01/54225 (also referenced by the PCT application PCT/EP00/00411) filed in the European Patent Office is the parent application of the '635 application and the '850 and '822.

Defendants' contend the construction requires "straight segments" for all the relevant patents. DEF. RESP. at 40-41. Defendants' further contend that when the claims and specifications of the '850 and '822 are read in context, they require straight segments. *Id.* at 41-42. Defendants' also argue that the '850 and '822 patents provide no written description to support "segment" without the modifier "straight." *Id.* at 42-44. Defendants' argue in the alternative that the '762 and SFC patents recite contradictory definitions for SFC which should be resolved by construing the term according to the narrower definition, *i.e.* "straight segments." *Id.* at 44. Defendants' also contend that the other "curve" terms require the same construction as the term SFC. *Id.* at 44-46.

Where the specification contains a definition for a term that differs from the meaning the word would otherwise possess, the patentee's lexicography controls. *Phillips*, 415 F.3d at 1316. Moreover, other claims, asserted and unasserted, can provide additional instruction because "terms are normally used consistently throughout the patent." *Id.* at 1314. Differences among claims, such as additional limitations in dependent claims, can provide further guidance. *Id.* Courts presume that a claim term carries the same meaning throughout a particular patent and related patents. *Omega Eng'g*, 334 F.3d at 1334 ("we presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning). However, this presumption can be overcome by evidence that the patentee assigned a different meaning to a term that appears in two related or unrelated patents. *See id.* (citing *Fin Control Sys. Pty, Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1318 (Fed. Cir 2001)); *see also IP Innovation LLC v. Sony Electronics, Inc.* 2005 WL 2035578 at \*7 (N.D. Ill. 2008).

#### *The '762*

Defendants are correct that the '762 requires "straight" segments. The patentee explicitly

defined SFC within the '762 specification. The patentee interpreted the language from WO 01/54225 to require "a curve composed by at least ten connected straight segments, wherein said segments are smaller than a tenth of the operating free-space wavelength and they are spatially arranged in such a way that none of said adjacent and connected segments form another longer straight segment." The Court finds that the patentee's lexicography should control. Thus, for the '762 the Court construes "space-filling curve"/"SFC" as "a curve composed by at least ten connected straight segments, wherein said segments are smaller than a tenth of the operating free-space wavelength and they are spatially arranged in such a way that none of said adjacent and connected segments form another longer straight segment."

*The '850 and '556*

Defendants are correct that the earlier filed '762 patent provided an interpretation of the parent application of the '850 (WO 01/54225) requiring SFCs with straight segments. The '762's interpretation of the '850, however, is overcome by the patentee's subsequent amendments removing straight from the claims, which also conforms with the definitional language in the specification which does not mention "straight" segments. During prosecution of the '850, the patentee explicitly amended the claims to remove the "straight" requirement. Indeed, the PTO not only allowed the patentee to remove the "straight" requirement from the relevant claims, but also allowed dependent claims which specifically call for curved corners between adjacent segments. *See* '850 at 9:34-35, 10:25-26. Unlike the explicit requirement of straight segments in the '762, the patentee specifically removed the requirement from the claims of the '850 during prosecution. Therefore, the construction cannot add back a requirement which was deliberately removed during prosecution.

Defendants also contend the SFC patents explain that two adjacent and connected segments

of a claimed SFC cannot form “a longer straight segment.” DEF. RESP. at 41-42. Accordingly, Defendants argue that if the segments of the SFC are construed to allow curves, it would be impossible for two adjacent curved segments to form a “longer straight segment.” *Id.* In essence, Defendants argue the patentee would not restrict longer *straight* segments if the segments were not required to be straight. Therefore, Defendants’ contend, all the segments must be straight. *Id.* However, construing the term SFC to allow for curved segments does not preclude the use of straight segments to form a SFC. In other words, straight segments are not precluded by the SFC patents, they are merely not required.

Defendants also contend that all the figures in the SFC specifications illustrate straight segments, thus the patent is directed at SFCs with straight segments. *Id.* at 41. However, a person of ordinary skill would rarely confine “their definitions of terms to the exact representations depicted in the embodiments.” *Phillips*, 415 F.3d at 1323. Also, Plaintiff’s additional proposal for a “small” antenna and changing “the” to “at least one” is not supported in the SFC specifications. The meaning of SFC is defined and Plaintiff’s suggestions are not contained within the clearly presented definition of SFC.

The ‘556 incorporates the ‘850 by reference, (‘556 at 2:57-61) thus, the same construction for SFC applies to both the ‘850 and ‘556. The Court construes these terms, for the ‘850 and ‘556 patents as, “a curve for the shaping part of an antenna element composed by at least ten segments which are connected in such a way that each segment forms an angle with their neighbors, that is, no pair of adjacent segments define a larger straight segment, and wherein the curve can be optionally periodic along a fixed straight direction of space if and only if the period is defined by a non-periodic curve composed by at least ten connected segments and no pair of said adjacent and connected

segments define a longer straight segment; the space filling curve can only intersect itself, if at all, at its initial and final point; and each segment must be shorter than a tenth of the free-space operating wavelength.”

*The ‘822 and Other “Curve” Terms*

The ‘822 is a continuation of the ‘850, thus they share a common specification. *See* ‘822 at RELATED U.S. APPLICATION DATA. Here, the parties dispute is similar to the earlier disagreement regarding “multilevel structure” and “structure.” *See supra* at 9-10. For much the same reasoning that “multilevel structure” and “structure” require the same construction, SFC and the other “curve” terms require the same construction. The ‘822 patent describes the “present invention” as a “space-filling curve.” *See* ‘822 at 1:16-21; *see also id.* at 1:27-29 (“the geometry of Space-Filling Curves (SFC) is defined in the present invention”); *id.* at 2:3-8 (“[i]n the present invention, a novel set of geometries names Space-Filling Curves (hereinafter SFC) are introduced”). The ‘822 specification limits the disclosed invention to a “space-filling curve.” Indeed, the SFC specifications explain that the essence of the claimed invention requires “space-filling curves.” The specifications do not mention any of the other “curve” terms. While “different terms presumptively have different meanings” (*Seachange Int’l*, 413 F.3d at 1368-69), “the doctrine is not a hard and fast rule of construction.” *Id.* at 1369. “[C]laims that are written in different words may ultimately cover substantially the same subject matter.” *Id.*

Plaintiff concedes that the ‘822 specification does not provide any definition for the other “curve” terms. PL’S BR. at 46. Nonetheless, Plaintiff contends that some of the figures provide drawings demonstrating curves that are not “space-filling curves.” *Id.* All of Plaintiff’s cited drawings, however, are not examples of the “present invention.” *See* ‘822 at 4:41-42. In fact, the



specification explains that the drawings cited by Plaintiff are presented as curves that *do not* embody the claimed invention – an SFC. *See id.* at 4:26-28.

As such, despite the use of different terms in the claim language, the Court construes “multi-segment curve,” “substantially non-periodic curve” and “substantially non-periodic multisegment curve” the same as “space-filling curve”/“SFC”.

“Box-counting dimension” [‘850, cl. 1, 17, 19 21,24–26, 48, 58, 61, 65, 66; ‘822, cl. 4, 5, 30, 31, 46, 53] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“mathematical method used to calculate the dimension D for highly complex geometrical curves and structures”	<p>“a dimension for a set of points F determined according to the following formula:</p> $\dim_B F = \lim_{\delta \rightarrow 0} \frac{\log N_\delta(F)}{-\log \delta}$ <p>where <math>N_\delta(F)</math> is the minimum number of ‘boxes’ of size <math>\delta</math> necessary to cover F”</p>

Plaintiff contends that the term “box-counting dimension” is a well-known measurement tool used by mathematicians. PL’S BR at 47. Plaintiff further asserts that there exist multiple techniques for calculating the box-counting dimension. *Id.* Plaintiff argues that the claims and the specifications of the SFC patents provide the necessary information for a person of ordinary skill in the art to calculate the box-counting dimension. *Id.* at 48. Plaintiff asserts that because the explanation given in the SFC claims and specifications would apprise a person of ordinary skill in the art of the meaning of the term, only a basic construction without technical details is necessary. *Id.* Plaintiff argues that Defendants’ proposed construction is improper because it is directed at infinite mathematical

abstractions, not finite geometries. Plaintiff further asserts that Defendants' construction may be unhelpful for the jury because of its unnecessary technical complexity. *Id.* Plaintiff concedes that Defendants' construction is a correct statement of one equation used to calculate the box-counting dimension. PL.'S REPLY at 20. However, Plaintiff asserts that Defendants will use the "abstract form of the equation inconsistent with how one of ordinary skill in the art would apply the equation." *Id.*

Defendants agree that the box-counting dimension is well-known to those skilled in mathematics theory. DEF. RESP. at 47. Defendants contend because the box-counting dimension is a term of art, it must be construed according to its customary meaning. *Id.* Defendants argue that their proposed construction is the accepted definition of the box-counting dimension. *Id.* Defendants further assert that Plaintiff is incorrect in asserting that the claims and specifications of the SFC patents define the box-counting dimension. *Id.* Defendants argue that the purported definition in Claim 1 of the '850 would not inform a person of ordinary skill in the art the necessary information to compute the box-counting dimension. *Id.*

The parties agree that the box-counting dimension is well-known to persons of ordinary skill in the art. Indeed, the parties have attached a plethora of extrinsic sources acknowledging that the box-counting dimension and methods calculating the dimension were well-known in the art at the time of the invention. *See e.g.* DEF. RESP. at EXHIBITS 47-52; PL.'S BR. at EXHIBITS 32-34; 35-36. Moreover, the parties agree that there is "no standard method" in calculating the box-counting dimension. *See* DEF. MSJ at 24; PL.'S MSJ at 32. The parties further appear to agree that Defendants' construction is at least one equation used to calculate the box-counting dimension. DEF. RESP. at 48-49; PL.'S REPLY at 20.

Based on the foregoing, the parties appear to agree that the box-counting dimension may be

calculated using various methods, all well-known to persons of ordinary skill in art. The technical literature attached by the parties explains that given the list of methods to calculate the box-counting dimension, “in practice [a person of ordinary skill in the art would] adopt[] the definition most convenient for a particular application.” DEF. MSJ at EX. MM at 41; PL.’S BR. at EX. 36 at 44.

Defendants’ construction, therefore, while embodying one standard equation for the box-counting dimension, is too limiting. Moreover, Defendants’ construction is unlikely to be instructive to a juror. On the other hand, Plaintiff’s construction is too generic to capture the basic elements of the various methods used to calculate the box-counting dimension. Defendants’ best capture the proper construction, as defined by various extrinsic sources, of calculating the box-counting dimension: “[b]ox-counting refers to many methods of counting the smallest number of “boxes” ( $N_\partial$ ) of a defined size ( $\partial$ ) that are necessary to cover an object. Box-counting dimension is the logarithmic rate at which the number of boxes ( $N_\partial$ ) increases as the size of the boxes ( $\partial$ ) approaches zero.” DEF. MSJ at 24. As such, the Court adopts the foregoing, with minor modifications, as the construction for “box-counting dimension”

The foregoing definition explains that “the size of the boxes ( $\partial$ ) approaches zero,” which implies an infinite construction and may potentially lead to juror confusion. The Court’s construction attempts to allay that concern by removing the language that may lead to an infinite construction. Accordingly, the Court construes “box-counting dimension” as, “box-counting refers to many methods of counting the smallest number of boxes of a defined size that are necessary to cover an object. The box-counting dimension is the logarithmic rate at which the number of boxes increase as the size of the boxes decrease.”

“Self-similar” [‘822, cl. 29, 35, 44, 48] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“a self-similar object is an object comprising a number of copies of itself, which may be rotated or transposed, and possess symmetry across a series of different size scales.”	“an object which is composed of an infinite number of smaller copies of itself. A self-similar object can be broken down into a set of smaller pieces that are copies of the whole object, and each of those pieces can themselves be broken down into a set of smaller copies, and so on forever”

Plaintiff contends that the term “self-similar” has an ordinary meaning and adopts its construction from extrinsic sources defining “self-similar” objects. PL’S BR at 49-50. Plaintiff further asserts that the ‘822 describes self-similarity as permissible and provides algorithms for producing self-similar curves. *Id.* at 50. Defendants contend that the lead inventor of the ‘822 defined “self-similar” in his Ph.D dissertation and that the dissertation is part of the intrinsic record. DEF. RESP. at 49. Defendants argue that the dissertation definition of a self-similar object is an object made up of infinite smaller copies of itself. *Id.* Defendants’ further contend that the Plaintiff’s proposed construction would exclude all figures from the specification because they are all “self-similar,” while the claims require objects that are “not self-similar.” *Id.* at 49-50.

The SFC specifications allow for the possibility of “self-similar” curves. ‘822 at 2:21-26. Defendants’ reliance on the inventor’s dissertation does not consider the entirety of the disclosure. While the inventor defined a “self-similar object” as composed of infinite number of smaller copies of the whole object, Defendants concede that the inventor concluded the discussion of self-similar objects by explaining that the “property only applies strictly to ideal mathematical objects.” DEF. RESP., EXHIBIT 23 at 21. Defendants, however, excise the last portion of the relevant paragraph where the inventor further explained that in the real world self-similar objects “hold some similarity

properties up to a certain scale,” *i.e.* the objects are finite. *Id.*

All of the relevant claims contain the phrase, “not self-similar.” Thus, the construction must consider the context in which the term appears in the claims. For example, Defendants’ construction would have the claims require curves made up of finite self-similar curves. On the other hand, Plaintiff’s construction allows for curves that are not self-similar. The claim language supports Plaintiff’s proposed construction. For example, the relevant portion of claim 29 of the ‘822 would read as follows with Defendants’ proposed construction, “a portion of said multi-segment curve including bends is not [*an object which is composed of an infinite number of smaller copies of itself*] with respect to the entire multi-segment curve.” ‘822 at 9:61-62. The ‘822 is directed at an antenna, not a mathematical abstraction. The inventor did not explicitly intend to make a distinction between antennae composed of infinite curves as opposed to finite curves, *i.e.* “not self-similar” according to Defendants. Within context, it becomes clear that the inventor intended to distinguish antennae composed of curves made up of smaller copies of themselves and curves not composed of smaller copies of themselves.

Also, “persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments.” *Phillips*, 415 F.3d at 1323. Thus, Defendants’ contention that Plaintiff’s construction would exclude the SFC figures is unpersuasive.

As such, the Court construes this term as, “a self-similar object is an object composed of copies of itself.”

“At least a portion” / “at least one portion” [‘850, cl. 1, 48; ‘822, cl. 1, 44, 46, 48, 52, 53] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
Ordinary meaning: “at least a part”	“at least a part of: the arms of a dipole, the arm of a monopole, the perimeter of the patch of a patch antenna, the slot in a slot antenna, the loop perimeter in a loop antenna, the horn cross-section in a horn antenna, or the reflector perimeter in a reflector antenna”

The SFC patents use these phrases to require a “portion” of the claimed antennae be “shaped as a space-filling curve.” See ‘850 at 8:18-20 (“1. An antenna in which at least one portion of the antenna is shaped as a space-filling curve”); ‘822 at 8:21-24 (“The invention claimed is: 1. An antenna, comprising a radiating element having at least a portion defined by a multi-segment curve”). Defendants contend that the SFC specifications mandate that the SFC be applied to specific portions of the particular antennae disclosed in the SFC patents. DEF. RESP. at 50-53. Plaintiff contends that these phrases should be construed according to their ordinary meaning as defined by general purpose dictionaries. PL.’S BR. at 51-52.

Defendants’ proposal relies on a portion of the SFC specifications describing configurations of exemplary antennae. ‘850 at 2:24-30. Nothing in the SFC specifications limit the invention to the specific antennae disclosed. In fact, the SFC specifications provide examples of antennae which Defendants’ construction would exclude. For example, the SFC specifications describe an embodiment consisting of a patch antenna with an aperture shaped as a SFC. See ‘850 at 7:8-25. Such an antenna does not fit Defendants’ requirement that the “perimeter of the patch” be shaped as a SFC. Also, the SFC specifications explain that the general principles disclosed in the patent can be applied to other antennae configurations known in the art and not explicitly disclosed in the

specification. ‘850 at 7:26-30 (“the same SFC geometric principle can be applied in an innovative way to all the well known, prior art configurations”). As such, Defendants’ proposal would improperly import limitations from the specifications into the claims. *Trading Tech. Int’l v. eSpeed, Inc.*, 595 F.3d 1340, 1352 (Fed. Cir. 2010).

Plaintiff relies on extrinsic sources to construe these phrases according to their ordinary meaning. However, limiting and construing the ordinary meaning of these non-technical terms is unhelpful and may cause jury confusion. As such, the Court does not adopt Plaintiff’s proposal and finds that no construction is necessary.

“Connecting” / “connected to” [‘556, cl. 36, 39] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
Ordinary meaning: “join or link”	“directly joining” / “directly joined to”

Defendants contend that the ‘556 specification mandates a construction of “connecting”/“connected to” requiring “direct” connections. DEF. RESP. at 54. Defendants’ citations to the ‘556 specification, however, are directed at an “exemplary clamshell type cellular telephone.” ‘556 at 5:18-19. Limiting the claim terms in such a way would improperly import a limitation from the specification into the claims. *Trading Tech*, 595 F.3d at 1352. Moreover, Defendants’ have not demonstrated that the patentee disavowed “indirect” connections.

On the other hand, Plaintiff’s proposed construction is unnecessary. “Connecting”/“connected to” are common words used in everyday language. Construing these phrases would be unhelpful to the jury and likely lead to confusion. Accordingly, the Court finds that no construction is necessary for these terms.

“First radiating arm”/“second radiating arm” [‘556, cl. 23, 26, 30, 36, 39] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
<p>No construction required.</p> <p>In the alternative, Fractus proposes the following construction for “radiating arm” only: “a projecting part of an antenna which supports the radio frequency currents that contribute to the radiation of the antenna.”</p>	<p><u>For HTC, RIM, Samsung, LG, Pantech:</u> No construction required.</p> <p><u>In the alternative:</u> “radiating arm” only: “an arm which is capable of radiating or receiving electromagnetic waves”</p> <p><u>For Kyocera, Palm, and UTStarcom:</u> “first radiating arm”: a contiguous conductive material that is tuned to a first operating frequency of the mobile communications device</p> <p>“second radiating arm”: a contiguous conductive material that is tuned to a second operating frequency, different from the first operating frequency of the mobile communications device</p>

Only the PKU Defendants’ ask that these terms be construed. The ‘556 specification clearly discloses examples of each radiating arm. *See e.g.* ‘556 at ABSTRACT (“[i]n one embodiment, the first radiating arm includes a space-filling curve. In another embodiment, the first radiating arm includes a meandering section extending from the common conductor in a first direction and a contiguous extended section from the meandering section in a second direction.”) Moreover, as the RIM Defendants’ explain, the PKU Defendants’ construction relies on a sentence in the ‘556 specification explaining how a radiating arm functions, not what actually constitutes a radiating arm. DEF. RESP. at 56. Further, the PKU Defendants’ distinction between a radiating “arm” and “element” is without substantive difference. As such, the Court finds that no construction is necessary for “first radiating arm”/“second radiating arm.”



“Mounted on” [‘556, cl. 36, 39, 43] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
Ordinary meaning: “placed or set on”	“securely fixed to and supported by”

“Mounted on” appears in several claims of the ‘556. Plaintiff contends the term is used within the patent according to its ordinary meaning. Thus, Plaintiff proposes a construction based on general usage dictionaries. PL.’s BR. at 57-58. Defendants assert that their proposed construction is consistent with the specification and the customary meaning. DEF. RESP. at 56-57.

Defendants’ are correct that the ‘556 specification uses “mounting” to describe “securing” an antenna to a mounting structure. *Id.*; ‘556 at 5:4-7; *id.* at 5:18-22. However, the ‘556 specification does not support Defendants’ restrictive proposal to the extent that “mounting” requires the antenna be “supported by” a mounting structure or anything else. Further, Plaintiff is correct that Defendants’ restrictive construction would require the antenna be directly affixed to the circuit board, absent the intervening antenna mounting structure explicitly recited in the ‘556 specification. PL.’s BR. at 57-58. On the other hand, Plaintiff’s overly broad construction is improper because the ‘556 specification explicitly describes “mounting” to require “securing” an antenna to another structure.

Based on the foregoing, the Court construes this term as, “secured directly or indirectly to.”

“Conducting surface” [‘762, cl. 1, 7, 8, 12, 14,15, 17, 21] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“a part of the radiating element that carries radio frequency currents that contribute to the radiation of the antenna”	“a polygon, a multilevel structure, or a solid surface with a space filling curve as its perimeter”

The term “conducting surface” is used in the ‘762 patent. Plaintiff contends the term should

be construed according to its ordinary meaning as reflected in technical dictionaries and the ‘762 specification. PL’S BR at 59-60. Defendants’ argue that the requirements for a “conducting surface” are explicitly defined within the ‘762 specification. DEF. RESP. at 57-58.

Defendants’ are correct that the requirements for a conducting surface are defined within the ‘762 specification. Where the specification contains a definition for a term that differs from the meaning the word would otherwise possess, the patentee’s lexicography controls. *Phillips*, 415 F.3d at 1316. The ‘762 specification explains:

There are three types of geometries that can be used for the conducting surface according to the present invention: a) A polygon (i.e., a triangle, square, trapezoid, pentagon, hexagon, etc. or even a circle or ellipse as a particular case of polygon with a very large number of edges). b) A multilevel structure, Patent No. WO0122528 entitled "Multilevel Antennas". c) A solid surface with an space-filling perimeter.

‘762 at 3:24-31. As such, the Court construes this term as, “a polygon, a multilevel structure, or a solid surface with a space-filling perimeter.”

“Loading structure” [‘762, cl. 1, 7, 8, 11, 12,17, 21] as:

<b>Plaintiff’s Proposed Construction</b>	<b>Defendant’s Proposed Construction</b>
“a part of the radiating element that modifies the input impedance, the distribution of the radiating currents, or both”	“one or more conducting strips whose presence enables multiband performance for an antenna as compared to an identical antenna without the one or more conducting strips, and the width of each conducting strip is less than one tenth of the width of the conducting surface”

The term “loading structure” is used in the ‘762 patent. Plaintiff contends that the “loading structure” is part of the radiating element of the antenna and Plaintiff relies on technical dictionaries

to construct a definition. PL's BR at 59-61. Defendants contend that the term is defined within the specification. DEF. RESP. at 58-60. Despite the Plaintiff's and Defendants' contentions, the term is defined explicitly in the claims.

Claim 1 of the '662 reads in relevant part:

1. A loaded antenna comprising: . . . the second part comprising a loading structure, the loading structure comprising at least one conducting strip connected at at (sic) least one point on an edge of the at least one conducting surface, the maximal width of the at least one conducting strip being less than a quarter of the longest straight edge of the conducting surface;

'662 at 8:10-21. Moreover, all of the dependent claims are consistent with this definition. For example, dependent claim 7 recites:

7. The loaded antenna of claim 1, wherein the loading structure comprises at least two conducting strips connected at a plurality of points on a perimeter of the at least one conducting surface.

'662 at 8:64-67. In other words, while Claim 1 requires "at least one conducting strip," Claim 7 simply requires "at least two conducting strips." Also, Claim 1 requires the conducting strip to be connected at least at one point, while Claim 7 requires at least two conducting strips be connected at a plurality of points. The other dependent and independent claims of the '662 are similarly consistent.

Accordingly, the Court finds that the term is defined in the claims as, "at least one conducting strip connected to at least one point on an edge of the at least one conducting surface, the maximal width of the at least one conducting strip being less than a quarter of the longest straight edge of the conducting surface."

### **CONCLUSION**

For the foregoing reasons, the Court adopts the constructions set forth above.

So ORDERED and SIGNED this 17th day of December, 2010.

  
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JOHN D. LOVE  
UNITED STATES MAGISTRATE JUDGE