UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.

Petitioner

v.

FRACTUS, S.A.

Patent Owner

U.S. Patent No. 7,123,208
Issued: Oct. 17, 2006
Inventors: Puente Baliarda, et al.
Appl. No. 11/102,390
Filed: Apr. 8, 2005

Title: MULTILEVEL ANTENNAE

Case Number: IPR2014-00008

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 7,123,208 UNDER TO 35 U.S.C. §§ 311 *ET SEQ.* AND 37 C.F.R. § 42.100 *ET SEQ.*

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LIST OF EXHIBITS[1]

Petition Exhibit 1001	U.S. Patent No. 7,123,208 to Baliarda *et al*. issued on October 17, 2006
Petition Exhibit 1002	U.S. Patent No. 6,239,765 to Johnson *et al.* issued on May 29, 2001 ("Johnson")
Petition Exhibit 1003	U.S. Patent No. 5,995,064 to Yanagisawa *et al.* issued on November 30, 1999 ("Yanagisawa '064") [2]
Petition Exhibit 1004	Misra and Chowdhury, "Study of Impedance and Radiation Properties of a Concentric Microstrip Triangular-Ring Antenna and Its Modeling Techniques Using FDTD Method," IEEE Transactions on Antennas and Propagation, Vol. 46, No. 4, April 1998 ("Misra-Chowdhury")
Petition Exhibit 1005	Declaration of Dr. Bodnar[3]

[1] Any exhibits marked confidential are no longer confidential or have been redacted to remove confidential information. Thus, all exhibits submitted herein may be posted publically.

[2] Another patent by the same inventor, Yanagisawa, is at issue in related *inter partes* reexamination proceedings. Therefore, the '064 identifier is used for the Yanagisawa patent at issue in this petition.

[3] For consistency and convenience of the office, the identical declaration of Dr. Bodnar is being submitted by Petitioner in four related Inter Partes Review petitions including this petition. As such, only portions of the submitted declaration

Petition Exhibit 1006	Right of Appeal Notice of co-pending reexamination of the ’208 patent mailed December 10, 2012
Petition Exhibit 1007	Patent Owner Appeal Brief to the ’1389 Reexamination, filed May 6, 2013
Petition Exhibit 1008	Petitioner’s Respondent Brief to the ’1389 Reexamination, filed June 6, 2013
Petition Exhibit 1009	Patent Owner Rebuttal Brief to the ’1389 Reexamination, filed July 25, 2013
Petition Exhibit 1010	Complaint filed May 5, 2009 in the case of *Fractus, S.A. v. Samsung Electronics Co., Ltd. et al.*, No. 6:09cv203 (E.D. Tex).
Petition Exhibit 1011	Complaint filed February 28, 2013 in the case of *Fractus, S.A. v. Samsung Electronics Co., Ltd. Et al.*, No. 6:13cv210 (E.D. Tex)
Petition Exhibit 1012	Memorandum Opinion issued on March 15, 2013 issued in *Fractus S.A. v. Samsung Electronics Co. Ltd. Et al.,* Case No. 6:09cv203 (E.D. Tex.)
Petition Exhibit 1013	Preliminary infringement Contentions for the '208 patent in the case of *Fractus, S.A. v. Samsung Electronics Co., Ltd. Et al.*, No. 6:09cv203 (E.D. Tex).
Petition Exhibit 1014	Patent Owner’s Expert report by Dr. Long (Redacted to remove confidential information)
Petition Exhibit 1015	Infringement Trial Demonstrative presented by Patent Owner's expert, Dr. Long, in the case of *Fractus, S.A. v. Samsung Electronics Co., Ltd. Et al.*, No. 6:09cv203 (E.D. Tex).

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are explicitly relied on for purposes of this petition as indicated in the arguments below.

Petition Exhibit 1016	Declaration of Owner's expert, Dr. Jaggard, on Infringement submitted on August 16, 2010 in *Fractus S.A. v. Samsung Electronics Co. Ltd. Et al.,* Case No. 6:09cv203 (E.D. Tex.)
Petition Exhibit 1017	Court Claim Construction Order in the case of *Fractus, S.A. v. Samsung Electronics Co., Ltd. Et al.*, No. 6:09cv203 (E.D. Tex).
Petition Exhibit 1018	Response filed May 26, 2004 in Application No. 10/102,568
Petition Exhibit 1019	U.S. Patent No. 7,015,868 to Baliarda *et al* issued on March 21, 2006

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311 *ET SEQ.* AND 37 C.F.R. §§ 42.100 *ET SEQ.*

The Real Party in Interest, Samsung Electronics Co. Ltd. (hereinafter "Petitioner") hereby respectfully requests *inter partes* review pursuant to 35 U.S.C. §§ 311 *et seq.* and 37 C.F.R. §§ 42.100 *et seq*., of claims 1, 7, 10, 11 and 12 of U.S. Patent No. 7,123,208 ("the '208 Patent") filed April 8, 2005 and issued October 17, 2006 to Baliarda et al. *See* Exhibit 1001, '208 patent.

The '208 patent has been the subject of *inter partes* reexamination proceedings and litigation involving the Petitioner and the Patent Owner, Fractus, S.A. (hereinafter "Owner"). In particular, the *inter partes* reexamination that was filed by Petitioner against the '208 patent is well-advanced. *See* Control No. 95/001,389 ("the '1389 IPX"). In the '1389 IPX, Owner has appealed multiple outstanding rejections of claims 7 and 12. The PTAB has set a hearing date of November 20, 2013 for the '1389 IPX appeal.[4]

A review of the appeal record in the '1389 IPX highlights many of the key disputed issues between the parties that are also relevant in this IPR proceeding,

[4] Given that briefing is complete, the issues are defined, and a hearing date is set in the IPX appeal, the PTAB should not stay the IPX appeal in light of this IPR which may take up to 18 months to complete.

particularly the disputed claim interpretations. *See* Exhibits 1006 to 1009, which includes the Examiner's Right of Appeal Notice, Owner's Appeal Brief, Petitioner's Respondent Brief, and Owner's Rebuttal Brief respectively.

The proposed grounds of rejection in this petition will address claims 1, 7, 10, 11 and 12 as required by statute as well as address the issues that the Owner raised in the '1389 IPX.

An *Inter Partes* Review fee, as set forth in 37 C.F.R. § 42.15(a), accompanies this Petition. If any required fee is missing or unpaid, please charge the fee to deposit account no. 14-1437. A copy of this Petition and all supporting evidence has been served on the Owner, at the correspondence address of record for the patent-at-issue as required by 37 C.F.R. § 42.105(a).

I. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(a)(1)

Petitioner satisfies each requirement for *Inter Partes* Review of the '208 patent pursuant to 37 C.F.R. § 42.8(a)(1).

A. Real Party In Interest Under 37 C.F.R. § 42.8(b)(1)

The Real Party in Interest is Samsung Electronics Co. Ltd.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

A. District Court Proceedings

The '208 patent is the subject of the following court proceedings:

- *Fractus, S.A. v. Samsung Electronics Co., Ltd. et al.*, No. 6:09-cv-00203 (E.D. Tex); currently on appeal to CAFC (Appeal No. 12-1633)
- *Fractus, S.A. v. Samsung Electronics Co., Ltd. et al.*, No. 6:13-cv-00210 (E.D. Tex).

A copy of the complaint for each district court proceeding is attached as Exhibit 1010 and 1011 respectively.

B. PTO Proceedings

The '208 patent is/was the subject of the following *inter partes* reexaminations:

- 95/001,389 filed July 1, 2010; and
- 95/000,591 filed December 14, 2010; and
- 95/001,501 filed December 3, 2010.

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner is represented by the following counsel:

Lead Counsel: James Murphy, Reg. No. 55,474

Back-up Counsel: Henry Petri, Reg. No. 33,063

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney has been filed with this Petition.

D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Service information for lead and back-up counsel is as follows:

NOVAK DRUCE CONNOLLY BOVE + QUIGG LLP

1000 Louisiana Street, 53rd Floor

Houston, Texas 77002

Petitioner also consents to service by e-mail to the following address: FractusIPR@novakdruce.com.

II. OTHER REQUIREMENTS FOR *INTER PARTES* REVIEW

A. GROUNDS FOR STANDING UNDER 37 C.F.R. § 42.104(a)

Petitioner certifies that the patent for which review is sought is available for *inter partes* review and that the Petitioner is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in the Petition. 37 C.F.R. § 42.104(a). Petitioner was served with a complaint alleging infringement of the '208 patent in connection with Civil Action No. 6:13-cv-00210 on March 11, 2013. Under 35 U.S.C. § 315(b), this *inter partes* review is not estopped as this petition is filed within 1 year of being served that complaint.

Petitioner was also served a complaint alleging infringement of the '208 patent in connection with Civil Action No. 6:09-cv-00203 on or around May 7, 2009. However, this complaint was served prior to the enactment of the current version of § 315(b) and cannot be a complaint that "is served" as required by the statute. The usage of "is" indicates the present tense which can only mean a

complaint that "is served" on or after current § 315(b) went into effect as law on September 16, 2012. Current § 315 (b) is reproduced below (emphasis added):

> (b) PATENT OWNER'S ACTION.--An inter partes review may not be instituted if the petition requesting the proceeding is filed more than 1 year after the date on which the petitioner, real party in interest, or privy of the petitioner *is served* with a complaint alleging infringement of the patent. The time limitation set forth in the preceding sentence shall not apply to a request for joinder under subsection (c).

Indeed, this is the only proper interpretation of the statute under Supreme Court precedent. As the Supreme Court has noted, a statute's "use of verb tense is significant in construing statutes." *United States v. Wilson*, 503 U.S. 329, 333 (1992); see also *Carr v. United States*, 130 S. Ct. 2229, 2236 (2010) (courts frequently look to "Congress' choice of verb tense to ascertain a statute's temporal reach"). In addition, under the Dictionary Act, Congress has specifically defined "words used in the present tense include the future as well as the present." 1 U.S.C. § 1. "By implication, then, the Dictionary Act instructs that the present tense generally does not include the past." *Carr*, 130 S. Ct. at 2236; *see also id*. at 2236 n. 5 ("omnitemporality," by which a verb would be understood to "refer to past,

present, and future all at the same time," "is not the typical understanding of the present tense in either normal discourse or statutory construction").

Thus the statute's use of "is served" is plain and unambiguous on its face that a complaint filed prior to enactment of current § 315(b) does not start the clock for the one year bar because. Had Congress intended for the statute to encompass complaints filed before enactment of current § 315(b) it would have used the phrase "was served" rather than "is served." Furthermore, "[i]t is well settled law that the plain and unambiguous meaning of the words used by Congress prevails in the absence of a clearly expressed legislative intent to the contrary." *Hoechst Aktiengesellschaft v. Quigg*, 917 F.2d 522, 526 (Fed. Cir. 1990).

Here, the legislative history is completely silent regarding the scope of the statute with regards to complaints filed before the enactment of current § 315(b). At most the legislative history discusses the reason that a length of one year was chosen compared to shorter or longer lengths of time. *See e.g.,* 157 Cong. Rec. S5429 (daily ed. Sept. 8, 2011). *Id*. However, there is no discussion on if the one year deadline should run from complaints served before enactment of the statute. Thus there is no legislative history indicating that the usage of "is served a complaint" in the statute should be interpreted to encompass a complaint served prior to enactment of the statute…let alone a clearly expressed intent.

Even if the PTAB decides the May 5, 2009 complaint "is" served in accordance with 35 USC § 315(b), Petitioner would still not be estopped from filing this petition. 35 USC § 315(b) states "…petitioner is served with *a complaint* alleging infringement of the patent." (emphasis added). The February 28, 2013 complaint is "a complaint" and this petition is filed within a year of being served "a complaint."

This is also the only reading of 35 U.S.C. § 315(b) consistent with the statutory design as indicated by the legislative history. Congress designed the IPR authority to be an option to contest validity of a patent concurrently with district court proceedings involving the same patent. 154 Cong. Rec. S9987 (daily ed. Sept. 27, 2008). In discussing the one year bar provision, Senator Kyl stated it was important to give a reasonable amount of time to determine "how those claims are alleged to read on the defendant's products" "[a]nd in light of the present bill's enhanced estoppels. Here, Owner was required to file its February 28, 2013 complaint to assert infringement of new products of Petitioner that are different than the products accused of infringement in the lawsuit related to the May 5, 2009 complaint. Exhibit 1012, Memorandum Opinion issued on March 15, 2013. Thus the District Court order confirms that the May 5, 2009 complaint could not have provided Petitioner a reasonable amount of time to determine how the claims are

asserted against the products currently accused of infringement in the February 28, 2013 complaint.

In summary, Congress's usage of the phrase "is served a complaint" in 35 U.S.C. § 315(b) unambiguously means a complaint served on or after the statute was enacted. There is no legislative history that indicates Congress meant for § 315(b) to include complaints served prior to enactment of the statute. Thus, the only complaint served on Petition for purposes of § 315(b) is the February 28, 2013 complaint served on or about March 11, 2013 which is less than one year before the filing of this petition. In addition, the May 5, 2009 complaint does not provide reasonable notice of the positions Owner would take in its February 28, 2013 complaint so applying the one year bar based on the May 5, 2009 complaint would thwart Congressional intent.

B. IDENTIFICATION OF CLAIMS FOR WHICH REVIEW IS REQUESTED 37 C.F.R. § 42.104(b)(1)

Petitioner requests review of claims 1, 7, 10, 11 and 12 of the '208 Patent.

C. THE SPECIFIC STATUTORY GROUNDS ON WHICH REVIEW IS REQUESTED UNDER 37 C.F.R. § 42.104(b)(2)

Petitioner submits that claims 1, 7, 10, 11 and 12 are rendered obvious under 35 U.S.C. § 103 in view of the cited prior art. A statement pointing out each showing of a reasonable likelihood that Petitioner will prevail ("RLP") with respect to at least one claim of the '208 patent can be found below:

Ground #1 Claims 1, 7, 10, 11 and 12 are rendered obvious by Johnson under 35 U.S.C. § 103;

Ground #2 Claims 1, 7, 10, 11 and 12 are rendered obvious by Yanagisawa '064 under 35 U.S.C. § 103; and

Ground #3 Claims 1, 7, 10, 11 and 12 are rendered obvious by Misra-Chowdhury under 35 U.S.C. § 103.

III. OVERVIEW OF THE '208 PATENT

A. Summary of Specification

The '208 Patent is directed to a multilevel structure formed by "sets of similar geometric elements" to create "a specific geometrical design." Exhibit 1001, '208 patent at 1:14-20. As the specification explains, "the essence of the invention is found in the geometry used in the multilevel structure." *Id*. at 6:1-3. The inventors claimed the "difference between multilevel antennae and other existing antennae lies in the particular geometry." *Id*. at 5:44-46.

In particular, a multilevel antenna is characterized by a plurality of polygons/polyhedrals having the same number of sides and of the same type, the polygons/polyhedrals are electrically coupled via direct contact or by close proximity, at least 75% of the polygons/polyhedrals have more than 50% of their perimeter not in contact with other polygons/polyhedrals, the polygons/polyhedrals are clearly visible and individually distinguishable, and that the polygons/polyhedrals form two levels of detail: that of the overall structure and

that of the individual polygons/polyhedrals that form the overall structure. *Id*. at 4:50-5:11.

B. Summary of *Inter Partes* Reexaminations

On July 1, 2010, Petitioner filed an *inter partes* reexamination request of the '208 patent which was granted as Control No. 95/001,389 ("the '1389 IPX"). Subsequently, HTC and Kyocera also filed *inter partes* reexamination against the '208 patent which were merged with the '1389 IPX. *See* Control Nos. 95/000,591 and 95/001,501. In the '1389 reexamination, the examiner issued a Right of Appeal Notice rejecting all reexamined claims. Exhibit 1006, Examiner's Right of Appeal Notice. Owner then appealed and all briefing by both parties is completed. See Exhibit 1007, Owner's Appeal Brief; Exhibit 1008, Petitioner's Respondent Brief; and Exhibit 1009, Owner's Rebuttal Brief.

The major point of dispute raised by Owner in its appeal is whether the claimed "multilevel structure" excludes groupings of single band antennas and/or antennas that incorporate reactive elements. Exhibit 1007, Owner's Appeal Brief at 4-17. In addition, the Owner contested what types of antenna structures should be excluded from "multilevel" stating that branched antennas are excluded unless they had certain operational characteristics including that they "reuse portions of the antenna for different frequency bands." *Id*. at 12; *see also* Exhibit 1009, Owner's Rebuttal Brief at 5 (arguing that an accused infringing branch antenna is a

multilevel structure because "the 850 MHz antenna structure is reused for the 1900MHz antenna structure").

In its respondent brief, Petitioner identified why Owner's interpretation of "multilevel structure" is not supported by the specification, and how each reference still discloses a "multilevel structure" even under Owner's narrow definition. Exhibit 1008, Petitioner's Respondent Brief at 2-8. However, given Owner's reliance on operational characteristics to distinguish the prior art, Petitioner is submitting an expert declaration with this petition to provide technical analysis of the operational characteristics of the prior art antennas, including measurements that confirm portions of the prior art antenna are reused for different frequency bands.

IV. HOW THE CHALLENGED CLAIMS ARE TO BE CONSTRUED UNDER 37 C.F.R. § 42.104(b)(3)

Petitioner requests that the Office give the claim terms of the '208 Patent their broadest reasonable interpretation, as understood by one of ordinary skill in the art and consistent with the disclosure. *See* 37 C.F.R. § 42.100(b). Owner has asserted an extremely broad scope for claims 1, 7, 10, 11 and 12 of the '208 patent. [5] *See* Exhibit 1013, Owner's Preliminary infringement Contentions and Exhibit

[5] While Requester does not agree with the reasonableness of the Patent Owner's claim scope for infringement purposes, the statements provide admissions by the

1015 Owner's Trial Demonstrative of Infringement. Further, the Claim Construction Order from the underlying litigation is also provided for completeness. *See* Exhibit 1017, Claim Construction Order.

Guidance is also given by the examiner's broadest reasonable interpretation in the '1389 IPX. The examiner looked at the claims and made findings regarding the broadest reasonable interpretation of certain claim terms. Exhibit 1006, RAN at 5-6. In its appeal to the PTAB in the '1389 IPX, Owner challenged the examiner's broadest reasonable construction of two claim terms: multilevel structure and polygon/polyhedral.

Therefore, the construction of these two terms is disputed and should be construed by the PTAB as indicated below. All other claim terms not specifically addressed should be accorded their broadest reasonable interpretation in light of the specification.

Patent Owner regarding its position for the broadest reasonable interpretation of the scope of Claims 1, 7, 10 ,11 and 12 of the '208 patent. 37 C.F.R. §1.104(C)(3).

A. Multilevel Structure

For purposes of this petition, Petitioner accepts the examiner's broadest reasonable interpretation of multilevel structure.[6] *See* Exhibit 1006, RAN at 5-6. According to the examiner, the broadest reasonable interpretation of a multilevel structure is the following:

- "A plurality of polygons of the same type (i.e., same number of sides)
- The polygons are electromagnetically coupled, via direct contact or close proximity
- At least 75% of the elements (polygons) have more than 50% of their perimeter not in contact with other elements of the structure
- Due to the above, one can individually distinguish most of the component polygons, presenting at least two levels of detail:

[6] Petitioner does not dispute the examiner's construction based upon the broadest reasonable interpretation standard given Owner's admissions regarding broadly asserted claim scope. However, Petitioner has asserted a more narrow construction in the underlying litigation based on the standard of construction used in litigation. *See In re Trans Texas Holding Corp.*, 498 F.3d 1290, 1298 (Fed. Cir. 2007) (citing *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984)).

that of the overall structure, and that of the polygons that form it. To the extent this feature is not claimed, it appears essential to the definition as it is the very reason behind the name multilevel. Col. 2 lines 32-37, 54-58.

- The construction materials and the configuration in an antenna (i.e., monopole, dipole, patch, etc.) do not affect the definition; the geometry of the structure is what matters. Col. 5 line 44 – col. 6 line 24."

See Exhibit 1006, RAN at 5 (citing '208 patent at 4:50 *et seq*.)(footnote omitted). In addition, the Examiner determined claim 1 of the '208 patent further limited multilevel structure so that "[n]ot all the polygons have the same size" and that "[t]he perimeter of the multilevel structure has a different number of sides than the polygons that compose it." *Id*. at 5-6. For comparison, the district court's construction is reproduced below:

"a structure for an antenna useable at multiple frequency bands with at least two levels of detail, 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."

Petition Exhibit 1017, Claim Construction Order at 18-19.

In its appeal of the '1389 IPX, Owner contested the examiner's interpretation of multilevel structure and argued it should instead be interpreted much more narrowly to exclude certain antenna types and require certain functional characteristics. The examiner in reviewing the specification did not agree that the specification supported the narrowing language that Owner proposed. *See* e.g., Exhibit 1006, RAN at 10-11. Notably, not even the narrower district court construction contain the exclusions Owner proposed. Petition Exhibit 1017, Claim Construction Order at 18-19. For the reasons given below, Owner's narrowing constructions should not be adopted.

Owner's Proposed Exclusions are Improper

Owner argued that "multilevel structure" is a coined term and is defined to exclude antennas incorporating reactive elements that force the apparition of new frequencies as well as antennas grouping several single band antenna. Exhibit 1007, Owner's Appeal Brief at 4-9. Owner's support for this narrow definition is the statement in the specification that purports to distinguish those types of antenna

because "Multilevel antenna on the contrary base their behavior on their particular geometry." '208 patent at 3:47-54.

The particular geometry of a multilevel antenna as determined by the examiner and the district court is noted above. Thus, if an antenna has the same geometry as a multilevel structure, it is not clear how it could be excluded even if the antenna incorporated reactive elements or consisted of a grouping of several single band antennas. As such, the '208 patent fails demonstrate the clear and explicit intent to define "multilevel structure" to exclude such antennas. *Thorner v. Sony Computer Entertainment America L.L.C.*, 669 F.3d 1362, 1365-66 (Fed. Cir. 2012) ("[T]he inventor's written description of the invention, for example, is relevant and controlling insofar as it provides clear lexicography") ; *see also Irdeto Access, Inc. v. Echostar Satellite Corp.,* 383 F.3d 1295, 1303 (Fed. Cir. 2004).

Furthermore, Owner's proposed definition of "multilevel structure" that excludes capacitance between antenna elements contradicts the specification of the '208 patent. The "multilevel structure" shown in Figure 4.12 is comprised of square polygons that are coupled together "due to the mutual capacitance." '208 patent at 5:33-40 and Figure 4.12. Without this capacitive coupling, the individual square polygons would behave as separate antenna with their own individual resonance frequencies. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 15. Thus, the resonant frequencies associated with Figure 4.12, whatever they are, would be due

substantially to capacitance between antenna elements. Similarly, Figure 3.13 also relies on capacitive coupling since there is no direct coupling between the antenna elements. *See*'208 patent at Figure 3.13.

Therefore, it would be improper to interpret "multilevel structure" to exclude the embodiments shown in Figures 4.12 and 3.13 that rely on capacitive coupling for their respective resonant frequencies. *Vitronics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1583 (Fed. Cir. 1996) (A claim interpretation that excludes a preferred embodiment from the scope of the claim "is rarely, if ever, correct").

Lastly, Owner has proposed that the phrase "grouping several single band antennae" means a single antenna that is easily separable into multiple antennas. Exhibit 1009, Owner's Rebuttal Brief at 5. In essence, Owner argues that an antenna that could be "easily" modified to fall within a proposed exclusion should be excluded even when not modified. Yet, Owner cites no legal basis for this rationale. Nor has the Owner pointed to any portion of the specification that supports a finding that the phrase grouping several single band antenna should be interpreted to mean a single antenna that is easily separable into multiple antenna.

That the claims do not exclude a single un-separated antenna structure is confirmed by the prosecution history of the parent application where applicant tried to distinguish the prior art on grounds that it disclosed an "antenna array, i.e., a group of several *separate*" antenna rather than a "*single* antenna having a

multilevel structure." Exhibit 1018, Response filed May 26, 2004 in Application No. 10/102,568, at 7 (emphasis in original).

Owner's Proposed Functional Requirements are Improper

Owner also proposes that a multilevel structure "reusing portions of the antenna for different frequency bands." Exhibit 1007, Owner's Appeal Brief at 12; *see also* Exhibit 1009, Owner's Rebuttal Brief at 5 (arguing that an accused infringing branch antenna is a multilevel structure because "the 850 MHz antenna structure is reused for the 1900MHz antenna structure"). Such a functional requirement does not appear anywhere in the specification of the '208 patent and should not be read into the apparatus claims at issue. *In re Schreiber*, 128 F.3d 1473, 1477-78 (Fed. Cir. 1997) (claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function.)

Given the above, the broadest reasonable interpretation of "multilevel structure" for this proceeding should be the broadest reasonable interpretation adopted by the examiner without the exclusions proposed by the Owner. Exhibit 1006, RAN at 5-6.

B. Polygonal or Polyhedral

Owner argued that the claimed multilevel structure comprising "polygonal or polyhedral elements" does not read on an antenna made of "very thin wire." Petition Exhibit 1007, Owner's Appeal Brief at 14-16. Yet, Owner's proposed

construction directly contradicts the usage of the term in the claims of its parent patent which recites "the multilevel structure comprising a set of polygonal or polyhedral elements…multilevel structure is formed only by cylinders." *See* Petition Exhibit 1019, U.S. Patent No. 7,015,868 at Claims 1 and 10; *see also Omega Eng'g, Inc. v. Raytek Corp*., 334 F.3d 1314, 1334 (Fed. Cir. 2003) (same claim term in related patents should be given the same meaning unless otherwise compelled).

Even a very thin wire is a cylinder and thus within the scope of the polygons or polyhedrals that comprise a multilevel structure. Furthermore, the '208 patent never restricts a multilevel structure to only polygons/polyhedrals of a certain width. Given the above, the broadest reasonable interpretation of "polygonal or polyhedral elements" for this proceeding would not exclude a wire conductor, even a very thin wire conductor as asserted by Owner.

C. Level of One of Ordinary Skill in the Art

Petitioner does not oppose Owner's proposed level of ordinary skill in the art. Namely, Owner has proposed that one of ordinary skill in the art at the relevant time period would have a M.S. degree in Electrical Engineering with a major in electromagnetics and antennas, and at least 5 years of experience with antenna design and multi-scale objects; or alternatively, have a Ph.D. in Electrical Engineering with an emphasis in electromagnetics, a knowledge of fractals, and at

least 2 years of experience with antenna design and multi-scale objects. Exhibit 1016, Declaration of Owner's expert Dr. Jaggard at ¶ 14.

V. BASIS FOR DECLARATION EVIDENCE AND UNDERLYING FACTUAL SUPPORT OF TESTING PERFORMED

In the *inter partes* reexamination, Owner has relied on arguments that attempt to distinguish the prior art based on operational characteristics of antennas rather than antenna structure. Exhibit 1009, Owner's Rebuttal Brief at 9 ("to meet the definition of 'multilevel structure,' the prior art would need to show an antenna… [that] display[s] the multiband operation characteristics…"). Based on Owner's distinguishing arguments, such operational characteristics include: current densities, radiation patterns and impedance levels.[7]

Petitioner submits a declaration of Dr. Bodnar that provides the measurements of these operational characteristics of prior art antennas. *See* Exhibit 1005, Declaration of Dr. Bodnar. Importantly, the measurements performed by Dr. Bodnar compute the same variables as relied on by Owner's expert, Dr. Long, in Dr. Long's infringement assessment of accused products in the underlying litigation. Exhibit 1014 at 52-58 and 71-73 ("Methodology for

[7] As these characteristics are merely functions of the underlying structure they should not be given patentable weight to the apparatus claim at issue here. *See In re Schreiber*, 128 F.3d 1473, 1477-78 (Fed. Cir. 1997).

Infringement Analysis"). The relevance of the prior art teaching the same operational characteristics as was relied on to show infringement is captured in the maxim: "[T]hat which infringes if later anticipates if earlier." *Polaroid Corp. v. Eastman Kodak Co.*, 789 F.2d 1556, 1573, 229 USPQ 561, 574 (Fed. Cir. 1986) (*citing Peters v. Active Mfg. Co*., 129 U.S. 530, 537 (1889).

A. Summary of Dr. Long's Infringement Methodology to Determine if an Antenna Infringes a "Multilevel Structure"

According to Owner's expert, Dr. Long, determining if an antenna infringes the multilevel structure of the '208 patent can be done by comparing the portions of an antenna associated with different frequency bands. Exhibit 1014, Dr. Long's Expert Report at 72. Dr. Long begins his analysis by identifying a number of polygons that make up the overall antenna structure. *Id*. at 40-51. Dr. Long then superimposes current density measurements over the identified polygons using a computer modeling program. *Id*. at 52-55. According to Dr. Long, "the polygon should be considered 'active' or 'associated' with the selected frequency" if the polygon has current density between 0 and -10dB. *Id*. at 54. For polygons with current densities -10dB and below, the polygon is active if the majority of the antenna portion has a current density above -20dB. *Id*. A polygon is only inactive if a majority of the current density is below -20dB. *Id*.

Thus, according to Dr. Long, looking at the current densities of the antenna at a particular frequency provides an indication of what portions of the antenna are

associated with each frequency band For determining similar radiation patterns, Dr. Long analyzed whether the radiation patterns were characterized as the same general pattern (e.g., omnidirectional or directive) and for determining similar impedance levels Dr. Long analyzed if the Voltage Standing Wave Ratio (VSWR) was below a threshold of 4.0. *Id*. at 55-58.

B. Underlying Support for Dr. Bodnar's Testing Methodology

Petitioner's counsel retained Dr. Bodnar to perform measurements on the operational characteristics of antennas taught by the prior art as well as to provide technical analysis of the prior art and antennas in general. Dr. Bodnar reviewed each piece of prior art to be measured and based on relevant disclosure of each reference regarding dimensions and structure was able to generate a computer model of an antenna taught by each reference. Exhibit 1005, Dr. Bodnar Declaration at ¶¶ 17-24. This type of antenna modeling and simulation is routine in the industry and within the level of ordinary skill in the art. *Id*. at ¶ 18; *see also* Exhibit 1016, Declaration of Owner's expert Dr. Jaggard at ¶ 29.

Where a reference failed to give an explicit dimensional value of a certain antenna element, Dr. Bodnar was able to determine a reasonable dimensional value to one of ordinary skill in the art based on other disclosure within the reference including the antenna layout, general operational characteristics, and materials used. Exhibit 1005, Dr. Bodnar Declaration at ¶ 18.

Each of the computer models was generated using a standard industry program for antenna testing call FEKO. *Id*. at ¶ 18-19. Once an antenna model was generated, Dr. Bodnar used the built in tools of the FEKO program to analyze current density, current paths, radiation patterns, and VSWR levels at the resonant frequencies. *Id*. at ¶ 19-24. The data used to generate the models tested by Dr. Bodnar are attached to his declaration as an exhibit. *Id*. at ¶ 20. This modeling data information would permit others of ordinary skill in the art to recreate the models relied on by Dr. Bodnar to validate the measurements obtained. *Id.*

VI. HOW THE CONSTRUED CLAIMS ARE UNPATENTABLE UNDER 37 C.F.R. § 42.104(b)(4)

A. Johnson Renders Obvious Claims 1, 7, 10, 11 and 12 of the '208 Patent

Johnson discloses using the antenna of Figure 9 as the antenna in Figure 3 but does not provide explicitly disclosure on the operational details of that embodiment. Johnson at 5:50-6:33. The operation of this embodiment would be obvious to one of ordinary skill as evidenced by Dr. Bodnar's declaration. Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 37-48.

Furthermore, Johnson discloses a multi-band antenna design but does not explicitly disclose the measurements of current density, which Owner asserts is required to demonstrate that an antenna has the claimed "multilevel structure." Exhibit 1007, Owner's Reexam Appeal Brief at 12. In addition, certain other

operational characteristics for the disclosed antennas are not expressly given at all resonant frequency bands. Therefore, it would have been obvious to one of ordinary skill in the art to model an antenna as taught by Johnson in order to measure the current density and other relevant radio electric characteristics of the antenna at the resonant frequency bands. Modeling an antenna is a routine task to those of ordinary skill in the art and it demonstrates how the embodiment taught by Johnson of using the antenna of Figure 9 as the antenna in Figure 3 operates.

Claim 1

1. A multi-band antenna including

Johnson discloses an exemplary embodiment wherein a "tri-band antenna" operates across "a cellular band (880-960 MHz), a PCS band (1710-1880 MHz), and the BLUETOOTH™ band (2.4-2.5 GHz)." Johnson at 5:36-39. A single conductive trace 40 is responsible for the dual band operation across the cellular and PCS bands. *Id*. at 39-40, see Figure 9 reproduced below.

FIG. 9

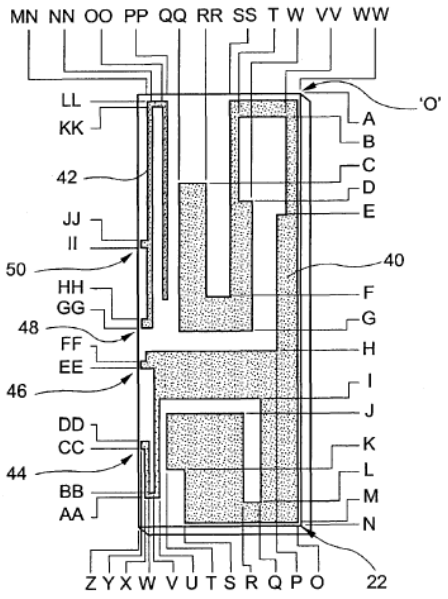


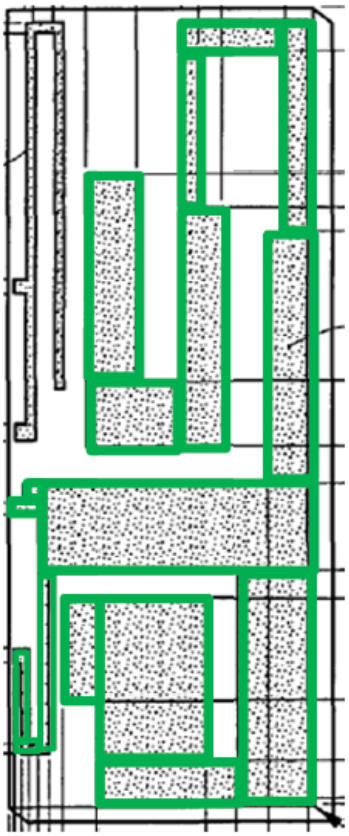
FIG. 9 of Johnson

Thus at a minimum, conductive trace 40 is a multi-band antenna resonant at two frequency bands.

at least one multilevel structure wherein the multilevel structure includes at least one antenna region comprising a set of polygonal or polyhedral elements having the same number of sides or faces,

Johnson discloses a multilevel structure because it achieves multi-band behavior by use of a single conductive trace for different frequency bands, e.g., the cellular and PCS frequency bands. Johnson at Fig. 9 (reproduced below) and 5:36-39. Johnson discloses that the antenna embodiment of Figure 9 is comprised of numerous polygonal elements having four sides. *See* Johnson at 5:35-6:34. The

Johnson antenna comprises identifiable polygons as illustrated below. *See also e.g.* Petition Exhibit 1013, Owner's Infringement Contentions at 2 and Petition Exhibit 1015, Owner's Trial Demonstrative at 35-39.

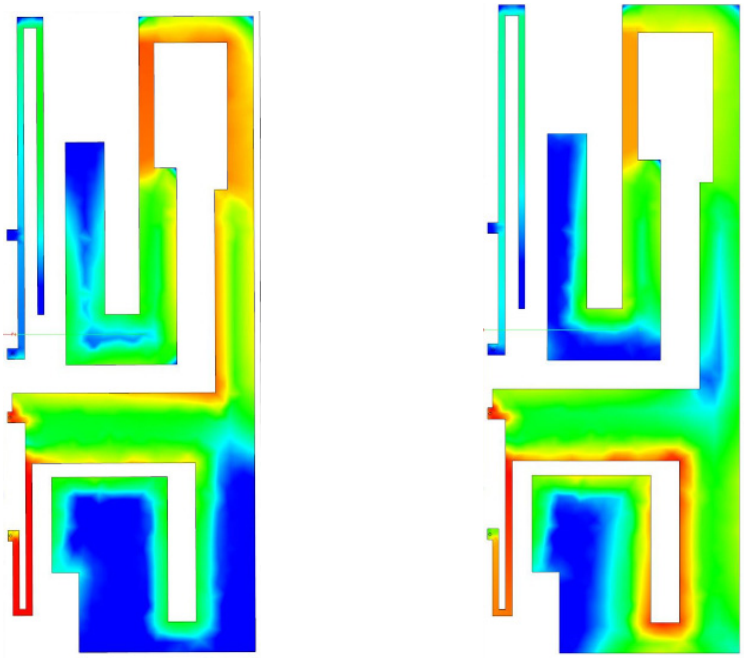


Johnson Figure 9 identifying 17 polygon elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. Exhibit 1006, RAN at 5-6. To the extent relevant, Johnson also would not be excluded under Owner's narrow claim interpretation of multilevel structure. Johnson's multi-band behavior is not due to any concentrated or integrated reactive elements that force the apparition of new frequencies. Exhibit

1005, Declaration of Dr. Bodnar at ¶ 40. Nor is Johnson a grouping of single band antennas because Johnson "reuses" the same portions of conductive strip 40 for both frequency bands as demonstrated through the measurements of the antenna taught by Johnson. *Id*. at ¶ 43-48.

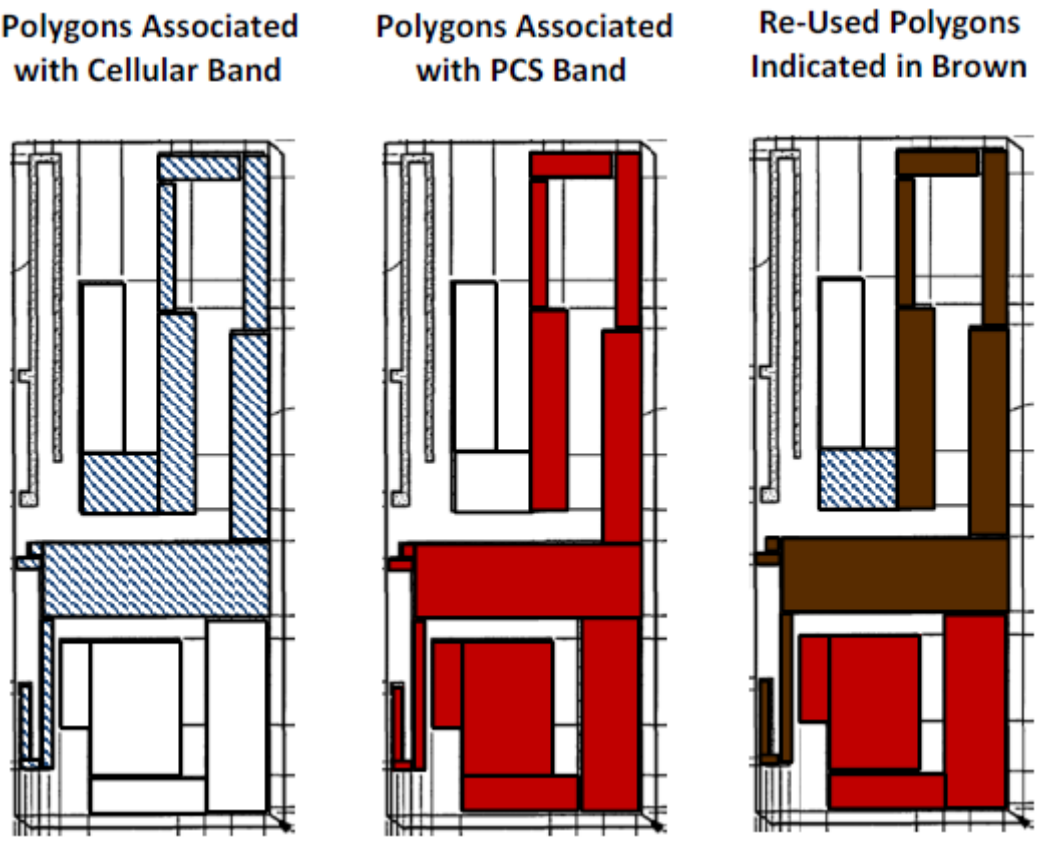
In addition, Johnson also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by Owner. When one of ordinary skill in the art models the antenna taught by Johnson, the current density at various frequencies can be measured to show that the same portions of the antenna are associated with multiple frequency bands.



Cellular band **PCS Band**

Petition Exhibit 1005, Declaration of Dr. Bodnar at Exhibit B pgs. 14-15

At a minimum, the below shaded polygons are associated with the respective frequency bands using Owner's interpretation of claim scope. *See* Petition Exhibit 1015, Owner's Trial Demonstrative at 54-55. The polygons associated with both frequency bands (e.g., reused) is also indicated.



Polygons of Johnson Figure 9 associated with frequency bands

According to Owner, the operational function that the same polygonal element is reused for more than one frequency band is required of a multilevel structure. Petition Exhibit 1007, Appeal Brief, at 12. Given that some of the same polygons are used for at least different frequency bands, Johnson is a multilevel antenna under the broadest reasonable interpretation or even under the Owner's

narrow construction which requires the reuse of polygonal elements.

wherein each of said elements in said antenna region is electromagnetically coupled to at least one other of said elements in said region either directly through at least one point of contact or through a small separation providing coupling,

The multilevel structure of Johnson comprises a plurality of electromagnetically coupled geometric element through a point of contact or a small separation. Johnson at 5:36-47 and FIG. 9. The polygonal elements in Johnson are coupled to each other by direct contact since they are part of the single conductive trace 40.

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,

Johnson provides the explicit dimensions in Table 1 of conductive trace 40 shown in Figure 9. Johnson at 5:50-6:33. The dimensions provided in Table 1 are used in the model measured by Dr. Bodnar. Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 38 and 42. Using the dimensions provided by Johnson, 16 out of 17 of the identified elements (~95%) have less than 50% of the perimeter in contact

with other elements.

wherein not all the polygonal or polyhedral elements have the same size and

Johnson provides the explicit dimensions of the metal trace that forms antenna 40 at Table 1. Johnson at 5:50-6:33. Based on these dimensions, not all of the identified elements have the same size. As one example, the large center rectangle has a size of 4.14mm x 14.44mm while an adjacent polygon has a different size of 11.94mm x 2.29mm.

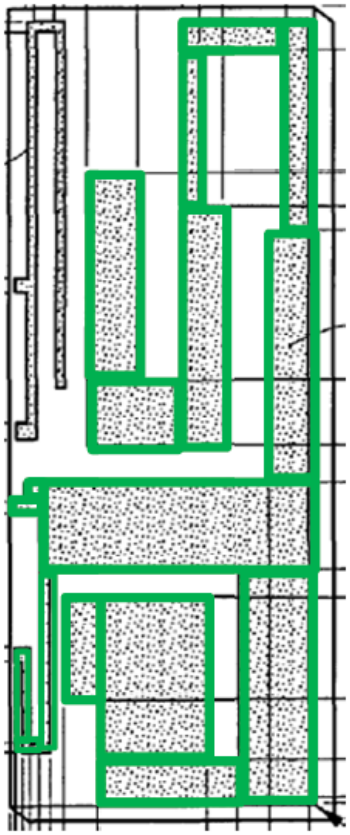
wherein the perimeter of the multilevel structure has a different number of sides than the polygons that compose said antenna region, and

The rectangular polygonal elements, identified in Figure 9 above, all have four sides while the overall number of sides of the perimeter of conductive trace 40 is much greater than four. Johnson at Figure 9 and Table 1.

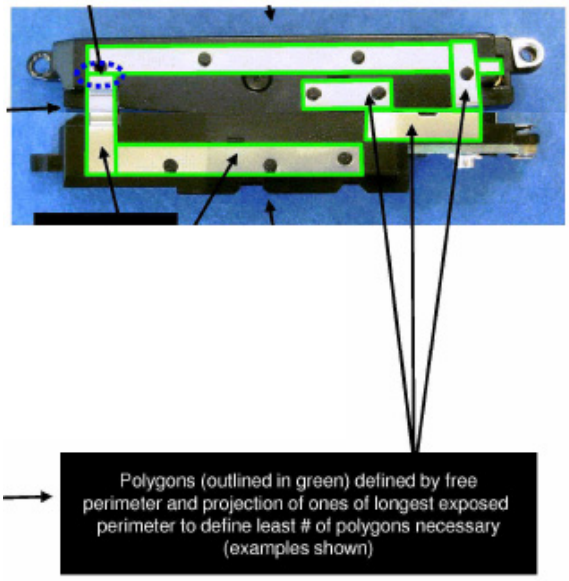
further wherein a plurality of polygons of said antenna region are generally identifiable as a geometrical element defined by the free perimeter thereof and the projection of ones of the longest exposed perimeters thereof to define the least number of polygons within said region necessary to form said generally

distinguishable elements where said polygon perimeters are interconnected.

Petitioner has identified the rectangular polygons using the free perimeter and the longest identifiable perimeter to define the least number of polygons, reproduced below. Johnson at Figure 9 and Table 1. Further, the identification of polygons is consistent with how Owner has interpreted the scope of this limitation. *See* 37 C.F.R. § 1.104(C)(3); *see also* Petition Exhibit 1014, Long Report at 45-50 and 65 and Petition Exhibit 1015, Owner's Trial Demonstrative at 35-39.



Johnson Figure 9 (annotated)



Petition Exhibit 1013, Owner's Infringement Contentions at 2.

7. The multi-band antenna set forth in claim 1, wherein the level of impedance and radiation pattern of said antenna are similar in several frequency bands so that the antenna maintains basically the same radio-electric characteristics and functionality in said bands to allow it to operate simultaneously in several frequencies and thereby be able to be shared by several communication services.

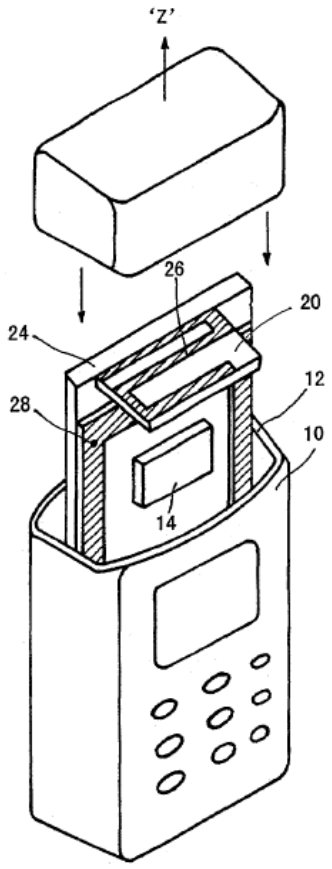
Johnson renders obvious claim 1 as discussed above. To the extent it is viewed that the disclosed structure and operation of Johnson does not disclose impedance levels or radiation patterns, one of ordinary skill in the art can measure those characteristics based on Johnson's teachings of the antenna. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 43. One of ordinary skill in the art looking at the measurements would understand that the measurements for impedance levels and radiation patterns are substantially similar over both frequency bands. *Id*. at ¶¶ 45-48. In addition, Johnson's antenna permits simultaneous operation so that the antenna can be shared by multiple communication services. *Id*. at ¶ 44.

Furthermore, Owner asserts that a similar level of impedance can be shown by demonstrating that the VSWR (voltage standing wave ratio) remains below 4.0 for a majority of frequencies in the band. Petition Exhibit 1014, Long Report at 58. Likewise, Owner contends that a similar radiation pattern can be shown if the

radiation patterns are omni-directional for the multiple frequency bands. *Id*. at 57. Johnson discloses both that the VSRW is under 4.0 and that the radiation patterns are omni-directional at both frequency bands. 1005, Declaration of Dr. Bodnar at ¶¶ 47-48 and Exhibit B.

10. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device.

Johnson renders obvious claim 1 as discussed above. Johnson discloses a tri-band antenna designed to operate for "a cellular band (880-960 MHz), a PCS band (1710-1880 MHz), and the BLUETOOTH™ band (2.4-2.5 GHz)." Johnson at 5:36-39. Fig. 1 (reproduced below) of Johnson is an "exploded perspective view of a *wireless communication device* incorporating an antenna assembly according to the present invention." Johnson at 3:10-12 (emphasis added); *see also* 1005, Declaration of Dr. Bodnar at ¶ 37. Further, Johnson discloses "an antenna assembly 20 disposed within a wireless communication device, such as a *cellular telephone* 10." Johnson at 3:63-65 (emphasis added).



Johnson at FIG 1

The "preferred embodiments of an antenna assembly 20 according to the present invention are illustrated in FIGS 1-12." Johnson at 3:45-48. Thus Figure 9 is one of the embodiments that can be included in a portable communications device.

11. The multi-level antenna set forth in claim 10, wherein said portable communication device is a handset.

Johnson renders obvious claim 10 as discussed above. As discussed with respect to claim 10, Johnson discloses using the antenna in a cellular telephone

handset. Johnson at 3:63-65 ("an antenna assembly 20 disposed within a wireless communication device, such as a *cellular telephone* 10.") (emphasis added.); *see also* Figure 1 and 1005, Declaration of Dr. Bodnar at ¶ 37.

12. The multi-level antenna set forth in claim 11, wherein said antenna operates at multiple frequency bands, and where in at least one of said frequency bands is operating within the 800 MHz - 3600 MHz frequency range.

Johnson renders obvious claim 11 as discussed above. Johnson discloses an exemplary embodiment wherein the antenna operates across "a cellular band (880-960 MHz), a PCS band (1710-1880 MHz)…" Johnson at 5:36-39; *see also* Exhibit 1005, Declaration of Dr. Bodnar at ¶ 44 (measuring resonant frequency bands around 1030 MHz and 1825 MHz). The frequency bands provided by Johnson and measured by Dr. Bodnar are all within the claimed 800 MHz-3600 MHz frequency range.

B. Yanagisawa '064 Renders Obvious Claims 1, 7, 10, 11, and 12 of the '208 Patent

Yanagisawa '064 teaches, but does not expressly illustrate, an antenna according to Figure 1 having four horizontal return portions and five vertical portions. Yanagisawa '064 at 13:52-62. This proposed rejection relies on the

structure and operation of that embodiment as understood by one of ordinary skill in the art. Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 25-36.

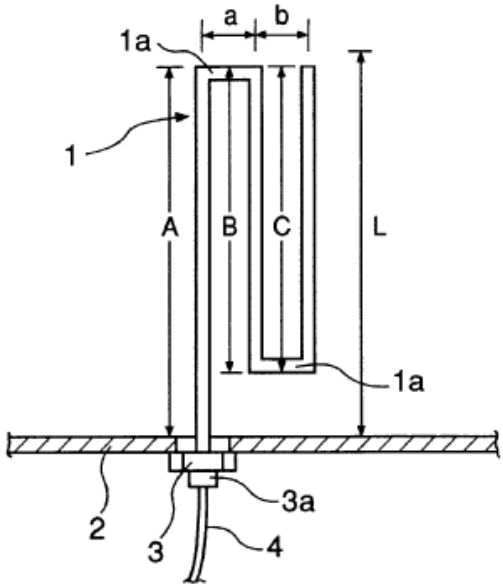
Furthermore, Yanagisawa '064 discloses a multi-band antenna design but does not explicitly disclose the measurements of current density, which Owner asserts is required to demonstrate an antenna has a multilevel structure. Exhibit 1007, Owner's Reexam Appeal Brief at 12. In addition, certain operational characteristics for the disclosed antennas are not expressly given at all resonant frequency bands. Therefore, it would have been obvious to one of ordinary skill in the art to model an antenna as taught by Yanagisawa '064 in order to measure the current density, current paths and other relevant radio electric characteristics of the antenna at the resonant frequency bands. Modeling an antenna is a routine task to those of ordinary skill in the art and it demonstrates how an embodiment of an antenna taught by Yanagisawa '064 operates.

Claim 1

1. A multi-band antenna including

Yanagisawa '064 discloses an antenna that operates in multiple bands. Yanagisawa '064 at 17:52-57 ("when the antenna as shown in FIG. 1 is used as the whole or a part of the antenna of the radio apparatus, it is possible to obtain a small-sized radio apparatus which can transmit and receive multi-frequency bands at a high sensitivity."); *see also* Exhibit 1005, Declaration of Dr. Bodnar at ¶ 25.

As will be discussed in detail below, the embodiment taught by Yanagisawa ’064 modeled by Dr. Bodnar and relied on herein resonates at multiple bands. See below for a comparison of Figure 1 and the embodiment modeled by Dr. Bodnar.



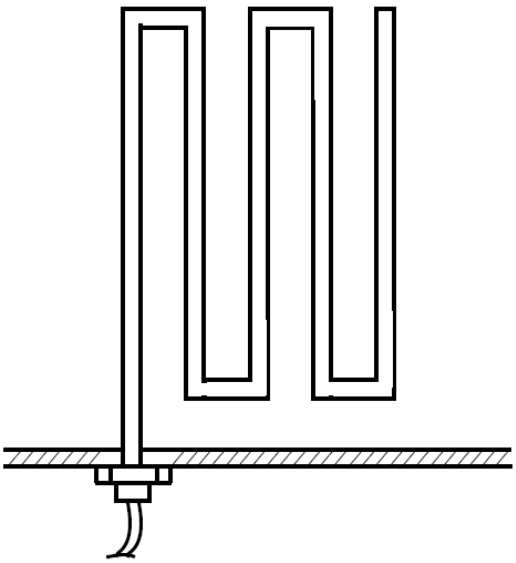


Figure 1 of Yanagisawa ’064 *Embodiment modeled by Dr. Bodnar*

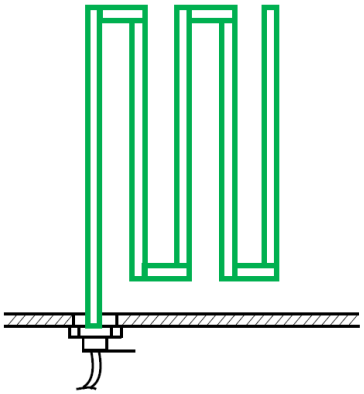
at least one multilevel structure wherein the multilevel structure includes at least one antenna region comprising a set of polygonal or polyhedral elements having the same number of sides or faces,

The Yanagisawa ’064 multi-band antenna includes at least one multilevel structure because it achieves multi-band behavior “by use of a single antenna.” Yanagisawa ’064 at 4:15-25 and 17:52-18:5. The structure of the antenna is comprised of a plurality of directly coupled elements. Yanagisawa ’064 at Figure 1 and 5:12-20 (“…the first antenna element is formed by an electrically conductive

belt-shaped body"); *see also* 1005, Dr. Bodnar Declaration at ¶ 26. Using the notations in Figure 1, there is a first element that spans the length of "A," a second element that spans the length of "a," a third element that spans the length of "B," a fourth element that spans the length of "b," and a fifth element that spans the length of "C." *Id*. at ¶ 28.

Yanagisawa '064 also states that the antenna of Figure 1 with two return portions can be modified to further reduce the height by adding in additional return portions, with an even number of returns up to six being preferred. Yanagisawa '064 at 13:49-62; 1005, Declaration of Dr. Bodnar at ¶ 28. Thus, the antenna modeled by Dr. Bodnar that forms the basis of this rejection used a total of four returns, which is within the preferred teachings of Yanagisawa '064.

Based upon the teachings of Yanagisawa '064 and the claim scope relied on to identify polygons provided by Owner's expert, the Yanagisawa '064 antenna modeled by Dr. Bodnar comprises identifiable polygons as depicted below. *See e.g.*, Petition Exhibit 1013, Owner's Infringement Contentions at 2 and Petition Exhibit 1015, Owner's Trial Demonstrative at 35-39.

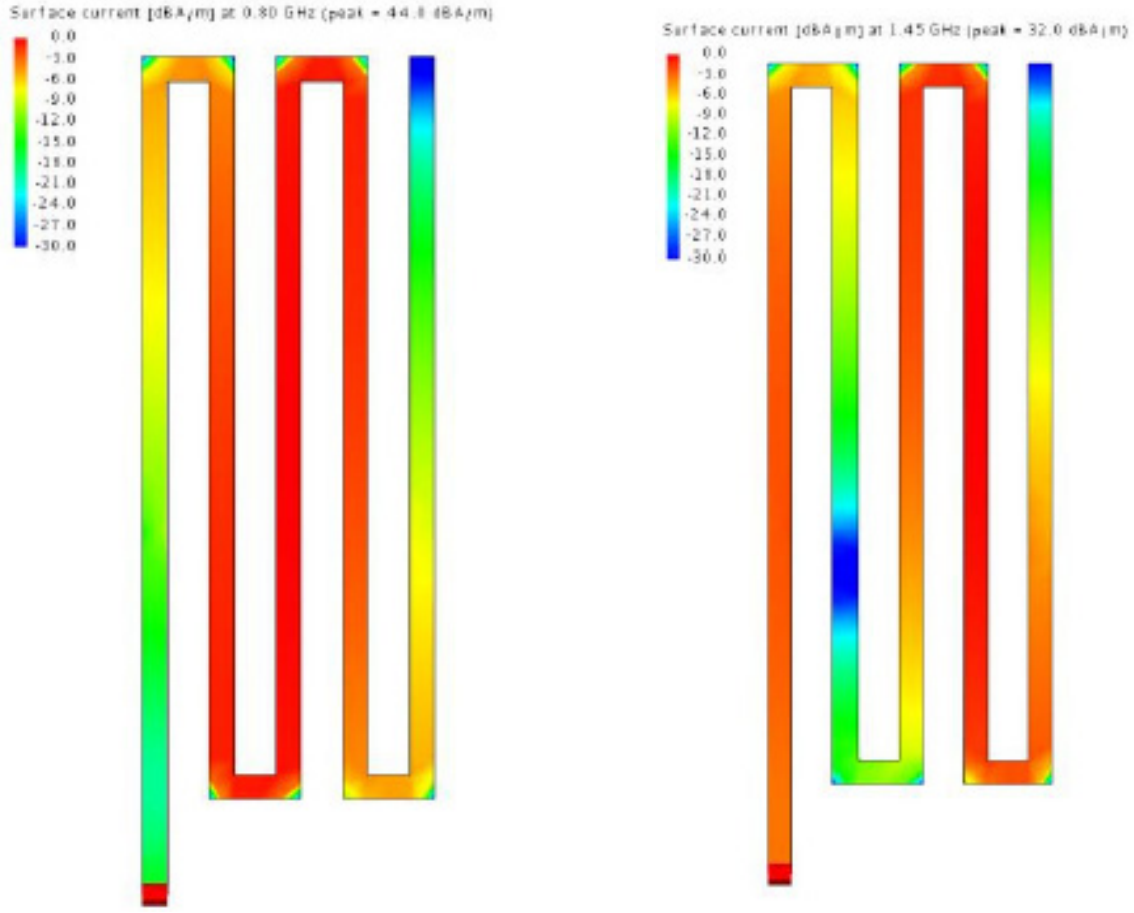


Yanagisawa '064 embodiment identifying 9 polygon elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. Exhibit 1006, RAN at 5-6. To the extent relevant, Yanagisawa '064 also would not be excluded under Owner's narrow claim interpretation of multilevel structure. Yanagisawa '064's multi-band behavior is not due to a grouping of single band antennas because Yanagisawa '064 is a single antenna that resonates at more frequencies than it has branches. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 26. Nor does Yanagisawa '064 contain any concentrated or integrated reactive elements that force the apparition of new frequencies. *Id*.

In addition, Yanagisawa '064 also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by Owner. After one of ordinary skill in the art models the antenna taught by Yanagisawa '064, the current density at various frequencies can be measured to show that the same portions of the antenna

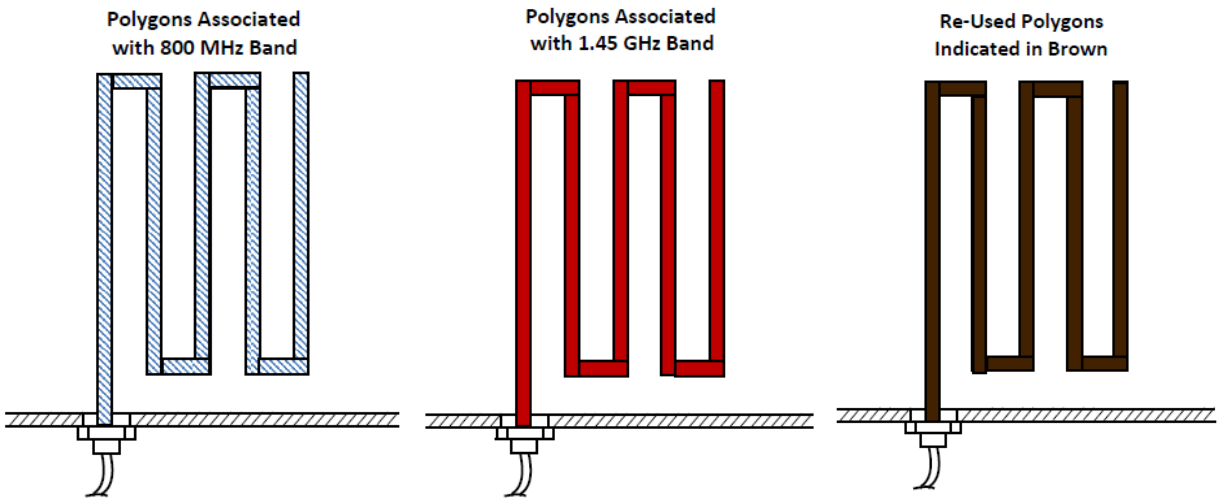
are associated with multiple frequency bands. Two such measurements are shown below.



800 Mhz **1.45 GHz**

Petition 1005, Declaration of Dr. Bodnar at Exhibit B pg. 3

At a minimum, the below shaded polygons are associated with the respective frequency bands using Owner's interpretation of claim scope. *See* Petition Exhibit 1015, Owner's Trial Demonstrative at 54-55. The polygons associated with both frequency bands (e.g., reused) are also indicated, which for these two frequencies comprises all of the polygons.



Polygons of Yanagisawa '064 associated with frequency bands

According to Owner, the operational function that the same polygonal element is reused for more than one frequency band is required of a multilevel structure. Petition Exhibit 1007, Appeal Brief, at 12. Given that some of the same polygon elements are used for at least different frequency bands, Yanagisawa '064 is a multilevel antenna under the broadest reasonable interpretation or even under the Owner's narrow construction which requires the reuse of polygonal elements.

> **wherein each of said elements in said antenna region is electromagnetically coupled to at least one other of said elements in said region either directly through at least one point of contact or through a small separation providing coupling,**

The elements of the Yanagisawa '064 multilevel antenna are a plurality of electromagnetically coupled geometric elements through at least one point of contact or through a small separation. Yanagisawa '064 at 5:12-20 ("…the first

antenna element is formed by an electrically conductive belt-shaped body"); *see also*, Yanagisawa '064 at Figure 1. The polygon elements in Yanagisawa '064 are coupled to each other by direct contact since they are formed from a single conductive belt-shaped trace.

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,

As described in the specification, for at least 75% of the identified polygonal elements the region of contact between the polygonal elements is less than 50% of the perimeter or area of the elements. *See* Yanagisawa '064 at Figure 1; and 13:1-62. Even without specific dimensions, the layout of the antenna relies on a single trace of constant width, so that 100% the identified rectangles necessarily have more that 50% of their perimeter free.[8]

Furthermore, the antenna modeled by Dr. Bodnar has explicit dimensions for

[8] 50% of the perimeter of a rectangle is equal to the length of one of its longer sides and one of its shorter sides. Figure 1 of Yanagisawa '064 would be inoperable if both the longer and shorter side were fully in contact with other portions since there would no longer be space between the vertical portions.

the width and length of the belt-shaped tracing based on the understanding of one of skill in the art. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 30 and Exhibit B. Using these dimensions, 9 out of 9 of the identified elements (100%) have less than 50% of the perimeter on contact with other elements.

wherein not all the polygonal or polyhedral elements have the same size and

As described by Yanagisawa '064, not all the identified polygons have the same size. For example, the first polygon that spans the length of "A" is longer than other vertical polygons and all the vertical polygons are longer than the horizontal polygons. Yanagisawa '064 at Figure 1 and 13:1-62 (the horizontal return lengths "are small as compared with the longitudinal length A, B and C").

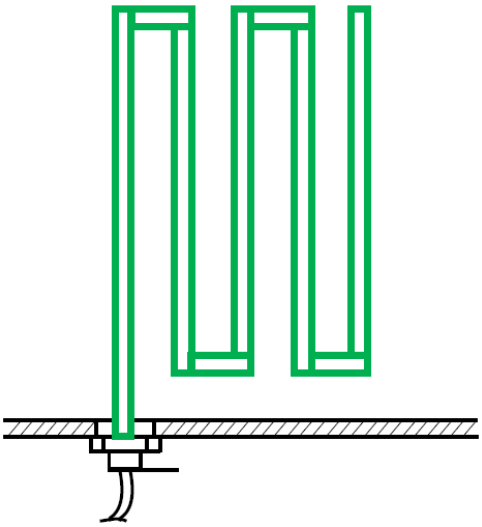
Furthermore, the antenna modeled by Dr. Bodnar has dimensions for the width and length of the belt-shaped tracing based on the understanding of one of skill in the art further evidencing the sizes of the indicated polygons are different. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 29-30 and Exhibit B. Using these dimensions, clearly not all of the identified elements have the same size.

wherein the perimeter of the multilevel structure has a different number of sides than the polygons that compose said antenna region, and

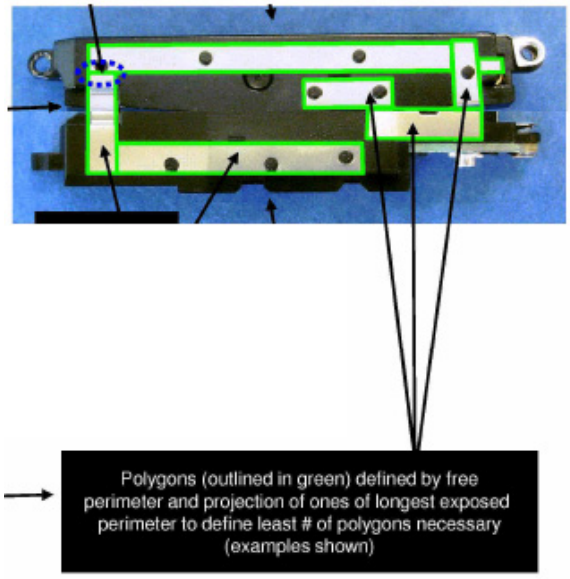
The polygonal elements, identified above, all have four sides while the overall number of sides for perimeter of the embodiment modeled by Dr. Bodnar is much greater than four. Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 30-31 and Exhibit B; *see also* Yanagisawa '064 at Figure 1 and 13:1-62.

> **further wherein a plurality of polygons of said antenna region are generally identifiable as a geometrical element defined by the free perimeter thereof and the projection of ones of the longest exposed perimeters thereof to define the least number of polygons within said region necessary to form said generally distinguishable elements where said polygon perimeters are interconnected.**

Petitioner has identified the rectangular polygons using the free perimeter and the longest identifiable perimeter to define the least number of polygons, reproduced below. Yanagisawa '064 at Figure 1 and Exhibit 1005, Declaration of Dr. Bodnar at ¶ 29. Further, the identification of polygons is consistent with how Owner has interpreted the scope of this limitation. *See* 37 C.F.R. § 1.104(C)(3); *see also* Petition Exhibit 1014, Long Report at 45-50 and 65 and Petition Exhibit 1015, Owner's Trial Demonstrative at 35-39.



Yanagisawa '064 (annotated)



Petition Exhibit 1013, Owner's Infringement Contentions at 2.

7. The multi-band antenna set forth in claim 1, wherein the level of impedance and radiation pattern of said antenna are similar in several frequency bands so that the antenna maintains basically the same radio-electric characteristics and functionality in said bands to allow it to operate simultaneously in several frequencies and thereby be able to be shared by several communication services.

Yanagisawa '064 renders obvious claim 1 as discussed above. Yanagisawa '064 teaches that the radio electric behavior is substantially similar between the first and second frequency bands. Yanagisawa '064 at 17:52-63 ("antenna as

shown in Fig. 1 is used as the whole or a part of the antenna of the radio apparatus, it is possible to obtain a small-sized radio apparatus which can transmit and receive multi-frequency bands at high sensitivity…without deteriorating the radiation characteristics of the antenna"). Since the radiation characteristics of the antenna do not deteriorate, the radio electric behavior at each frequency band is substantially similar.

Although Yanagisawa '064 does not expressly provide measurements of impedance or radiation patterns, one of ordinary skill in the art can measure those characteristics based on Yanagisawa '064's teachings of the antenna structure. One of ordinary skill in the art looking at the measurements would understand that the measurements are substantially similar over both frequency bands. *Id*. at ¶ 35. In addition, Yanagisawa '064's antenna permits simultaneous operation so that the antenna can be shared by multiple communication services. *Id*. at ¶ 33.

Furthermore, according to Owner, under the broadest reasonable interpretation, a similar level of impedance can be shown by demonstrating that the VSWR (voltage standing wave ratio) remains below 4.0 for a majority of frequencies in the band. Petition Exhibit 1014, Long Report at 58. Likewise, Owner contends that a similar radiation pattern can be shown if the radiation patterns are omni-directional for the multiple frequency bands. *Id*. at 57. Yanagisawa '064 discloses both that the VSRW is below 4.0 and that the radiation

patterns are omni-directional at two frequency bands. Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 35-36.

10. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device.

Yanagisawa '064 renders obvious claim 1 as discussed above. The multilevel antenna disclosed by Yanagisawa '064 is included in a portable communications device.

> The present invention relates to an antenna for transmitting and receiving radio signals which is suitable for use with a portable apparatus (e.g., portable telephone set) and a radio (AM and FM) and TV apparatus using the same antenna, and more specifically to a small-sized antenna for transmitting and receiving radio signals of two or more frequency bands and a radio apparatus using the same small-sized antenna.

Yanagisawa '064 at 1:8-15 (emphasis added); *see also* Exhibit 1005, Declaration of Dr. Bodnar at ¶ 25. Further, an embodiment disclosing the antenna included in a mobile telephone handset is depicted in Figure 22.

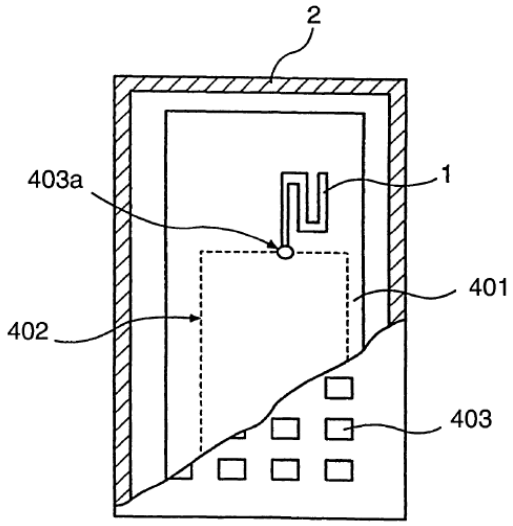


FIG.22

Yanagisawa '064 Figure 22

11. The multi-level antenna set forth in claim 10, wherein said portable communication device is a handset.

Yanagisawa '064 renders obvious claim 10 as discussed above. Yanagisawa '064 discloses that the "present invention relates to an antenna for transmitting and receiving radio signals which is suitable for use with a portable apparatus (e.g., portable telephone set). " Yanagisawa '064 at 1:8-15 (emphasis added); *see also* Figure 22. Moreover, one of ordinary skill in the art understands that Yanagisawa '064 is designed to operate in a handset, including the embodiment modeled by Dr. Bodnar. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 25.

12. The multi-level antenna set forth in claim 11, wherein said antenna operates at multiple frequency bands, and where in at least one of said frequency bands is operating within the 800 MHz - 3600 MHz frequency range.

Yanagisawa '064 renders obvious claim 11 as discussed above. Yanagisawa '064 discloses that "it is possible to transmit and receive signals of multi-frequency bands of even-number relationship (e.g., 900 MHz and 1800 MHz as with the case of the portable telephone sets) by use of a single antenna. " Yanagisawa '064 at 4:15-25. In addition, the resonant frequencies measured on the embodiment modeled by Dr. Bodnar include resonant frequency bands centered on 800 MHz, 1450 MHz, 1850 MHz, and 2275 MHz which are all within the claimed operating range. Exhibit 1005, Declaration of Dr. Bodnar at ¶32.

C. Misra-Chowdhury Renders Obvious Claims 1, 7, 10, 11 and 12 of the '208 Patent

Misra-Chowdhury teaches three different feeding positions for the antenna. This proposed rejection relies on the structure and operation of the 0.60cm off center feed embodiment as understood by one of skill in the art. Misra-Chowdhury at pg. 531 and Table 1; *see also* Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 68.

Misra-Chowdhury discloses a multi-band antenna design but does not explicitly disclose the measurements of current density, which Owner asserts is required to demonstrate an antenna has a multilevel structure. Exhibit 1007, Owner's Reexam Appeal Brief at 12. In addition, certain operational characteristics for the disclosed antennas are not expressly given at all resonant frequency bands. Therefore, it would have been obvious to one of ordinary skill in the art to model an antenna as taught by Misra-Chowdhury in order to measure the current density and other relevant radio electric characteristics of the antenna at the resonant frequency bands. Modeling an antenna is a routine task to those of ordinary skill in the art and it demonstrates how an embodiment of an antenna taught by Misra-Chowdhury operates.

Claim 1

1. A multi-band antenna including

Misra-Chowdhury discloses a concentric microstrip triangular-ring antenna that operates in multiple bands. Misra-Chowdhury at pg. 531 and Table 1. Misra-Chowdhury teaches that three concentric triangular rings can be used with multiple options for the placement of the feed line. *Id*. Petitioner relies on the teachings related to the .60cm off center feed embodiment of the antenna shown below.

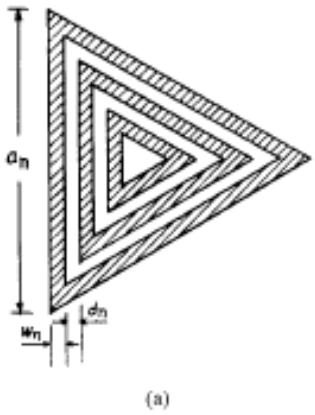


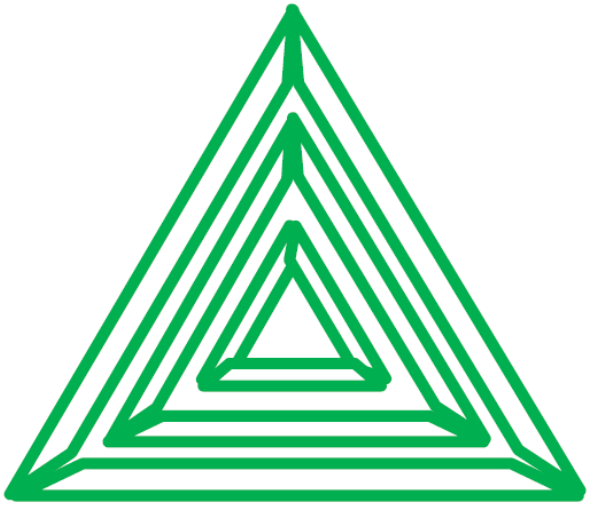
Figure 1 of Misra-Chowdhury

at least one multilevel structure wherein the multilevel structure includes at least one antenna region comprising a set of polygonal or polyhedral elements having the same number of sides or faces,

The Misra-Chowdhury multi-band antenna includes at least one multilevel structure. *See* e.g., Misra-Chowdhury at pg. 536 ("the concentric microstrip triangular ring antenna has a multiple band effect."). Each triangular ring of the antenna is comprised of a plurality of three geometric elements. Misra-Chowdhury at Figures 1 and pg. 531-32. Misra-Chowdhury provides the necessary information to calculate the physical dimensions of the disclosed antenna. *Id*. at ¶¶ 67-68. The antenna modeled by Dr. Bodnar substantially replicates the dimensions provided by Misra-Chowdhury. *Id*. at ¶ 68.

The Misra-Chowdhury antenna comprises identifiable polygons as depicted below. *See also e.g.*, Petition Exhibit 1013, Owner's Infringement Contentions at 2

and Petition 1015, Owner's Trial Demonstrative, at 35-39.

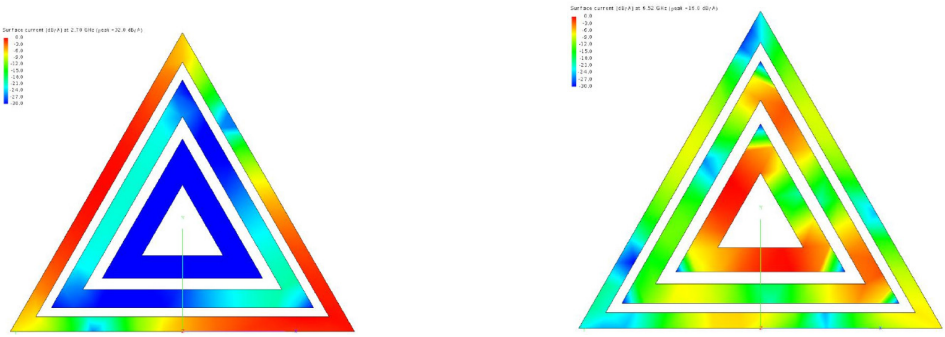


Misra-Chowdhury showing polygon elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. Exhibit 1006, RAN at 5-6. To the extent relevant, Misra-Chowdhury also would not be excluded under Owner's narrow claim interpretation of multilevel structure. Misra-Chowdhury's multi-band behavior is not due to any concentrated or integrated reactive elements that force the apparition of new frequencies. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 66. Nor is Misra-Chowdhury a grouping of single band antennas because Misra-Chowdhury is a single antenna and it "reuses" the same rings for multiple frequencies. Misra-Chowdhury at pg. 534, Table 1.

When one of ordinary skill in the art models and simulates an antenna taught by Misra-Chowdhury, the current density at the relevant frequencies can be

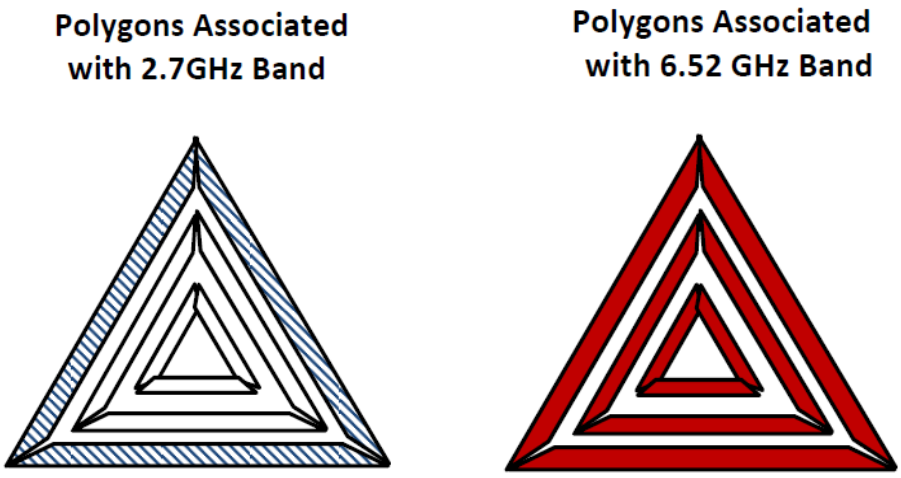
measured as shown below.



2.7 Ghz **6.52 GHz**

Petition Exhibit 1005, Declaration of Dr. Bodnar at Exhibit B pgs. 30 and 33

At a minimum, the below shaded polygons are associated with the respective frequency bands using Owner's interpretation of claim scope. *See* Petition Exhibit 1015, Owner's Trial Demonstrative at 54-55. The polygons associated with both frequency bands (e.g., reused) are also indicated.



Polygons of Misra-Chowdhury associated with frequency bands

According to Owner, the operational function that the same polygonal element is reused for more than one frequency band is required of a multilevel

structure. Petition Exhibit 1007, Appeal Brief, at 12. Given that some of the same geometric elements are used for at least different frequency bands, Misra-Chowdhury is a multilevel antenna under the broadest reasonable interpretation or even under the Owner's narrow construction that requires the reuse of polygonal elements.

wherein each of said elements in said antenna region is electromagnetically coupled to at least one other of said elements in said region either directly through at least one point of contact or through a small separation providing coupling,

The elements of the Misra-Chowdhury multilevel antenna comprise a plurality of electromagnetically coupled geometric elements through at least one point of contact or through a small separation. *See* Misra-Chowdhury at Figure 1. Each of the three triangular rings are electromagnetically coupled together. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 65. In addition, the three polygons identified in each of the triangular ring are directly coupled to each, see figures above.

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,

As described in the reference, for at least 75% of said polygonal elements, the region of contact between the polygonal elements is less than 50% of the perimeter or area of said elements. Misra-Chowdhury at Figure 1; and pg. 531-32. The dimensions provided by Misra-Chowdhury are used in the model measured by Dr. Bodnar. Exhibit 1005, Declaration of Dr. Bodnar at ¶¶ 67-68. Using the dimensions provided by Misra-Chowdhury, 9 out of 9 of the identified elements (100%) have less than 50% of the perimeter on contact with other elements.

wherein not all the polygonal or polyhedral elements have the same size and

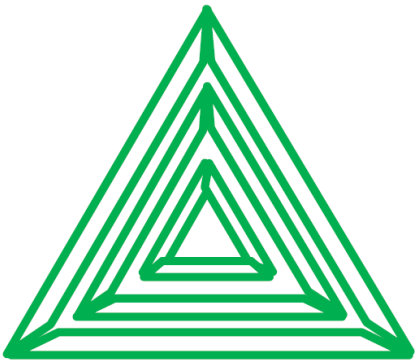
As described in the reference, the elements comprising the interior triangular ring have smaller length and larger widths than the elements comprising the middle and exterior triangular rings. Misra-Chowdhury at Figure 1; and pg. 531-32; *see also* Exhibit 1005, Declaration of Dr. Bodnar at ¶ 68. As one example, the longest side of the geometric element in the outer ring has a length of 3cm while the longest side of the geometric element in the innermost ring has a different size of 1.4cm.

wherein the perimeter of the multilevel structure has a different number of sides than the polygons that compose said antenna region, and

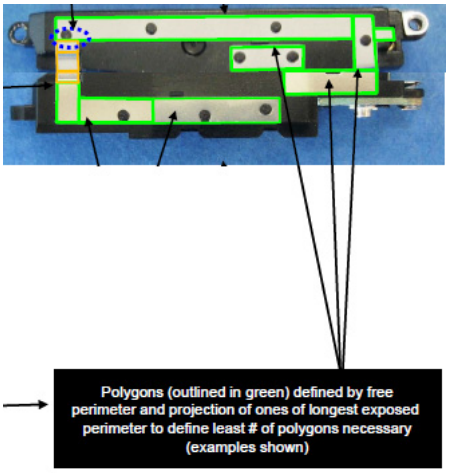
The polygonal elements, identified in Figure 1 above, all have four sides while the number of sides of the perimeter of the triangular concentric ring antenna is different than four. Misra-Chowdhury at Figure 1.

> **further wherein a plurality of polygons of said antenna region are generally identifiable as a geometrical element defined by the free perimeter thereof and the projection of ones of the longest exposed perimeters thereof to define the least number of polygons within said region necessary to form said generally distinguishable elements where said polygon perimeters are interconnected.**

Petitioner has identified the polygons using the free perimeter and the longest identifiable perimeter to define the least number of polygons, reproduced below. Misra-Chowdhury at Figure 1. Further, the identification of polygons is consistent with how Owner has interpreted the scope of this limitation. *See* 37 C.F.R. § 1.104(C)(3); *see also* Petition Exhibit 1014, Long Report at 45-50 and 65 and Petition Exhibit 1015, Owner's Trial Demonstrative at 35-39.



Misra-Chowdhury



Petition Exhibit 1013, Owner's Infringement Contentions at 2.

7. The multi-band antenna set forth in claim 1, wherein the level of impedance and radiation pattern of said antenna are similar in several frequency bands so that the antenna maintains basically the same radio-electric characteristics and functionality in said bands to allow it to operate simultaneously in several frequencies and thereby be able to be shared by several communication services.

Misra-Chowdhury renders obvious claim 1 as discussed above. Misra-Chowdhury provides some radiation patterns for the 0.60cm off center feed showing similar radiation patterns. Misra-Chowdhury at pg. 536. However, Misra-Chowdhury does not provide the radiation pattern for all resonant frequencies and does not provide the pattern in all planes.

However, one of ordinary skill in the art can measure the full radiation patterns and impedance by modeling the antenna. Exhibit 1005, Declaration of Dr. Bodnar at ¶ 73. One of ordinary skill in the art looking at the measurements of the modeled antenna would understand that the measurements are substantially similar over both frequency bands. *Id*. at ¶¶ 73. In addition, Misra-Chowdhury's antenna permits simultaneous operation so that the antenna can be shared by multiple communication services. *Id*. at ¶ 71.

Furthermore, according to Owner, under the broadest reasonable interpretation, a similar level of impedance can be shown by demonstrating that the VSWR (voltage standing wave ratio) remains below 4.0 for a majority of frequencies in the band. Petition Exhibit 1014, Long Report at 58. Likewise, Owner contends that a similar radiation pattern can be shown if the radiation patterns are omni-directional for the multiple frequency bands. *Id*. at 57. Misra-Chowdhury discloses both that multiple resonant frequency bands have VSRW below 4.0 and that the radiation patterns are omni-directional for at least two frequency bands. 1005, Declaration of Dr. Bodnar at ¶¶ 73-74.

10. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device.

Misra-Chowdhury renders obvious claim 1 as discussed above. Additionally, one of ordinary skill in the art would look to use the multilevel

antenna taught by Misra-Chowdhury in a portable communications device because of the small size of the antenna as well as the radio electric characteristics which are suited for a portable electronic device. Petition Exhibit 1005, Declaration of Dr. Bodnar at ¶ 64. Further one of ordinary skill in the art would be motivated to use Misra-Chowdhury in order to provide access to multiple different communication services using a single antenna. *Id*. Finally, implementation of Misra-Chowdhury's antenna into a portable communication device is within the level of skill to one of ordinary skill in the art and it would not require any undue experimentation. *Id.*

11. The multi-level antenna set forth in claim 10, wherein said portable communication device is a handset.

Misra-Chowdhury renders obvious claim 10 as discussed above. Additionally, one of ordinary skill in the art would look to use the multilevel antenna taught by Misra-Chowdhury in a handset because of the small size of the antenna as well as the radio electric characteristics which are suited for a portable electronic device. Petition Exhibit 1005, Declaration of Dr. Bodnar at ¶ 64. Further one of ordinary skill in the art would be motivated to use Misra-Chowdhury in order to provide access to multiple different communication services using a single antenna. *Id*. Finally, implementation of Misra-Chowdhury's antenna into a handset is within the level of skill to one of ordinary

skill in the art and it would not require any undue experimentation. *Id.*

12. The multi-level antenna set forth in claim 11, wherein said antenna operates at multiple frequency bands, and where in at least one of said frequency bands is operating within the 800 MHz - 3600 MHz frequency range.

Misra-Chowdhury renders obvious claim 11 as discussed above. Misra-Chowdhury also teaches that two resonant frequency bands for the 0.60cm off center feed are 2660-2690 MHz and 2720-2745 MHz . Misra-Chowdhury at pg. 534 and Table 1. In addition, the resonant frequencies measured by Dr. Bodnar include a resonant frequency bands centered on 2700 MHz which is within the claimed operating range. Petition Exhibit 1005, Declaration of Dr. Bodnar at ¶ 69.

VII. CONCLUSION

In view of the foregoing, claims 1, 7, 10, 11, and 12 of the ’208 Patent are not patentable over the prior art documents cited herein. The prior art documents teach the subject matter of the ’208 Patent in a manner establishing a reasonable likelihood that the Petitioner will prevail with respect to at least one of the claims challenged in this Petition as required by 35 U.S.C. § 314(a).

Accordingly, Petitioner respectfully requests that trial be instituted and claims 1, 7, 10, 11, and 12 of the ’208 Patent be canceled.

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of this **PETITION FOR *INTER PARTES* REVIEW UNDER TO 35 U.S.C. §§ 311 *ET SEQ*. AND 37 C.F.R. § 42.100 *ET SEQ*.** together with all exhibits, has been served via U.S. Priority mail on October 4, 2013 upon the following:

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