I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted today via the Office electronic filing system (EFS-Web) in accordance with 37 CFR §1.6 (a)(4).

Date: October 9, 2013 Signature: /Stephanie Dominguez/
Printed Name: Stephanie Dominguez

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	
Inventors: Baliarda *et al.*	REQUEST FOR REEXAMINATION UNDER 35 U.S.C. §§ 302-307 AND 37 C.F.R. § 1.510
Patent No.: 7,397,431	
Filed: July 12, 2005	
For: MULITILEVEL ANTENNA	

Mail Stop *Ex Parte* Reexamination
ATTN: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR *EX PARTE* REEXAMINATION OF U.S. PATENT 7,397,431

TABLE OF CONTENTS

TABLE OF EXHIBITS[1]

LIST OF EXHIBITS

The exhibits to the present Request are arranged in four groups: prior art ("PA"), relevant patent prosecution file history, patents, and claim dependency relationships ("PAT"), claim charts ("CC"), and other ("OTH").

A. PRIOR ART (PA)

PA-SB08A/B	USPTO Form SB/08A/B
PA-A	U.S. Patent No. 5,995,064 to Yanagisawa *et al.* issued on November 30, 1999 ("Yanagisawa '064")[2]
PA-B	U.S. Patent No. 6,133,879 to Grangeat *et al.* issued on October 17, 2000 ("Grangeat")
PA-C	U.S. Patent No. 6,300,914 to Yang issued on October 9, 2001 ("Yang")
PA-D	Misra, Ita *et al.*, "Experimental Investigations on the Impedance and Radiation Properties of a Three-Element Concentric Microstrip Antenna," Microwave and Optical Technology Letters, Vol. 11, No. 2, February 5, 1996 ("Misra")
PA-E	Y.X. Guo, *et al.*, Double U-Slot rectangular patch antenna, Electronic Letters Vol. 34, No. 19 published September 17, 1998 ("Guo")
PA-F	U.S. Patent No. 6,239,765 to Johnson *et al.* issued on May 29, 2001 ("Johnson")

B. RELEVANT PATENT MATERIALS (PAT)

PAT-A	U.S. Patent No. 7,397,431 ("the '431 patent")

[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 request.

C. Claim Charts (CC)

CC-A	Claim Chart comparing Claims 1, 12-14, and 30 of the '431 patent to the disclosure of Yanagisawa '064
CC-B	Claim Chart comparing Claims 1, 12-14, and 30 of the '431 patent to the disclosure of Grangeat
CC-C	Claim Chart comparing Claims 1, 12-14, and 30 of the '431 patent to the disclosure of Yang
CC-D	Claim Chart comparing Claims 1, 12-14, and 30 of the '431 patent to the disclosure of Misra
CC-E	Claim Chart comparing Claims 1, 12-14, and 30 of the '431 patent to the disclosure of Guo
CC-F	Claim Chart comparing Claims 1 and 12-14 of the '431 patent to the disclosure of Johnson

D. Other Documents (OTH)

OTH-A	Complaints filed by Fractus against Samsung Electronics Co. Ltd alleging patent infringement
OTH-B	Preliminary Infringement Contentions for the '431 patent in the case of *Fractus S.A. v. Samsung Electronics Co. Ltd. Et al.,* Case No. 6:09cv203 (E.D. Tex.)[3]
OTH-C	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.,* Case No. 6:09cv203 (E.D. Tex.)
OTH-D	Right of Appeal Notice of co-pending reexamination of the '431 patent mailed August 9, 2012.
OTH-E	Court Claim Construction in the case of *Fractus S.A. v. Samsung Electronics Co. Ltd. Et al.,* Case No. 6:09cv203 (E.D. Tex.).
OTH-F	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.)
OTH-G	Patent Owner's Expert report by Dr. Long
OTH-H	Declaration of Dr. Bodnar[4]

[3] Only a subset of the Preliminary Infringement Contentions is provided to avoid overloading the Patent Office with material in this Request for Reexamination.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	
Inventors: Baliarda *et al.*	REQUEST FOR REEXAMINATION UNDER 35 U.S.C. §§ 302-307 AND 37 C.F.R. § 1.510
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Alexandria, VA 22313-1450

REQUEST FOR *EX PARTE* REEXAMINATION OF U.S. PATENT 7,397,431

Dear Sir:

Pursuant to 37 C.F.R. § 1.510, Samsung Electronics Co. Ltd. (hereinafter "Requester") hereby respectfully requests reexamination pursuant to 35 U.S.C. §§ 301 *et seq.* and 37 C.F.R. §§ 1.510 *et seq.*, of Original Claims 1, 12-14 and 30[5] of U.S. Patent No. 7,397,431 ("the '431 patent") filed July 12, 2005 and issued July 8, 2008 to Baliarda *et al. See* Exhibit PAT-A.

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[4] For consistency and convenience of the office, the identical declaration of Dr. Bodnar is being submitted by requester in four related ex parte reexamination requests including this request. As such, only portions of the submitted declaration are explicitly relied on for purposes of this request as indicated in the arguments below.

[5] Patent Owner filed statutory disclaimer of claims 1, 12, and 13 on September 10, 2013. If the Office determines reexamination of those claims is no longer permissible, claim 14 depends on

This Request is based on the cited prior art documents set forth herein and on the accompanying Form PTO-SB/08A/B. *See* Exhibit PA-SB/08A/B. All of the cited prior art patents and publications constitute effective prior art as to the claims of the '431 patent under 35 U.S.C. § 102 and 35 U.S.C. § 103.

Pursuant to 37 C.F.R. § 1.510 Requester hereby respectfully requests reexamination pursuant to 35 U.S.C. §§ 301 *et seq.* and 37 C.F.R. §§ 1.510 *et. seq.*, of Original Claims 1, 12-14 and 30 of the '431 patent. Reexamination is requested in view of the substantial new questions of patentability ("SNQs") set forth in detail below and in the accompanying claim charts. Requester reserves all rights and defenses available including, without limitation, defenses as to invalidity and unenforceability. By simply filing this Request in compliance with applicable statutes, rules, and regulations, Requester does not represent, agree or concur that the '431 patent is enforceable. As alleged by Patent Owner in the below-defined Underlying Litigation, and as required by 37 C.F.R. § 1.510, the '431 patent is still within its period of enforceability for reexamination purposes (to the extent that the '431 patent has not lapsed for failure to pay maintenance fees, has not been the subject of any Terminal Disclaimer, and has not yet been held unenforceable in a court of competent jurisdiction). By asserting the SNQs herein, Requester specifically asserts that Original Claims 1, 12-14 and 30 of the '431 patent are in fact not patentable.

Accordingly, the U.S. Patent and Trademark Office ("the Office") should reexamine and find Claims 1, 12-14 and 30 of the '431 patent unpatentable and cancel these claims, rendering them null, void, and otherwise unenforceable.

II. REQUIREMENTS FOR *EX PARTE* REEXAMINATION UNDER 37 C.F.R. § 1.510

Requester satisfies each requirement for *Ex Parte* reexamination of the '431 patent pursuant to 37 C.F.R. § 1.510. A full copy of the '431 patent is submitted herein as Exhibit PAT-A in accordance with 37 C.F.R. § 1.510(b)(4).

Pursuant to 37 C.F.R. § 1.510(b)(3), a copy of every patent or printed publication relied upon to present an SNQ is submitted herein at Exhibits PA-A through PA-F, citation of which

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claim 13 which depends on claim 12 which depends on claim 1, and claim 30 depends on claim 1. As such, the analysis of claims 1, 12, and 13 are necessary to provide an explanation of the pertinency and manner of applying the cited prior art to claims 14 and 30.

may be found on the accompanying Form PTO-SB/08A as Exhibit PTO-SB/08A in accordance with 37 C.F.R. § 1.510. Each of the cited prior art publications constitute effective prior art as to the claims of the '431 patent under 35 U.S.C. § 102 and 35 U.S.C. § 103. Furthermore, each piece of prior art submitted was either not considered by the Office during the prosecution of the '431 patent or is being presented in a new light under MPEP § 2242 as set forth in the detailed explanation below and in the attached claim charts.

A statement pointing out each SNQ based on the cited patents and printed publications, and a detailed explanation of the pertinency and manner of applying the patents and printed publications to Claims 1, 12-14 and 30 of the '431 patent, is presented below and in attached claim charts in accordance with 37 C.F.R. § 1.510 (b)(2).

A copy of this request has been served in its entirety on the patent owner in accordance with 37 C.F.R. § 1.510(b)(5) at the following address:

EDELL, SHAPIRO & FINNAN, LLC
9801 WASHINGTONIAN BOULEVARD
SUITE 750
GAITHERSBURG MD 20878

In accordance with 37 C.F.R. § 1.510(a), a fee of $12,000.00 is required to file an ex parte reexamination request. Please charge this fee and any additional fees that may be missing or defective to the Novak Druce Deposit Account No. 14-1437.

III. OVERVIEW

A. DESCRIPTION OF THE '431 PATENT

The '431 Patent is directed to a multilevel structure formed by "sets of similar geometric elements" to create "a specific geometrical design." '431 patent at 1:16-24. As the specification explains, "the essence of the invention is found in the geometry used in the multilevel structure." *Id.* at 5:66-67. The inventors claimed the "difference between multilevel antennae and other existing antennae lies in the particular geometry." *Id.* at 5:42–44.

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 4:47-5:10.

B. THE '431 PATENT APPLICATION PROSECUTION HISTORY

On July 12, 2005, the Patent Owner filed Application No. 11/179,257 ("the '257 Application") that issued as the '431 patent. In its application, the Patent Owner filed a preliminary amendment adding a paragraph to the specification entitled "Cross-Reference to Related Applications," canceling Claims 1-39, and adding Claims 40-87. On August 23, 2006 there was a Requirement of Restriction/Election issued by the Examiner, to which the Patent Owner elected to pursue Claims 40-74 and 78-79 on September 12, 2006.

During the prosecution, the Examiner did not apply a single prior art rejection. There was an Ex Parte Quayle action wherein the Examiner noted that the "Claims 75-77 and 80-87 are withdrawn from consideration by the Examiner," in accordance with 37 C.F.R. § 1.142(b). The '257 Application at Ex Parte Quayle Action dated September 26, 2006 p. 2. In response thereto, the Patent Owner canceled unedited Claims 75-77 and 80-87. The '257 Application at Response to Ex parte Quayle Action dated October 9, 2006.

In view of the above, the Examiner allowed the claims of the '257 Application and provided the following reason for allowance:

Allowable Subject Matter

1. The following is a statement of reasons for the indication of allowable subject matter: Claim 40 is allowable over the art of record because the prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations.

The '257 Notice of Allowance dated October 19, 2006, p. 2.

Subsequently, a Petition to Withdraw from Issue and two subsequent Information Disclosure Statements were filed by the Patent Owner on November 28, 2007 and December 19, 2007, after which a non-final rejection was issued on February 4, 2008, which asserted a provisional obviousness-type double patenting rejection of Claims 40, 42-44, 48, and 50-51 as "unpatentable over claims 83 and 88-92 of copending Application No. 11/550,256." Non-Final Rejection dated February 4, 2008 p. 4.

In response, the Patent Owner filed a Terminal Disclaimer tied to "the expiration date of the full statutory term of any patent granted on pending reference Application Number 11/550,256, filed on October 17, 2006." The '257 Terminal Disclaimer Filed dated February 28, 2008 p. 1.

In view of the above, the Examiner again allowed the claims of the '257 Application providing no additional reasons for allowance than previously noted. p. 2.

C. Overview of the Claims

Independent Claim 1 reads as follows:

> 1. A multi-band antenna comprising: a conductive radiating element including at least one multilevel structure, said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements, said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, said second portion being located substantially within the first portion, said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.

Dependent claims 12-14, and 30 read as follows:

> 12. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device.
>
> 13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.
>
> 14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.
>
> 30. A multi-band antenna according to claim 1, wherein the antenna operates at three or more frequency bands and the antenna is shared by three or more cellular services.

D. Related Inter Partes Reexaminations of the '431 Patent

On November 11, 2010, Requester filed an *inter partes* reexamination request against claims 1, 4, 5, 7, 8, 12-14, 17, 21, 22, 24-27, and 29-31 of the '431 patent which was granted as Control No. 95/001,482 ("the '1482 reexamination"). Subsequently, HTC and Kyocera also filed inter partes reexamination against the '431 patent which were merged with the '1482 reexamination. *See* Control Nos. 95/000,586 and 95/001,497. In the '1482 reexamination, the examiner issued a Right of Appeal Notice rejecting all reexamined claims. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent mailed June 1, 2012. Patent Owner then

appealed and all briefing by both parties is completed. *See* Patent Owner Appeal Brief to the '1482 reexamination, filed February 22, 2013; Requester's Respondent Brief to the '1482 reexamination, filed April 16, 2013; and Patent Owner Rebuttal Brief to the '1482 reexamination, filed August 16, 2013.

The major point of dispute raised by the Patent Owner in its appeal is whether the claimed "multilevel structure" excludes groupings of single band antennas and/or antennas that incorporate reactive elements that force the apparition of new frequencies. *See* Patent Owner Appeal Brief to the '1482 reexamination, filed February 22, 2013 at 3-11. In addition, the Patent Owner contested what types of antenna should be excluded from "multilevel" stating that antennas are excluded unless they had certain operational characteristics including "reusing portions of the antenna for different frequency bands." *Id.* at 11; *see also* Patent Owner Rebuttal Brief to the '1482 reexamination, filed August 16, 2013 at 5 (arguing that an accused infringing branch antenna is a multilevel structure because "the 1800 MHz structure is reused for the 1900MHz structure").

In its respondent brief, Requester 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. Requester's Respondent Brief to the '1482 reexamination, filed April 16, 2013 at 2-8. However, given Patent Owner's reliance on operational characteristics to distinguish the prior art, Requester is submitting an expert declaration with this request 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.

Second Inter Partes Reexamination

On September 14, 2012, Requester filed a second *inter partes* reexamination requesting reexamination of claims 1, 12-14, and 30 of the '431 patent. The Office assigned the request Control No. 95/002,346 (hereinafter the '346 proceeding). Concurrently, on September 14, 2012, Requester filed a petition seeking Director authorization for the filing of the second *inter partes* reexamination request prior to the issuance and publication of the *inter partes* reexamination certificate in the first reexamination proceeding.

On November 23, 2012, the Office mailed a Decision denying Requester's Petition to authorize a second *inter partes* reexamination. The Office determined that Requester may seek

relief via *ex parte* reexamination, and/or the district court, and was therefore barred from filing a second *inter partes* reexamination. *See* Nov. 23, 2012 Decision on Petition For Authorization To File Second Request For Inter Partes Reexamination.

E. Related *Inter Partes* Review of the '431 Patent

On October 4, 2013 Requester filed a petition for *inter partes* review of the '431 patent which was assigned to case number of IPR2014-00011. The Office issued a notice that the filing date was granted but no other activity has occurred in the IPR as of the filing of this *ex parte* reexamination request

F. Related Co-Pending Litigation Requires Treatment with Special Dispatch and Priority Over All Other Cases

The '431 patent is presently the subject of the following co-pending litigation:

1. *Fractus, S.A. v. Samsung Electronics Co., Ltd. et al.*, No. 6:09-cv-00203 (E.D. Tex).
2. *Fractus, S.A. v. Samsung Electronics Co., Ltd. et al.*, No. 6:12-cv-00421 (E.D. Tex) which was severed from Case No. 6:09-cv-00203 on June 28, 2012.

See e.g., Exhibit OTH-A. Pursuant to 35 U.S.C. § 314, the Requester respectfully urges that this Request be granted and reexamination conducted not only with "**special dispatch**," but also with "**priority over all other cases**" in accordance with MPEP § 2661, due to the ongoing nature of the Underlying Litigation.

G. Claim Construction

For purposes of this Request, the claim terms are presented by the Requester in accordance with the Patent Owner's broad infringement contentions and claim construction positions from litigation and in accordance with 37 C.F.R. § 1.555(b) and MPEP § 2111. Specifically, Patent Owner has asserted an extremely broad scope for the claims of the '431 patent. *See* OTH-B, Patents Owner's Infringement Contentions and OTH-C, Patent Owner's infringement demonstrative presented during trial. While Requester does not agree with the reasonableness of the Patent Owner's Infringement Contentions, the Infringement Contentions provide admissions by the Patent Owner regarding its belief on the scope of the claims. *See* OTH-B and OTH-C. Furthermore, each term of the claims in the '431 patent is to be given its "broadest reasonable construction" consistent with the specification. MPEP § 2111; *In re Swanson*, 540 F. 3d 1368 (Fed. Cir. 2008); *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)).

Multilevel Structure

For purposes of this request, Requester accepts the examiner's broadest reasonable interpretation of multilevel structure.[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 by 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: 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 34-38, 55-59.
- 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 62 – col. 6 line 22."

See Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5 (citing '431 patent at 4:51 *et seq.*). For comparison, the district court's construction 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

[6] Requester does not dispute the examiner's construction based upon the broadest reasonable interpretation standard given Patent Owner's admissions regarding broadly asserted claim scope. However, Requester 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)).

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."

See, OTH-E, Claim Construction Order at 18-19.

In its appeal of the '1482 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 Owner proposes. *See* e.g., Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 12. Notably, not even the narrower district court construction contains the exclusions Owner proposed. OTH-E, Claim Construction Order at 18-19. For the reasons given below, the Patent Owner's narrowing constructions should not be adopted.

Patent Owner's Proposed Exclusions are Improper

Patent 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 antennas. Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 3-11. Patent 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." '431 patent at 3:48-51.

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 incorporates reactive elements or is a grouping of several single band antennas. As such, the '431 patent fails to 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, Patent Owner's proposed definition of "multilevel structure" that excludes capacitance between antenna elements contradicts the specification of the '431 patent. The "multilevel structure" shown in Figure 4.12 is comprised of square polygons that are coupled together "due to the mutual capacitance." '431 patent at 5:31-38 and Figure 4.12. Without this capacitive coupling, the individual square polygons would behave as separate antenna with their own individual resonance frequencies. OTH-H, 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* the '431 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 between antenna elements 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, the Patent Owner has proposed that the phrase "groupings of single band antennas" means a single antenna that is easily separable into multiple antennas. *See* Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 5. In essence, Patent Owner argues that an antenna that could be "easily" modified to fall within a proposed exclusion should be excluded even when not modified. Yet, Patent Owner cites no legal basis for this rationale. Nor has the Patent 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." Response filed May 26, 2004 in Application No. 10/102,568, at 7 (emphasis in original).

Patent Owner's Proposed Functional Requirement are Improper

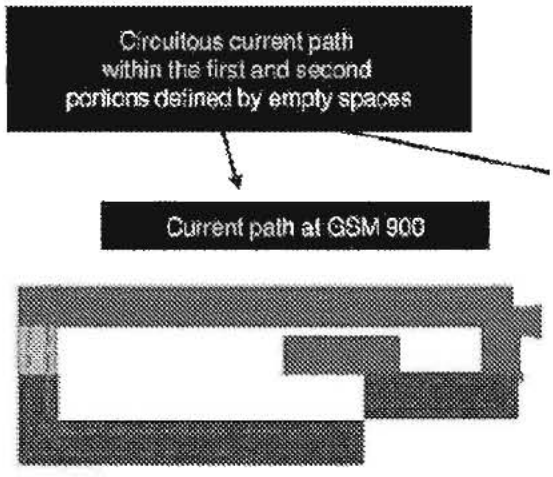
Patent Owner also proposes that a multilevel structure requires "reusing portions of the antenna for different frequency bands." Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 11; *see also* Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 5 (arguing that an accused infringing branch antenna is a multilevel structure because "the 1800 MHz structure is reused for the 1900MHz structure"). Such a functional requirement does not appear anywhere in the specification of the '431 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 Patent Owner. Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5.

Circuitous Current Path

The '431 patent does not provide any guidance on the meaning of this term, thus the ordinary meaning should apply. However, Requester agrees with Owner that "a circuitous path may be formed by successive straight lines, if (and only if) the successive straight lines are connected to each other at an angle." Patent Owner's Response to ACP of co-pending reexamination of the '431 patent, cntrl. #95/001,482, filed January 3, 2012 at 11. Thus the broadest reasonable interpretation of circuitous current path must not be so narrow in scope as to exclude two straight lines connected at an angle.

After this interpretation did not work to overcome the outstanding rejections in the reexaminations, Owner tried to further narrow the interpretation of circuitous current path to mean a path that is not L-shaped or slightly bent. *See* e.g., Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 13. Yet, Owner does not provide any citation from the specification that supports such a narrow construction. In fact, Owner's narrow construction is undercut by its own infringement contentions that illustrate a simple current path with very few bends is within the scope of a "circuitous current path." *See* OTH-B at 4.



OTH-B, Owner's Preliminary infringement Contentions at 4
(accused infringing circuitous current path depicted by arrows)

In response, Patent Owner states that its infringement contentions illustrate "at a very minimum four bends." Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 10. Yet Owner does not provide any citation to the '431 patent that supports Owner's very narrow and self-serving proposition that two bends is not a circuitous current path (to distinguish prior art in the '1482 reexamination) while four bends is a circuitous current path (to allege infringement).

Given the above, the broadest reasonable interpretation of "circuitous current path" should be its ordinary and plain meaning but should not exclude a current path formed by two successive straight lines connected to each other at an angle. .

Level of One of Ordinary Skill in the Art

Requester does not oppose Patent Owner's proposed level of ordinary skill in the art. Namely, Patent 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. 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.) at ¶14.

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

In the *inter partes* reexamination, Patent Owner has relied on arguments that attempt to distinguish the prior art based on operational characteristics of antennas rather than antenna structure. Based on Patent Owner's distinguishing arguments, such operational characteristics include: current densities, radiation patterns and impedance levels.[7]

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

[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).

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

Requester'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. OTH-H, 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* OTH-F, 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. OTH-H, 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. 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.*

V. SUMMARY OF EACH SUBSTANTIAL NEW QUESTIONS OF PATENTABILITY UNDER 37 C.F.R. § 1.510 (B)(2)

A. YANAGASAWA '064 PRESENTS AN SNQ WITH RESPECT TO CLAIMS 1, 12-14, AND 30 OF THE '431 PATENT

Yanagisawa '064 was filed on November 25, 1996 and issued on November 30, 1999. Accordingly, Yanagisawa '064 constitutes effective prior art under 35 U.S.C. § 103. Yanagisawa '064 was not cited in the '431 patent and is not cumulative to any prior art previously considered. Although another Yanagisawa reference is at issue in the co-pending inter partes reexamination, Yanagisawa '064 teaches a different antenna structure than the structure at issue in the inter partes reexamination. On this basis alone, Yanagisawa '064 is not cumulative to the previously considered Yanagisawa.

Even if the antenna structures were similar, Yanagisawa '064 is being presented in a new light in this ex parte reexamination request. MPEP § 2216. In particular, in the inter partes reexamination the other Yanagisawa reference is relied on for its anticipatory disclosure of all claim elements whereas for this ex parte reexamination request Yanagisawa '064 is being relied on for its teachings of obviousness. In addition, the Declaration of Dr. Bodnar submitted with this ex parte reexamination requests includes new computer simulations of the antenna taught by Yanagisawa '064 that are not part of the record of the inter partes reexamination. Thus, the arguments related to obviousness and the new evidence to support those arguments are newly presented to the Office and are not cumulative to the arguments the Office is already considering in the inter partes reexamination. Yanagisawa '064 was not cited in the '431 patent and is not cumulative to any prior art previously considered.

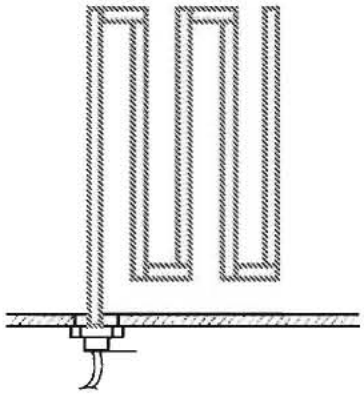
During examination of the '431 patent, the Examiner asserted that:

> "[T]he prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations"

Because Yanagisawa '064 discloses the above technical feature, along with each element of claims 1, 12-14 and 30, an Examiner would consider Yanagisawa '064 important in deciding the patentability of the '431 patent.

Yanagisawa '064 discloses a multi-band antenna (*i.e.*, an antenna operating in more than one frequency band). Yanagisawa '064 at Abstract, 1:8-15, FIGS. 1 and 22. Figure 22, below, illustrates that the antenna is formed on a circuit board housed in the radio apparatus. Yanagisawa '064 at FIG. 22, 12:15-19, 31:56-63.

Yanagisawa 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. Yanagisawa discloses: "the first antenna portion 10 can of course receive radio signals not only for a call signal but also for communications." Yanagisawa '064 at 16:22-25. Yanagisawa further discloses: "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." Yanagisawa '064 at 17:52-57. Thus, Yanagisawa discloses that the multi-band antenna includes at least one multilevel structure because the entire antenna structure 10 of embodiment 1 of Figure 1, below, radiates at multi-frequency bands. Yanagisawa '064 at 4:15-25, 16:22-25, and 17:52-57.



Yanagisawa '064 embodiment identifying 9 polygon elements

Yanagisawa '064 discloses all the limitations as defined by the Patent Owner. Specifically, Figure 1 discloses a multilevel structure having an overall shape of more than four

sides that is composed of various four-sided polygons. Yanagisawa '064 at FIG. 1. The entire antenna structure can be included inside a mobile phone as indicated in Figure 22.

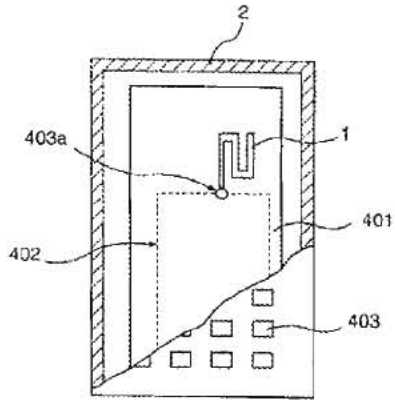


FIG.22

Yanagisawa '064 at FIG. 22

To the extent necessary, Yanagisawa also teaches similar radiation patterns, levels of impedance, and that the antenna can be in a cellular communications device. Yanagisawa '064 at 17:52-63 and Declaration of Dr. Bodnar at ¶¶ 35-36.

B. GRANGEAT PRESENTS AN SNQ WITH RESPECT TO CLAIMS 1, 12-14, AND 30 OF THE '431 PATENT

Grangeat is a U.S. Patent filed on December 11, 1998 and issued October 17, 2000. Accordingly, Grangeat constitutes effective prior art under 35 U.S.C. § 102. Grangeat was not cited in the '431 patent and is not cumulative to any prior art previously considered. Moreover, this reference teaches the alleged reason for patentability of the '431 patent and is not cumulative to any prior art previously considered.

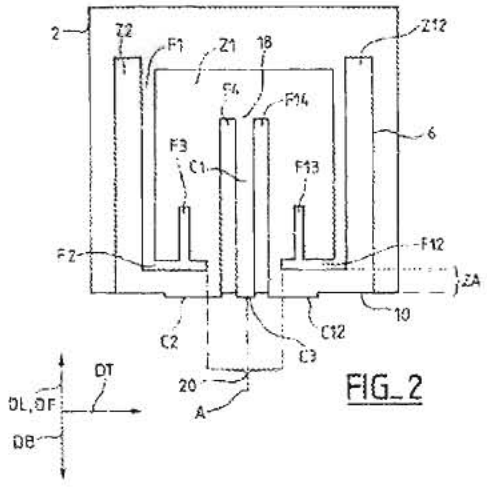
During examination of the '431 patent, the Examiner asserted that:

> "[T]he prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current

within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations"

Because Grangeat discloses the above technical feature, along with each element of claims 1, 12-14, and 30, an Examiner would consider Grangeat important in deciding the patentability of the '431 patent.

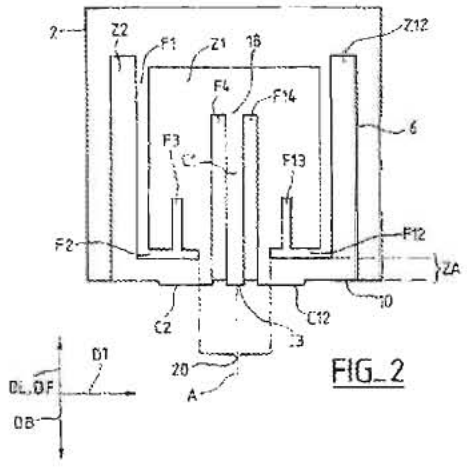
Specifically, Grangeat discloses a multifrequency microstrip antenna that enables two resonances to be established in two respective different areas. Specifically, "The antenna of the example is a dual-frequency antenna, i.e. it must give rise to at least two resonances so that it can operate in two modes corresponding to two operating frequencies... [o]ne operating mode of the antenna then constitutes a primary mode in which a standing wave is established by virtue of propagation of traveling waves both ways in the longitudinal direction or a direction near the longitudinal direction, the waves propagating in an area including the primary zone and the rear region and substantially excluding the secondary zone Z2. Another operating mode constitutes a secondary mode in which a standing wave is established by virtue of propagation of traveling waves both ways (the same as before) in another area including the primary and secondary zones and the rear region." Grangeat at 6:40-64 and Figure 2 [shown below].



Grangeat at FIG 2

Grangeat further discloses the limitation of claims where a conductive radiating element includes at least one multilevel structure, and the at least one multilevel structure comprising a

plurality of electromagnetically coupled geometric elements. Specifically, "...a plurality of conductive zones on the top surface of the substrate and each having an elongate shape imparting a candlestick shape to the antenna" Grangeat, 4:41-64 and Figure 2[shown below].



Grangeat at FIG 2

Grangeat further discloses the limitation of claims where a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion. Specifically, "...a plurality of conductive zones on the top surface of the substrate and each having an elongate shape imparting a candlestick shape to the antenna... wherein said conductive zones are sufficiently decoupled from each other to enable various resonances to occur, respectively, in various areas formed by said zones." Grangeat, 4:41-64; and Figure 2, [shown below].

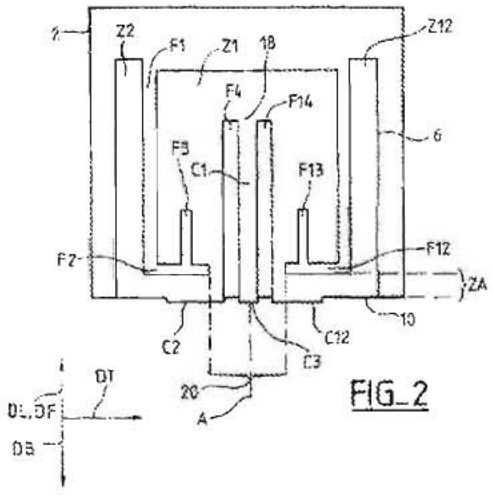


FIG_2

Figure 2 - Grangeat

Grangeat further discloses the limitation of claim 1 wherein defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion. Specifically, "To this end a slot formed in the patch 6 opens towards the front and outside the patch. It constitutes a longitudinal separator slot F1. The longitudinal extent of this slot defines in the patch a front region Z2, Z1, Z12 in which the slot divides a primary zone Z1 from a secondary zone Z2. A rear region ZA extends between the front region and the rear edge 10. The rear region is preferably shorter and even more preferably much shorter in the longitudinal direction DL than the front region." Grangeat, 6:40-51 and Figure 2 [shown below].

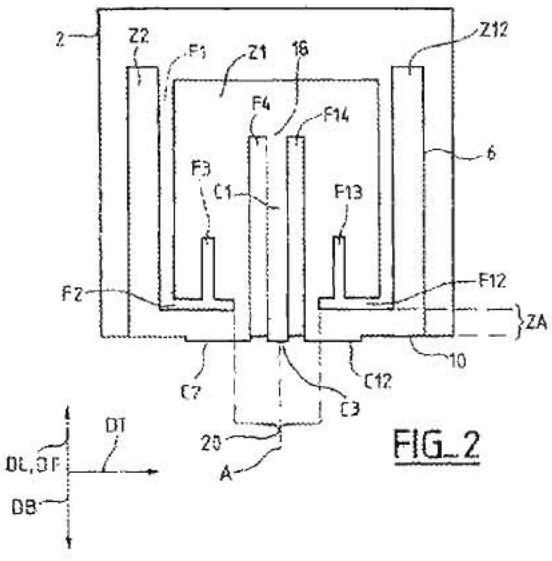


FIG_2

Figure 2 - Grangeat

Grangeat further discloses the final limitations of claim 1 being the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations. Specifically, "the same antenna impedance value for the various operating frequencies." Grangeat at 7:14-17 and Figure 4[shown below]. Furthermore, Grangeat discloses that all of the resonant frequency bands would involve similar radiating patch elements over the same ground plane so they would have a similar radiation pattern. The primary portion radiates at all resonant frequency bands, so the only change between radiating portions between resonant frequency bands is that the outer arms radiate at other bands. Grangeat at 6:52-64; and Figure 2 [shown below].

FIG_4

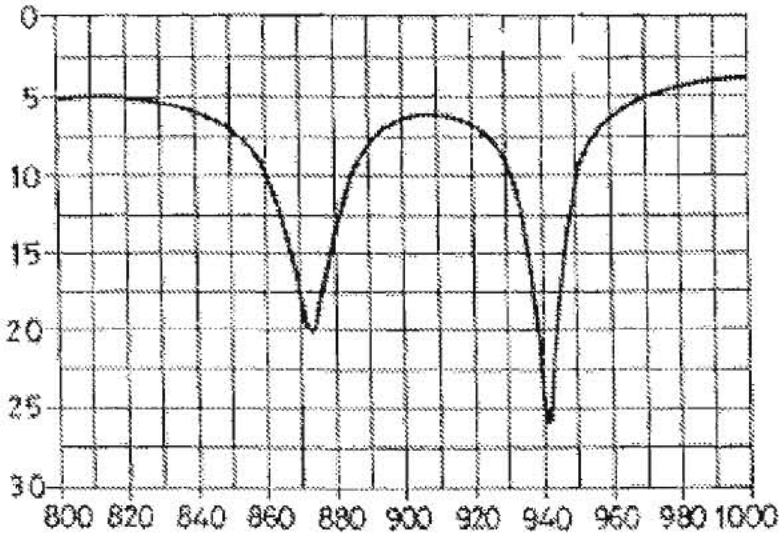


Figure 4 – Grangeat

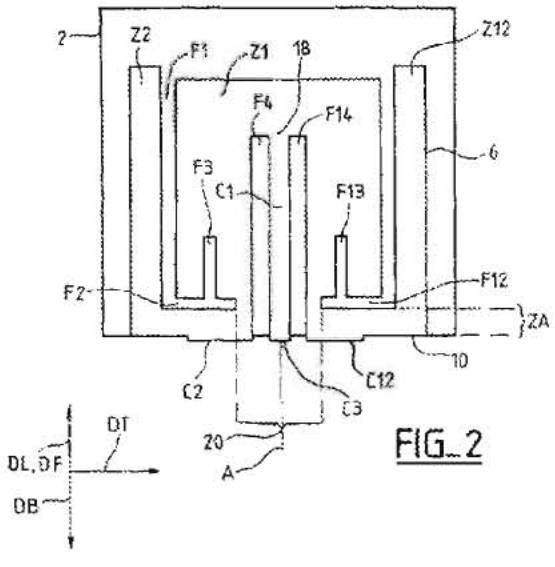


FIG_2

Grangeat at FIG 2

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Grangeat raises an SNQ with respect to claims 1, 12-14 and 30 of the '431 patent since Grangeat teaches the technical feature of the '431 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 12-14, and 30 of the '431 patent, cancel these claims, rendering them null, void, and otherwise unenforceable. patent.

C. YANG PRESENTS AN SNQ WITH RESPECT TO CLAIMS 1, 12-14, AND 30 OF THE '431 PATENT

Yang is a U.S. Patent filed on August 12, 1999 and issued October 9, 2001. Accordingly, Yang constitutes effective prior art under 35 U.S.C. § 102. Yang is listed on the face of the '431 patent, but was not used in any rejection by the Office nor substantively considered during prosecution. As will be discussed herein, Yang is presented in new light pursuant to MPEP § 2642. Moreover, this reference teaches the alleged reason for patentability of the '431 patent and is not cumulative to any prior art previously considered.

In addition, while in the related proceeding the Examiner agreed with the Patent Owner's argument that the claims do not read on fractal antenna, the Patent Owner later retracted that position and stated that there is no disclaimer of fractal antenna.[8] Further, Yang is not directed to a fractal antenna but to an antenna "substantially" related to fractals just as the '431 specification claims multilevel antennas are substantially related to fractal antenna. Yang discloses: "FIG. 4 illustrates a simple two fractal element antenna 38 including a first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length." Yang at 3:22-29.

[8] In a related reexamination proceeding of U.S. Patent No. 7,397,431 – Control Nos. 95/001,482 and 95/000,586 – Fractus stated: "Patent Owner hereby ***rescinds any disclaimer of claim scope*** made in the parent patent/application or any predecessor or related patent/application. The Examiner is advised that any previous disclaimer of claim scope, if any in the parent patent/application or any predecessor or related patent/application, and the alleged prior art that was made to allegedly avoid, may need to be revisited." *See* Control Nos. 95/001,482 and 95/000,586, Patent Owner's Response to Action Closing Prosecution, filed Jan. 3, 2012 at 1 fn. 1 (emphasis added).

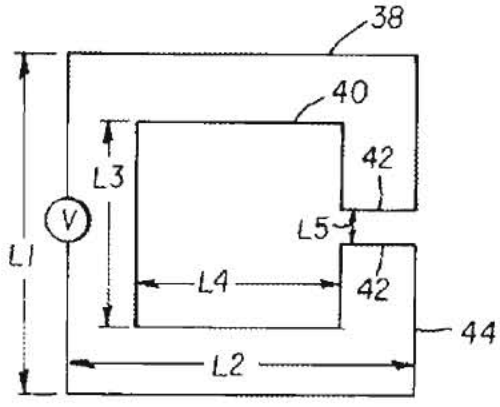


FIG. 4

Yang at FIG. 4

During examination of the '431 patent, the Examiner asserted that:

> "[T]he prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations"

Because Yang discloses the above technical feature, along with each element of claim 1, an Examiner would consider Yang important in deciding the patentability of the '431 patent.

Specifically, Yang discloses "a reduced size wideband antenna, in which a single compact antenna structure operates at multiple frequency bands." Yang, 1:37-43 and Figure 4. Yang also discloses that it was well known in the art that "[mu]lti-band and wideband antennas are desirable for personal communication systems." Yang, 1:4-9. Yang further discloses that the "invention relates in general to reduced size broadband antennas for wireless communication systems and other wireless applications." Yang, 1:12-25. Yang's multi-band antenna includes at least one multilevel structure.

The multilevel structure comprises a plurality of electromagnetically coupled geometric elements. Specifically, "[a] first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length. A gap L5 of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length." Yang, 3:22-34.

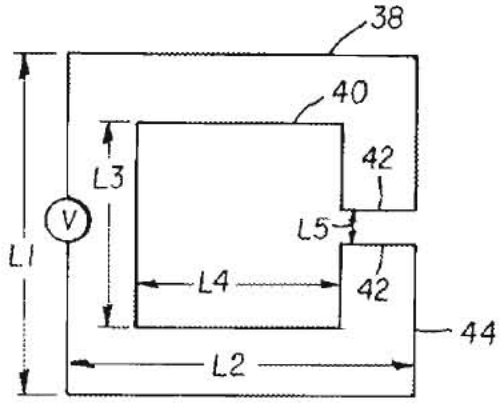


FIG. 4

Yang at FIG. 4

Yang further discloses the limitation of claims where a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion. Specifically, "[a] first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length. A gap L5 of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length. The input impedance of the antenna 38 over a desired frequency bandwidth is illustrated in FIGS. 5(a) and 5(b). The radiation pattern for the antenna 38 at a frequency of 1 GHz is shown in FIGS. 6(a), (b) and (c), at a frequency of 2 GHz is shown in FIGS. 7(a),(b) and (c), and at a frequency of 3 GHz is shown in FIGS. 8(a), (b) and (c)." Yang, 3:22-34 and Figure 4.

Yang further discloses the limitation of claim 1 wherein defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion. Specifically, "[a] first substantially square fractal

element 40 having sides L3, L4 that are ten centimeters in length. A **gap L5** of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length." (emphasis added) Yang, 3:22-34 and Figure 4.

Yang further discloses the final limitations of claim 1 being the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations. Specifically, "The input impedance of the antenna 38 over a desired frequency bandwidth is illustrated in FIGS. 5(a) and 5(b). The radiation pattern for the antenna 38 at a frequency of 1 GHz is shown in FIGS. 6(a), (b) and (c), at a frequency of 2 GHz is shown in FIGS. 7(a),(b) and (c), and at a frequency of 3 GHz is shown in FIGS. 8(a), (b) and (c)." Yang, 3:22-34 and Figures 6a, 6b, 6c, 7a, 7b, 7c, 8a, 8b, 8c, shown below.

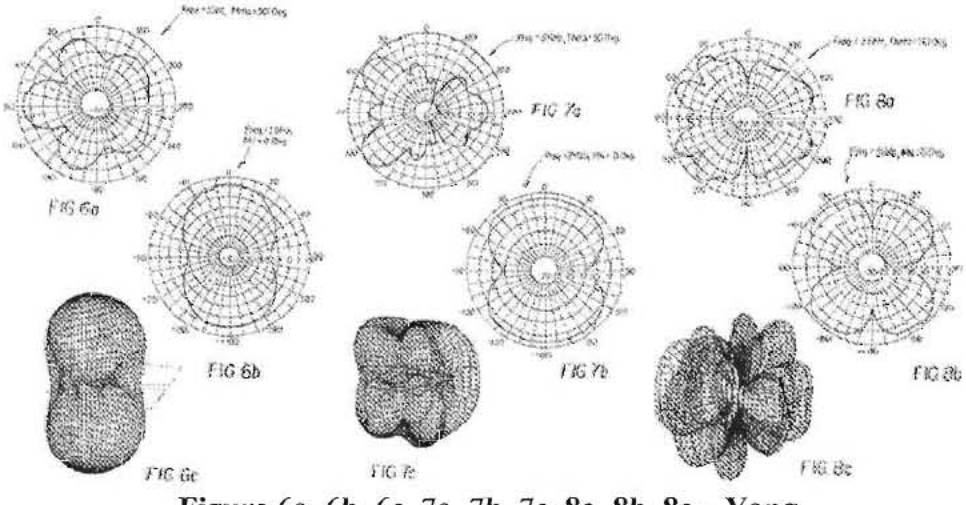


Figure 6a, 6b, 6c, 7a, 7b, 7c, 8a, 8b, 8c – Yang

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Yang raises an SNQ with respect to claim 1 of the '431 patent since Yang teaches the technical feature of the '431 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 12-14, and 30 of the '431 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

D. MISRA PRESENTS AN SNQ WITH RESPECT TO CLAIMS 1, 12-14, AND 30 OF THE '431 PATENT

Misra was published on February 5, 1996, and accordingly constitutes effective prior art under 35 U.S.C. § 102(b). Although Misra is at issue in the co-pending inter partes reexamination, Misra is being presented in a new light in this ex parte reexamination request. MPEP § 2216. In particular, in the inter partes reexamination Misra is relied on for its anticipatory disclosure of claim 1 whereas for this ex parte reexamination request Misra is being relied on for its teachings of obviousness. In addition, the Declaration of Dr. Bodnar submitted with this ex parte reexamination requests includes new computer simulations of the antenna taught by Misra that are not part of the record of the inter partes reexamination. Thus, the arguments related to obviousness and the new evidence to support those arguments are newly presented to the Office and are not cumulative to the arguments the Office is already considering in the inter partes reexamination.

During examination of the '431 patent, the Examiner asserted that:

> "[T]he prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations"

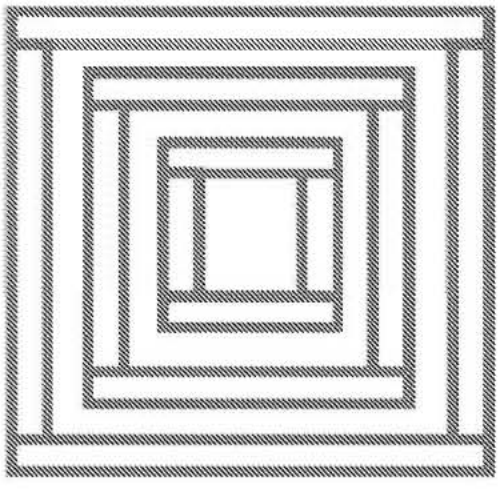
Because Misra discloses the above technical feature, along with each element of claims 1, 12-14 and 30, an Examiner would consider Misra important in deciding the patentability of the '431 patent.

Misra discloses a concentric microstrip square-ring antenna that operates in multiple bands. Misra at pg 66-67 and Table 1. Misra teaches that at least three concentric square rings can be used with multiple options for the placement of the feed line. *Id.*

The Misra multi-band antenna includes at least one multilevel structure. *See* e.g., Misra at pg. 68 ("the concentric microstrip square ring antenna has a multiple band effect.") The

structure of the antenna is comprised of a plurality of directly coupled rectangular geometric elements. Misra at Figures 1, 2 and pg. 67 (stating the length of the sides is much greater than the width indicating rectangular elements, e.g. 1.0cm x 0.2cm); *see also* OTH-H, Dr. Bodnar Declaration at ¶51. In fact, Misra provides the necessary information to calculate the approximate physical dimension of the disclosed antenna. *Id.* at ¶53. The antenna modeled by Dr. Bodnar substantially replicates those dimensions. *Id.* at ¶54.

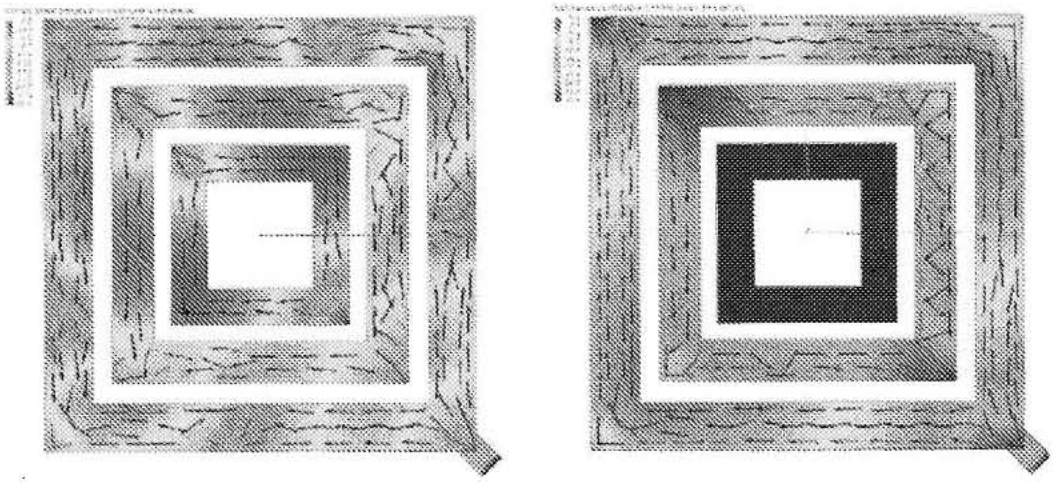
The Misra antenna comprises identifiable polygons as illustrated below. *See also e.g.*, OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Owner's Trial Demonstrative, at 35-39.



Misra showing geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5. To the extent relevant, Misra also would not be excluded under the Patent Owner's narrow claim interpretation of multilevel structure. Misra's multi band behavior is not due to a grouping of single band antennas because Misra is a single antenna that resonates at more frequencies than it has rings. Misra at pg. 67, Table 1; OTH-H, Declaration of Dr. Bodnar at ¶51-52. Nor does Misra contain any concentrated or integrated reactive elements that force the apparition of new frequencies. *Id.* At most, the rings of Misra are capacitively coupled just like the multilevel structures shown in Figures 4.12 and 3.13 of the '431 patent.

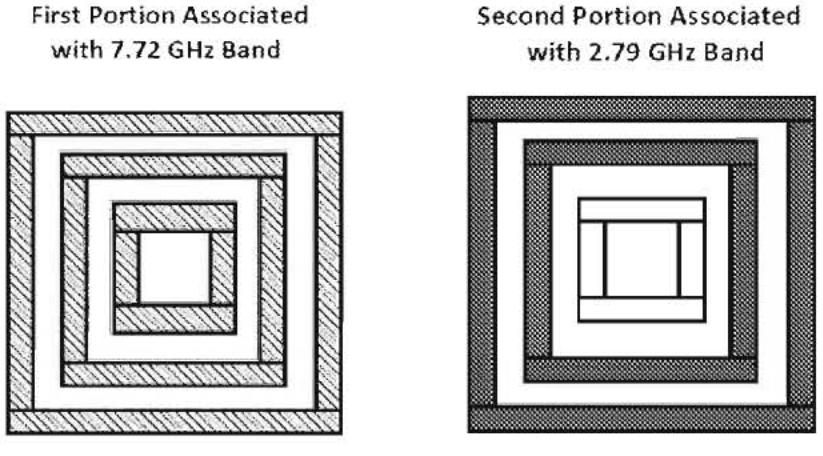
In addition, Misra also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by the Patent Owner. After one of ordinary skill in the art models the antenna taught by Misra, the current density 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:



7.72 GHz **2.79 GHz**

OTH-H, Declaration of Dr. Bodnar at Exhibit B

At a minimum, the below shaded portions are associated with the respective frequency bands using the Patent Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.



Portions associated with specified frequency bands

According to the Patent Owner, the operational function that the same geometric element is reused for more than one frequency band is required of a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013, at 12. Given that some of the same geometric elements are used for different frequency bands, Misra is a multilevel antenna under the broadest reasonable interpretation or even under the Patent Owner's narrow construction requiring reuse of geometric elements.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Misra raises an SNQ with respect to claims 1, 12-14 and 30 of the '431 patent since Misra teaches the technical features of the '431 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 12-14, and 30 of the '431 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

E. GUO PRESENTS AN SNQ WITH RESPECT TO CLAIMS 1, 12-14, AND 30 OF THE '431 PATENT

Guo was published on September 17, 1998, and accordingly constitutes effective prior art under 35 U.S.C. § 102. Although Guo is at issue in the co-pending inter partes reexamination, Guo is being presented in a new light in this ex parte reexamination request. MPEP § 2216. The Declaration of Dr. Bodnar submitted with this ex parte reexamination requests includes new computer simulations of the antenna taught by Guo that are not part of the record of the inter partes reexamination. Thus, the arguments related to obviousness and the new evidence to support those arguments are newly presented to the Office and are not cumulative to the arguments the Office is already considering in the inter partes reexamination.

During examination of the '431 patent, the Examiner asserted that:

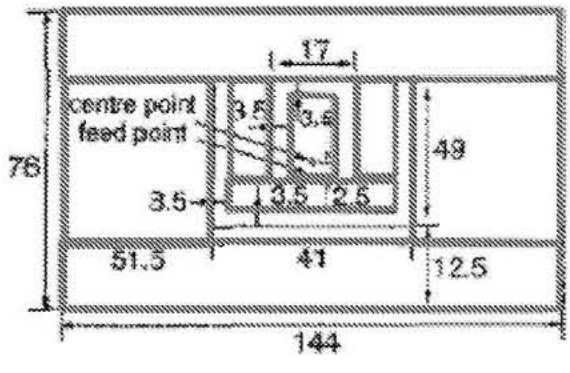
> "[T]he prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second

selected frequency band and in combination with the remaining claimed limitations"

Because Guo discloses the above technical feature, along with each element of claims 1, 12-14 and 30, an Examiner would consider Guo important in deciding the patentability of the '431 patent.

Guo discloses a multi-band antenna with three resonance frequency bands. Guo at 1805 ("In this Letter, we report on our experimental study of a double U-slot rectangular patch antenna. The resulting antenna has 44% impedance bandwidth with good pattern characteristics. In this new structure, a third resonance is added by the second U-slot") (emphasis added); *see also* OTH-H, Dr. Bodnar Declaration at ¶ 75.

Guo discloses a conductive radiating element (*i.e.*, an antenna) including at least one multilevel structure. *See*, e.g., Fig. 1, Guo, shown below, and pg. 1805. Guo's structure of the antenna is comprised of a plurality of electromagnetically coupled geometric elements. Guo at Figure 1 and pg. 1805. For example, the Guo antenna comprises identifiable polygons as illustrated below. *See also e.g.*, OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Owner's Trial Demonstrative, at 35-39.

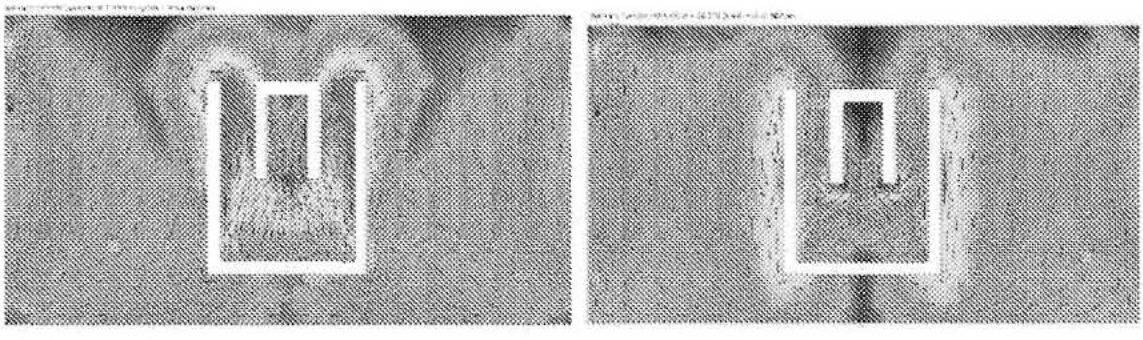


Guo annotated to show geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5-6. To the extent relevant, Guo also would not be excluded under the Patent Owner's narrow claim interpretation of multilevel structure. Guo's multi-band behavior is not due to a grouping of single band antennas because Guo is a single antenna that resonates at

multiple frequencies. *See* OTH-H, Declaration of Dr. Bodnar at ¶¶75 and 81. Nor does Guo contain any concentrated or integrated reactive elements that force the apparition of new frequencies. *See* OTH-H, Declaration of Dr. Bodnar at ¶76. The U-slots of Guo alter the resonant frequencies of the patch by altering the distance traveled by the current at certain frequencies rather than through the use of reactive elements. *Id.*

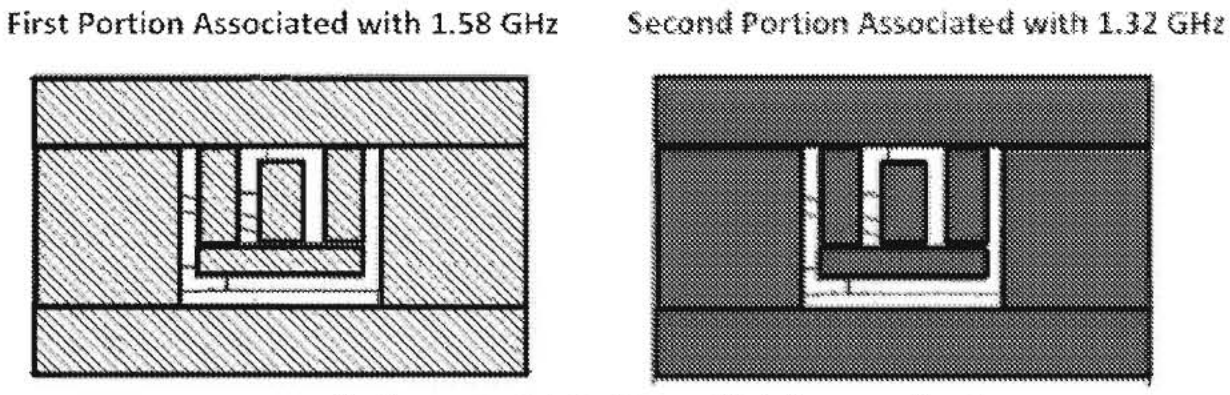
In addition, Guo also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by Owner. After one of ordinary skill in the art models the antenna taught by Guo, the current density at various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



1.58 GHz **1.32 GHz**

OTH-H, Declaration of Dr. Bodnar at Exhibit B

At a minimum, the below shaded portions are associated with the respective frequency bands using the Patent Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.



Portions associated with specified frequency bands

According to the Patent Owner, the operational function that the same geometric element is reused for more than one frequency band is required of a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013, at 12. Given that some of the same geometric elements are used for multiple frequency bands, Guo is a multilevel antenna under the broadest reasonable interpretation or even under the Patent Owner's narrow construction that requires the reuse of geometric elements.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Guo raises an SNQ with respect to claims 1, 12-14 and 30 of the '431 patent since Guo teaches the technical features of the '431 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 12-14, and 30 of the '431 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

F. JOHNSON PRESENTS AN SNQ WITH RESPECT TO CLAIMS 1 AND 12-14 OF THE '431 PATENT

Johnson was filed on August 24, 1999 and issued on May 29, 2001. Accordingly, Johnson constitutes effective prior art under 35 U.S.C. § 102(e). Although Johnson is at issue in the co-pending inter partes reexamination, Johnson is being presented in a new light in this ex parte reexamination request. MPEP § 2216. In particular, in the inter partes reexamination Johnson is relied on for its anticipatory disclosure of all claim elements whereas for this ex parte reexamination request Johnson is being relied on for its teachings of obviousness. In addition, the Declaration of Dr. Bodnar submitted with this ex parte reexamination requests includes new computer simulations of the antenna taught by Johnson that are not part of the record of the inter

partes reexamination. Thus, the arguments related to obviousness and the new evidence to support those arguments are newly presented to the Office and are not cumulative to the arguments the Office is already considering in the inter partes reexamination.

During examination of the '431 patent, the Examiner asserted that:

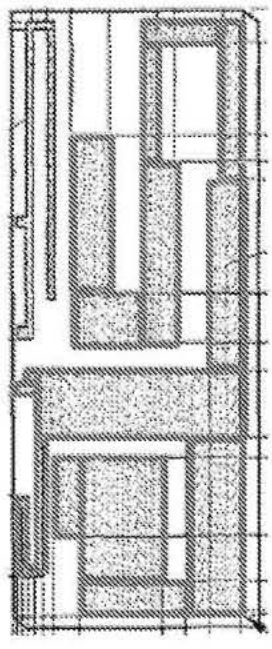
> "[T]he prior art does not teach a multi-band antenna comprising the plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band, the second portion being located substantially within the first portion, the first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion, the current within the first portion providing the first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of the second selected frequency band and in combination with the remaining claimed limitations"

Because Johnson discloses the above technical feature, along with each element of claims 1 and 12-14, an Examiner would consider Johnson important in deciding the patentability of the '431 patent.

Johnson discloses an exemplary embodiment wherein a "tri-band antenna" operates across "a cellular frequency 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. Thus at a minimum, conductive trace 40 is a multi-band antenna resonant at two frequency bands.

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 Fig. 9 (reproduced below) and 5:36-39. Johnson discloses that the antenna embodiment at Figure 9 is comprised of numerous polygonal elements having four sides. *See* Johnson at 5:35-6:34.

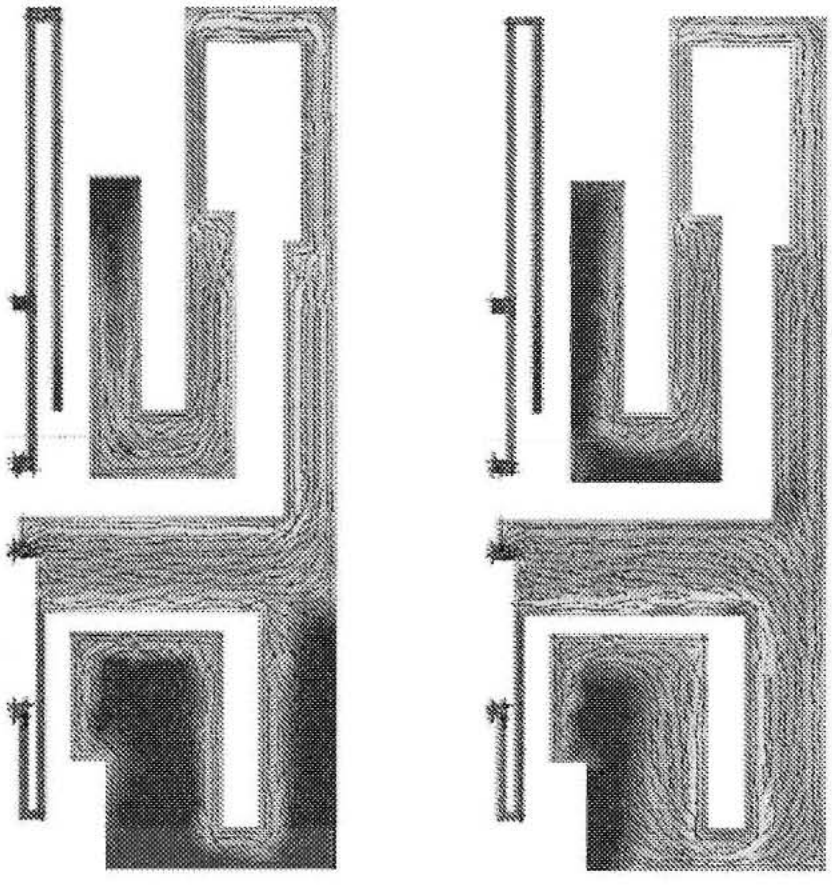
The Johnson antenna comprises identifiable polygons as illustrated below. *See also e.g* OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Long Demo, at 35-39.



Johnson Figure 9 identifying geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5-6. To the extent relevant, Johnson also would not be excluded under the Patent 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. *See* OTH-H, 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.

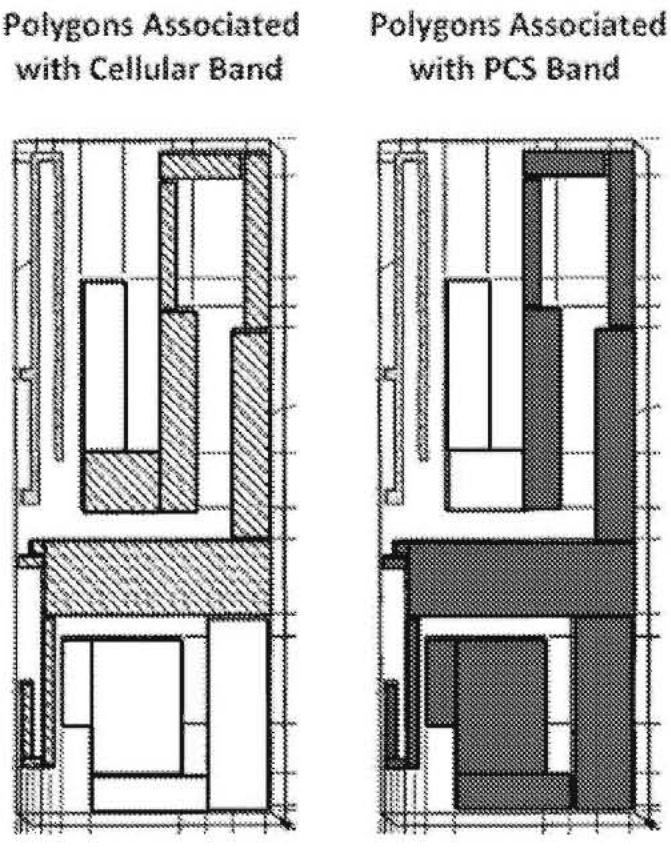
In addition, Johnson also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by Patent Owner. When one of ordinary skill in the art models the antenna taught by Johnson, the current density 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**

OTH-H, Declaration of Dr. Bodnar at Exhibit B

At a minimum, the below shaded portions are associated with the respective frequency bands using the Patent Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.



Polygons of Johnson Figure 9 associated with frequency bands

According to the Patent Owner, the operational function that the same geometric element is reused for more than one frequency band is required of a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013, at 11. Given that some of the same geometric elements are used for at least different frequency bands, Johnson is a multilevel antenna under the broadest reasonable interpretation or even under the Patent Owner's narrow construction that requires the reuse of geometric elements.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Johnson raises an SNQ with respect to claims 1 and 12-14 of the '431 patent since Johnson teaches the technical features of the '431 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1 and 12-14 of the '431 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

VI. MANNER OF APPLYING THE CLAIMS AS REQUIRED BY 37 C.F.R. § 1.510 (B)(2)

Claims 1, 12-14, 30 of the '431 patent are fully anticipated under 35 U.S.C. § 102 and/or are unpatentable under 35 U.S.C. § 103 in view of the prior art references cited herein, which were not previously considered by the Examiner during the examination of the '431 patent application or which are presented in a new light from the prosecution of the '431 patent application. Claims 1, 12-14, and 30 of the '431 patent are set forth in detail in the attached claim charts (Exhibits CC-A through CC-F) that compare the limitations of the claims of the '431 patent to the pertinent prior art references. As the claim charts demonstrate, Claims 1, 12-14, and 30 are unpatentable under 35 U.S.C. § 102 and/or 35 U.S.C. § 103 in view of the prior art presented herein.

A. CLAIMS 1, 12-14, 30 ARE RENDERED OBVIOUS BY YANAGISAWA '064 UNDER 35 U.S.C. § 103

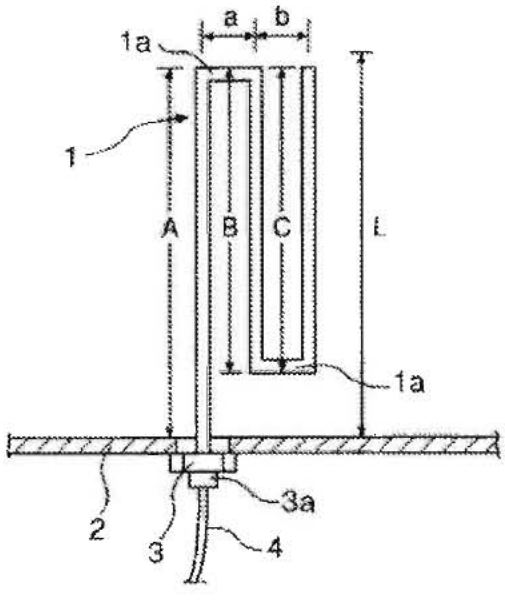
Requester respectfully submits that Claims 1, 12-14 and 30 of the '431 patent are rendered obvious by Yanigisawa '064 under 35 U.S.C. § 103. A claim chart applying Yanigisawa '064 is submitted herewith as Exhibit CC-A.

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. OTH-H, 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. Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 11. 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.

1. A multi-band antenna comprising:

Yanagisawa '064 discloses an antenna that operates in multiple bands. Yanagisawa '064, 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* OTH-H, 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.



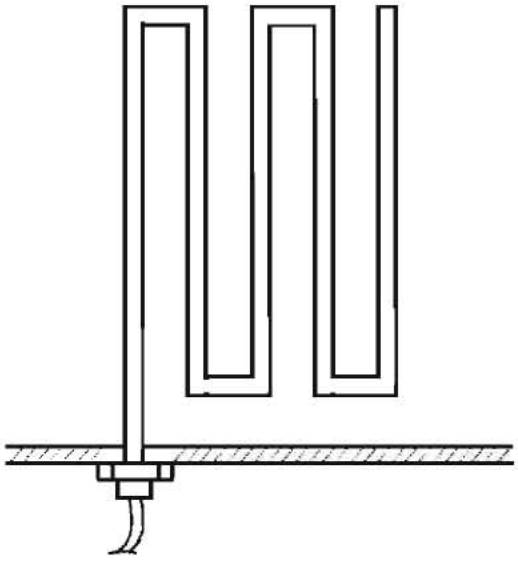


Figure 1 of Yanagisawa '064 **Embodiment modeled by Dr. Bodnar**

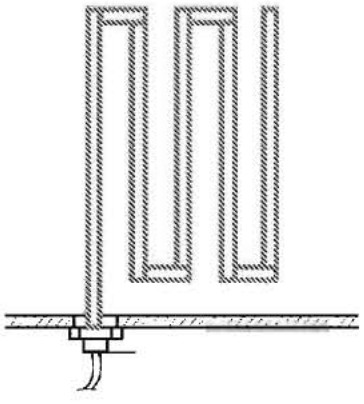
a conductive radiating element including at least one multilevel structure, said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements,

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* OTH-H, 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; OTH-H, 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.

The Yanagisawa '064 antenna modeled by Dr. Bodnar comprises identifiable polygons as depicted below. *See also e.g.*, OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Owner's Trial Demonstrative, at 35-39.

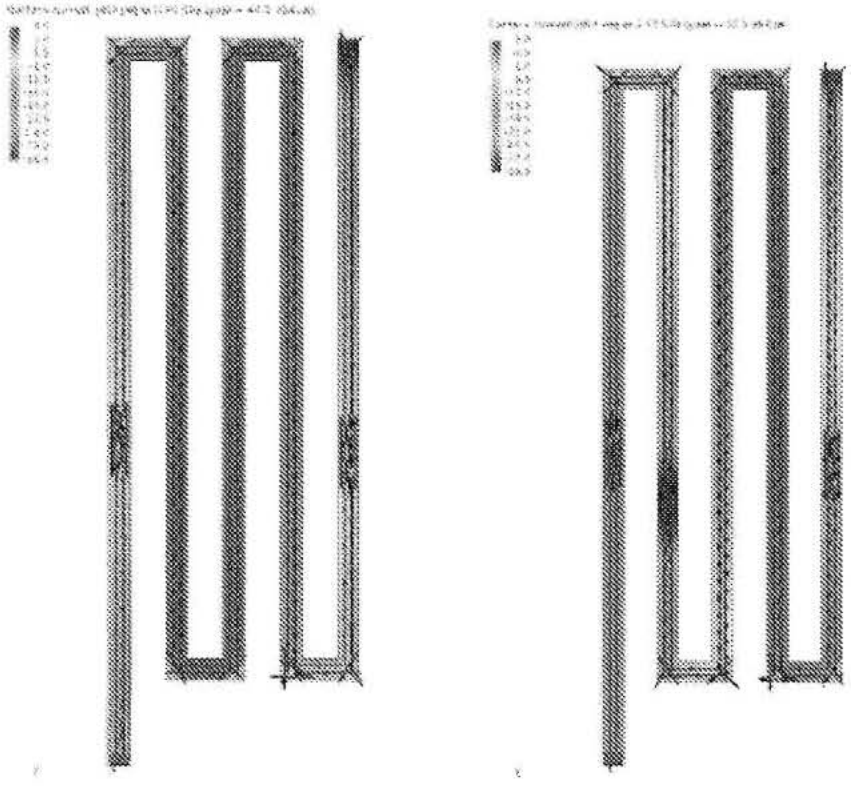


Yanagisawa '064 embodiment showing geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5. 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. OTH-H, 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

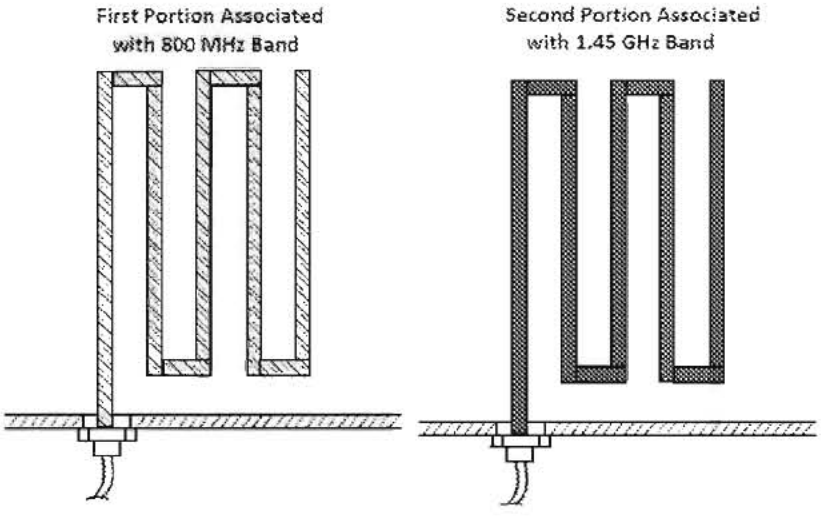
same portions of the antenna are associated with multiple frequency bands. Two such measurements are shown below.



800 Mhz **1.45 GHz**

OTH-H, Declaration of Dr. Bodnar at Exhibit B, pg. 7

At a minimum, the below shaded portions are associated with the respective frequency bands using Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.



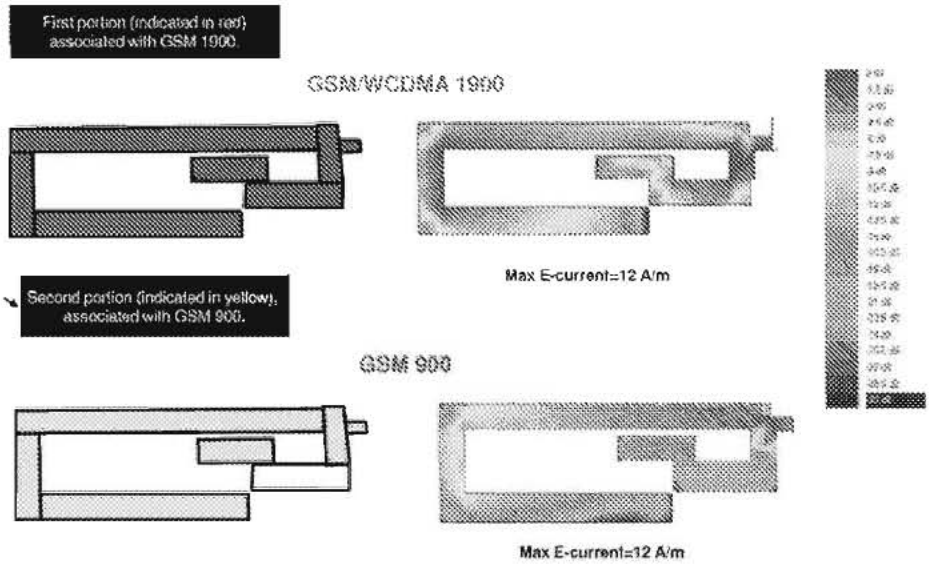
Yanagisawa '064 embodiment showing associated portions

According to Patent Owner, the operational function that the same geometric element is re-used for more than one frequency bands is a requirement of a multilevel structure. Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 11. Given that some of the same geometric elements are used for multiple different frequency bands, Yanagisawa '064 is a multilevel antenna under the broadest reasonable interpretation or even under the Owner's narrow construction requiring reuse of geometric elements.

said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band,

Yanagisawa '064 discloses that the single antenna as illustrated in Figure 1 is resonant at three or more frequencies. *See* Yanagisawa '064 at 4:22-25, 13:25-30, and 13:35-42. Similarly, the antenna taught by Yanagisawa '064 which is modeled by Dr. Bodnar resonates at more than three frequency bands. OTH-H, Dr. Bodnar Declaration at ¶33. Each of these resonant frequency bands has an associated portion of the antenna responsible for the resonance.

Patent Owner has indicated that the portions of an antenna which are associated with each frequency band are the geometric elements of an antenna that have a majority of the current density above -20dB relative to the max current. *See* OTH-B, Owner's infringement contentions below. *See also* OTH-G, Dr. Long's Expert Report at 52-55.

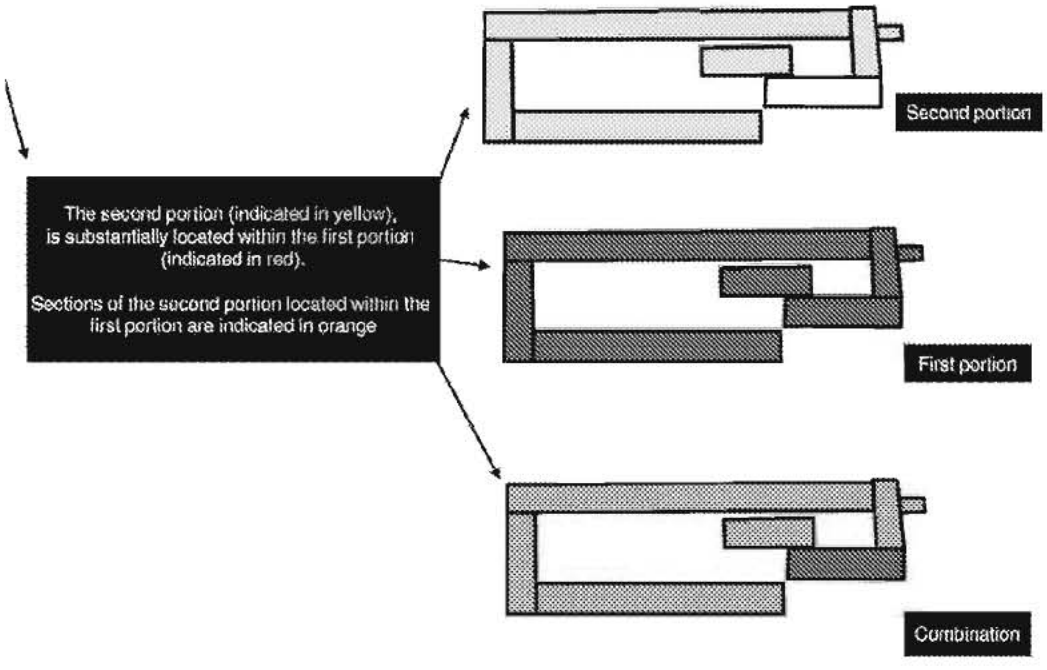


OTH-B, Patent Owner's Infringement Contentions at 2

As shown in the previous figures, when the same analysis is performed on an antenna, as taught by Yanagisawa '064, the results show that Yanagisawa '064 teaches this limitation in accordance with even the Owner's narrow construction of this claim. OTH-H, Dr. Bodnar Declaration at ¶34 and Exhibit B.

said second portion being located substantially within the first portion,

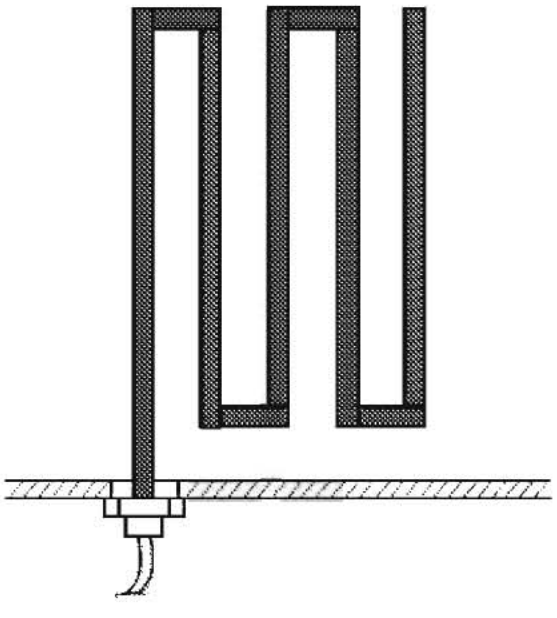
Patent Owner argued that the scope of this claim covers at least when the second portion overlaps with the first portion, as depicted in Owner's infringement contentions below.



OTH-B, Patent Owner's Infringement Contentions at 3

When the same analysis is performed on the antenna taught by Yanagisawa '064, the results show that Yanagisawa '064 teaches this limitation under the broadest reasonable construction or even under the Patent Owner's proposed claim scope.

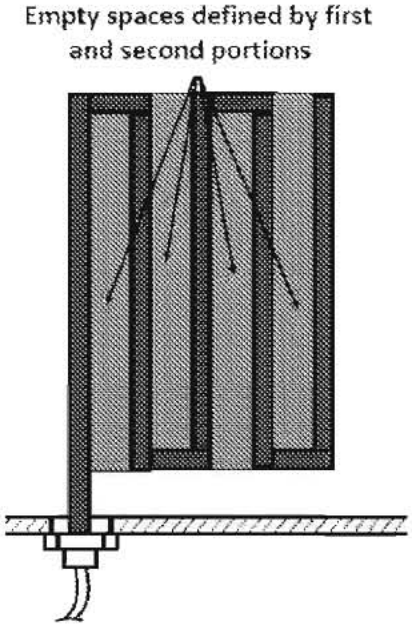
Combination of first and second portions
(overlap indicated in brown)



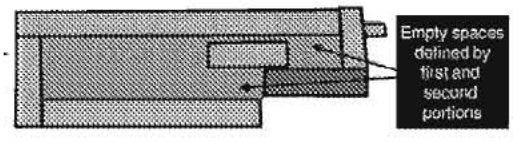
As seen in the above figure, active portions associated with the second frequency band overlap the active portions associated with the first frequency band.

said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion,

As can be seen from figure below, the portions of the Yanagisawa '064 antenna form empty spaces between their turns, which provide a circuitous current path. This is true even under the claim scope asserted by the Patent Owner for infringement.



Yanagisawa '064 Embodiment



Owner's Infringement Contentions at 4

Further, as discussed in the claim interpretation section, Patent Owner has previously construed circuitous current path to encompass two lines connected at an angle. Patent Owner's Response to ACP filed January 3, 2012 in 95/001,482 at 11. Patent Owner later distanced itself from that construction but contends that straight lines connected at four angles (or bends) is within the claim scope without specifying how the specification of the '431 patent limits the number of bends. Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 9-10.

The current path in Yanagiswa '064 bends at the corners which results in more than four bends in the current path for each of the first and second portions. OTH-H, Declaration of Dr.

Bodnar at ¶ 34 and Exhibit B. Thus, Yanagisawa '064 teaches a "circuitous current path" based on the broadest reasonable interpretation of that term and also within the scope of the claim as alleged for infringement by the Patent Owner.

and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.

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.

Furthermore, when one of ordinary skill in the art models the antenna taught by Yanagisawa '064, certain radio electric behavior can be measured including the radiation patterns and impedance. These radiation patterns would be considered substantially similar and omnidirectional at each frequency band to one of ordinary skill in the art. OTH-H, Declaration of Dr. Bodnar at ¶ 35.

In addition, to one of ordinary skill in the art, the impedance for each frequency is substantially similar and all are under the VSWR 4.0 threshold that the Owner relies on to show similarity for infringement. OTH-H, Declaration of Dr. Bodnar at ¶ 36.

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

As shown above, claim 1 is rendered obvious by an antenna taught by Yanagisawa '064. Additionally, the multilevel antenna taught by Yanagisawa '064 is included in a portable communications device. *See* Yanagisawa '064 at 1:8-15 ("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") (emphasis added).

An embodiment disclosing the antenna included in a mobile telephone is depicted in Figure 22.

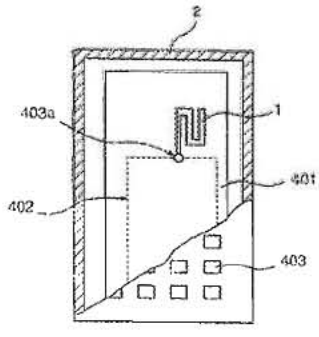


FIG.22

Yanagisawa '064 Figure 22

13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.

As shown above, claim 12 is rendered obvious by an antenna taught by Yanagisawa '064. 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. OTH-H, Declaration of Dr. Bodnar at ¶ 25.

14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.

As shown above, claim 13 is rendered obvious by an antenna taught by Yanagisawa '064. 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. OTH-H, Declaration of Dr. Bodnar at ¶32.

30. A multi-band antenna according to claim 1, wherein the antenna operates at three or more frequency bands and the antenna is shared by three or more cellular services.

As shown above, claim 1 is rendered obvious by an antenna taught by Yanagisawa '064. In addition, Yanagisawa '064 discloses that the single antenna as illustrated in Figure 1 operates at three or more frequencies. *See* Yanagisawa '064 at 4:22-25, 13:25-30, and 13:35-42. Similarly, the antenna taught by Yanagisawa '064, which is modeled by Dr. Bodnar, operates at more than three frequency bands and can be shared by three or more cellular services operating at those frequency bands. OTH-H, Dr. Bodnar Declaration at ¶33-36.

B. CLAIMS 1, 12-14, AND 30 ARE ANTICIPATED BY GRANGEAT UNDER 35 U.S.C. § 102

Requester respectfully submits that Claims 1, 12-14, and 30 of the '431 patent are anticipated by Pankinaho under 35 U.S.C. § 102. A claim chart applying Grangeat is submitted herewith as Exhibit CC-B.

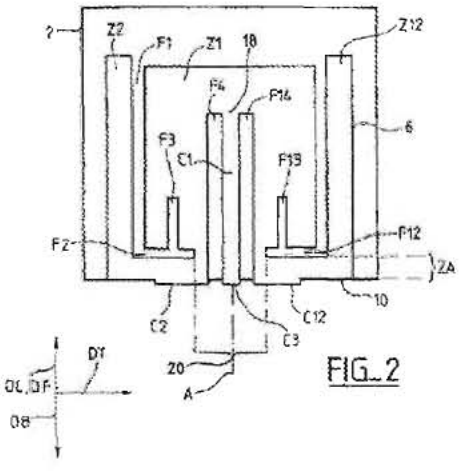
1. A multi-band antenna comprising:

Grangeat discloses a multi-band antenna (*i.e.*, an antenna capable of operation in multiple frequencies concurrently). *See*, Grangeat, 3:33-38 ("The present invention is more particularly concerned with the situation in which an antenna of the above kind must have the following properties: it must be a multifrequency antenna, i.e. it must be able to transmit and/or to receive efficiently on more than one operating frequency").

a conductive radiating element including at least one multilevel structure,

Grangeat discloses a conductive radiating element with a multilevel structure, (*i.e.*, a multi-band dipole antenna). *See*, Grangeat, 4:41-64 ("a plurality of conductive zones on the top surface of the substrate and each having an elongate shape imparting a candlestick shape to the antenna;"); *see also* Grangeat, 6:7-16 ("The device includes a main conductor consisting of two sections C1 and C3 connected to the patch 6 at an internal connection point 18. It further

includes a composite ground conductor that co-operates with the main conductor and is described below. It constitutes all or part of a connection system that connects the resonant structure of the antenna to a signal processing unit 8, for example to excite one or more antenna resonances from that unit in the case of a transmit antenna."); *see also* Grangeat, 6:40-51 ("The longitudinal extent of this slot defines in the patch a front region Z2, Z1, Z12 in which the slot divides a primary zone Z1 from a secondary zone Z2."); *see also* Grangeat, Figure 2, shown below.



Grangeat at FIG 2

In related proceedings, the Patent Owner has asserted that the claimed multilevel structure requires the same portion of the antenna to be active for multiple resonant frequency bands.[9] As disclosed in Grangeat, the primary portion of the antenna, Z1, is active and shared for both resonant frequencies, while secondary portion Z1 is only active for the second resonant frequency. Therefore, Grangeat anticipates the claimed multilevel structure even under the Patent Owner's improperly narrow interpretation of the claim.

said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements,

Grangeat discloses a multilevel structure composed of electromagnetically coupled geometric elements. *See*, Grangeat, 4:41-64 ("a plurality of conductive zones on the top surface

[9] Requester does not agree that Patent Owner's interpretation is correct, but presents it here to show that the prior art renders the claim unpatentable even under such an improper interpretation.

of the substrate and each having an elongate shape imparting a candlestick shape to the antenna;"); *see also* Grangeat, Figure 2, shown below.

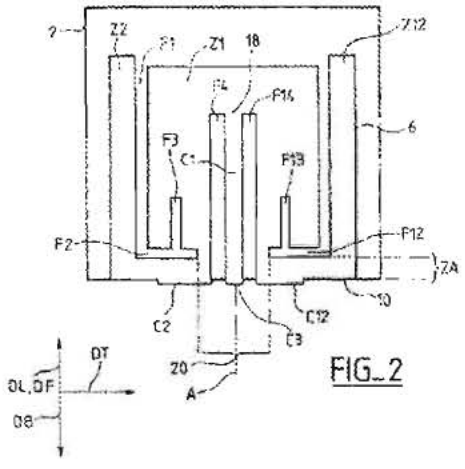


FIG_2

Grangeat at FIG 2

said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band,

Each of the geometric elements of the antenna disclosed by Grangeat is associated with a selected frequency band. *See,* Grangeat, 6:40 – 7:4 ("The antenna of the example is a dual-frequency antenna, i.e. it must give rise to **at least two resonances** so that it can operate in **two modes corresponding to two operating frequencies**... [T]he longitudinal extent of this slot defines in the patch a front region Z2, Z1, Z12 in which the slot divides a primary zone Z1 from a secondary zone Z2... **[O]ne operating mode** of the antenna then constitutes a primary mode in which a standing wave is established by virtue of propagation of traveling waves both ways in the longitudinal direction or a direction near the longitudinal direction, the waves propagating in an area including the primary zone and the rear region and substantially excluding the secondary zone Z2. **Another operating mode** constitutes a secondary mode in which a standing wave is established by virtue of propagation of traveling waves both ways (the same as before) in another area including the primary and secondary zones and the rear region.")(emphasis added); *see also* Grangeat, Figure 2 shown below.

said second portion being located substantially within the first portion,

The second portion of the multi-band antenna of Grangeat is located within the first portion. *See,* Grangeat, Figure 2 shown below.

said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion,

The portions of the multi-band antenna of Grangeat define empty spaces between them and provide a circuitous current path. *See*, Grangeat, 4:41-64 ("a plurality of conductive zones on the top surface of the substrate and each having an elongate shape imparting a candlestick shape to the antenna;"); *see also* Grangeat, Fig. 2.

and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.

The radio electric behavior of the frequency bands corresponding to the two portions of the multi-band antenna disclosed by Grangeat are similar to each other. *See*, Grangeat at 7:14-17 ("the same antenna impedance value for the various operating frequencies."); *see also,* Grangeat, 9:52 - 10:14 ("primary operating frequency: 940 MHz, secondary operating frequency: 870 MHz, input impedance: 50 ohms"); *see also,* Grangeat, Fig. 4, shown below. Furthermore, Grangeat discloses that both the first and second resonant frequency bands would be similar radiating patch elements over the same ground plane so they would have a similar radiation pattern. The primary portion radiates at all resonant frequency bands, so the only change between bands is that the outer arms radiate at other bands. *See,* Grangeat, 6:52-64.

FIG_4

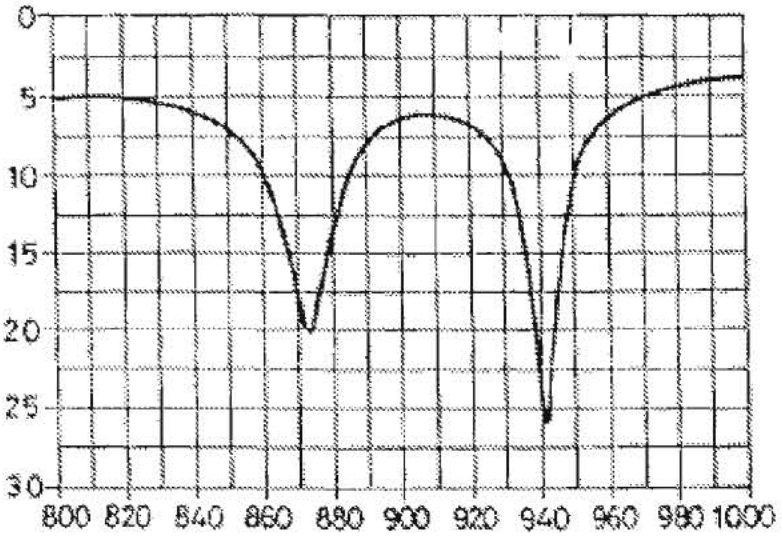


Figure 4 – Grangeat

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

As shown above, Claim 1 is anticipated by Grangeat. Additionally, in the multilevel antenna disclosed by Grangeat, is included in a portable communications device. *See,* Grangeat, Abstract ("The invention applies in particular to portable telephones and to their base stations.").

13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.

As shown above, Claim 1 and Claim 12 are anticipated by Grangeat. Additionally, the portable communication device disclosed by Grangeat, is a handset. *See,* Grangeat, Abstract ("The invention applies in particular to portable telephones and to their base stations.").

14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.

As shown above, Claim 1, 12, and 13 are anticipated by Grangeat. Furthermore, the multi-band antenna disclosed by Grangeat operates at 940 MHz and 870 MHz. *See,* Grangeat, 9: 52-59 ("primary operating frequency: 940 MHz, secondary operating frequency: 870 MHz").

30. A multi-band antenna according to claim 1, wherein the antenna operates at three or more frequency bands and the antenna is shared by three or more cellular services.

As shown above, Claim 1 is anticipated by Grangeat. Furthermore, the multi-band

antenna disclosed by Grangeat operates at three or more frequency bands and the antenna is shared by three or more cellular services. Moreover, the Grangeat antenna discloses operation 850-950MHz, which is shared by at least three cellular services. *See* Grangeat, 9:52-59 ("primary operating frequency: 940 MHz, secondary operating frequency: 870 MHz,"); *see also,* Grangeat, 10:14-30 ("First of all, it caters for the fact that three operating frequencies are needed. The patch 106 therefore additionally includes two mutually symmetrical tertiary zones. A first U-shaped slot F101 partly separates the primary zone Z101 from the two secondary zones Z102 and Z112. It lies within a second slot F105 the same shape separating the secondary zones from the tertiary zones Z103 and Z113."); *see also,* Grangeat, Fig. 5, shown below.

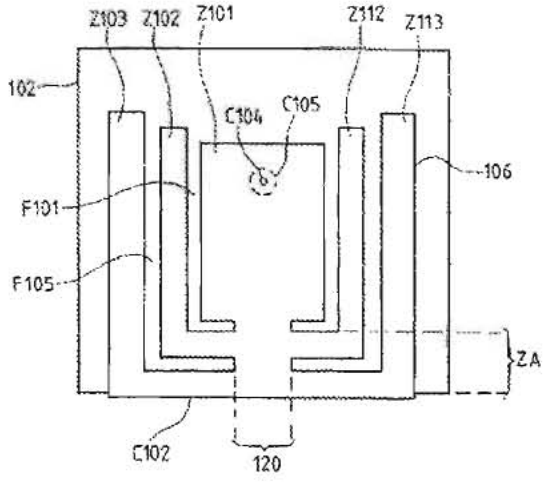


FIG_5

Figure 5 – Grangeat

C. CLAIMS 1, 12-14, AND 30 ARE ANTICIPATED BY YANG UNDER 35 U.S.C. § 102

Requester respectfully submits that Claims 1, 12-14, and 30 of the '431 patent are anticipated by Yang under 35 U.S.C. § 102. A claim chart applying Yang is submitted herewith as Exhibit CC-C.

1. A multi-band antenna comprising:

Yang discloses a multi-band antenna (*i.e.*, an antenna capable of operation in multiple frequencies concurrently). *See*, Yang, Abstract ("A reduced size wideband antenna operates at multiple frequency bands.").

a conductive radiating element including at least one multilevel structure,

Yang discloses a conductive radiating element with a multilevel structure. *See*, Yang, 3: 22-34 ("FIG. 4 illustrates a simple two fractal element antenna 38 including a first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length. A gap L5 of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length. The input impedance of the antenna 38 over a desired frequency bandwidth is illustrated in FIGS. 5(a) and 5(b). The radiation pattern for the antenna 38 at a frequency of 1 GHz is shown in FIGS. 6(a), (b) and (c), at a frequency of 2 GHz is shown in FIGS. 7(a),(b) and (c), and at a frequency of 3 GHz is shown in FIGS. 8(a), (b) and (c))"

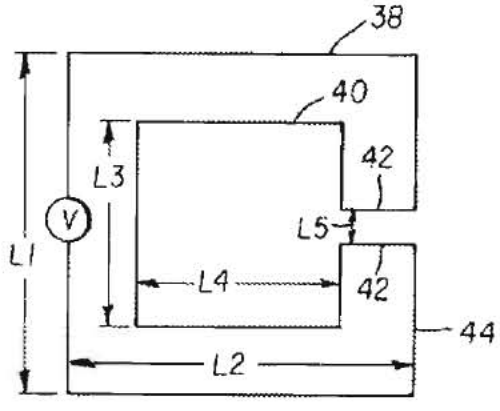


FIG. 4

Yang at FIG. 4

said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements,

The multilevel structure of Yang comprises a plurality of electromagnetically coupled geometric elements. *See,* Yang, 3:22-34. "FIG. 4 illustrates a simple two fractal element antenna 38 including a first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length. A gap L5 of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length. The input impedance of the antenna 38 over a desired frequency bandwidth is illustrated in FIGS. 5(a) and 5(b). The radiation pattern for the antenna 38 at a frequency of 1 GHz is shown

in FIGS. 6(a), (b) and (c), at a frequency of 2 GHz is shown in FIGS. 7(a),(b) and (c), and at a frequency of 3 GHz is shown in FIGS. 8(a), (b) and (c)") [10]

said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band,

Each of the geometric elements of the antenna disclosed by Yang is associated with a selected frequency band. *See* Yang, 1:66-67 ("FIGS. 6(a)[shown below], (b)[shown below] and (c)[shown below] illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 1 GHz; FIGS. 7(a)[shown below], (b)[shown below] and (c)[shown below] illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 2 GHz; FIGS. 8(a)[shown below], (b)[shown below] and (c)[shown below] illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 3 GHz")

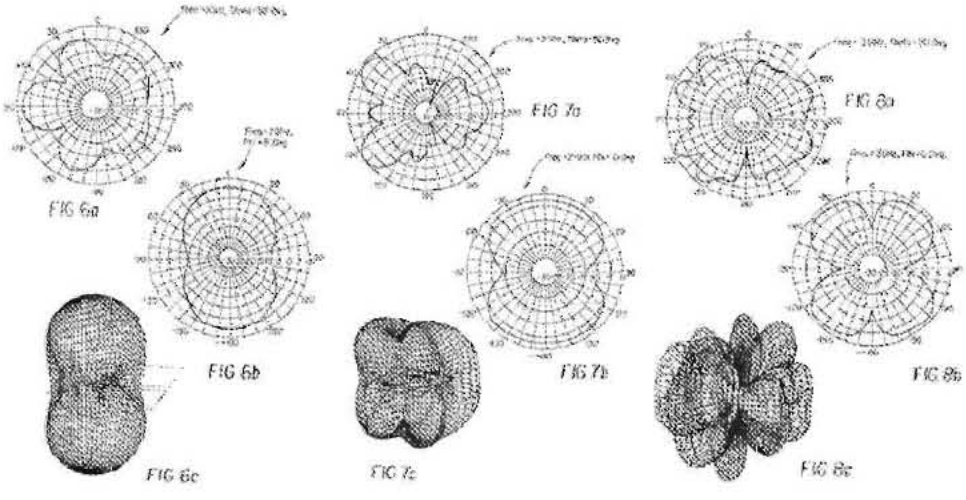


Figure 6a-6c - Yang Figure 7a-7c - Yang Figure 8a-8c - Yang

said second portion being located substantially within the first portion,

The second portion of the multi-band antenna of Yang is located within the first portion insofar as they substantially overlap (compare to Patent Owner's infringement contentions). *See* Yang, 3:22-34 ("FIG. 4 illustrates a simple two fractal element antenna 38 including a first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length. A

[10] Yang states the fractal elements may be formed by a patterned metal trace (e.g., a polygon) or alternatively from a wire (e.g., a polyhedron). Yang at 3:36-45 ("For Example, the fractal elements can be formed of a patterned metal layer placed on a substrate, where in the patterned metal layer can be cut from a solid sheet…Alternatively, the fractal elements can be formed of wire or other self supporting conductive materials.")

gap L5 of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length. The input impedance of the antenna 38 over a desired frequency bandwidth is illustrated in FIGS. 5(a) and 5(b). The radiation pattern for the antenna 38 at a frequency of 1 GHz is shown in FIGS. 6(a), (b) and (c), at a frequency of 2 GHz is shown in FIGS. 7(a),(b) and (c), and at a frequency of 3 GHz is shown in FIGS. 8(a), (b) and (c).")

said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion,

The portions of the multi-band antenna of Yang define empty spaces between them and provide a circuitous current path, as shown below in Figure 4 from Yang. *See also* Yang, 3:22-34 ("FIG. 4 illustrates a simple two fractal element antenna 38 including a first substantially square fractal element 40 having sides L3, L4 that are ten centimeters in length. A gap L5 of a length of two centimeters is provided on one side of the fractal element 40, and connection paths 42 connect the first fractal element 38 to a second substantially square fractal element 44 having sides L1, L2 that are eighteen centimeters in length. The input impedance of the antenna 38 over a desired frequency bandwidth is illustrated in FIGS. 5(a) and 5(b). The radiation pattern for the antenna 38 at a frequency of 1 GHz is shown in FIGS. 6(a), (b) and (c), at a frequency of 2 GHz is shown in FIGS. 7(a),(b) and (c), and at a frequency of 3 GHz is shown in FIGS. 8(a), (b) and (c).")

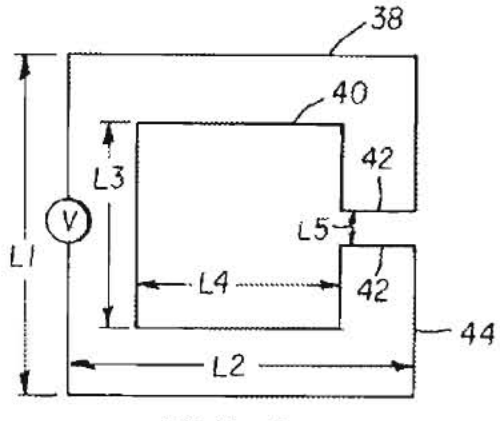


FIG. 4

Yang at FIG. 4

and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.

The radio electric behavior of the frequency bands corresponding to the two portions of the multi-band antenna disclosed by Yang are similar to each other. *See* Yang, 1:66-67 ("FIGS. 6(a)[shown below], (b)[shown below] and (c)[shown below] illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 1 GHz; FIGS. 7(a)[shown below], (b)[shown below] and (c)[shown below] illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 2 GHz; FIGS. 8(a)[shown below], (b)[shown below] and (c)[shown below] illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 3 GHz")

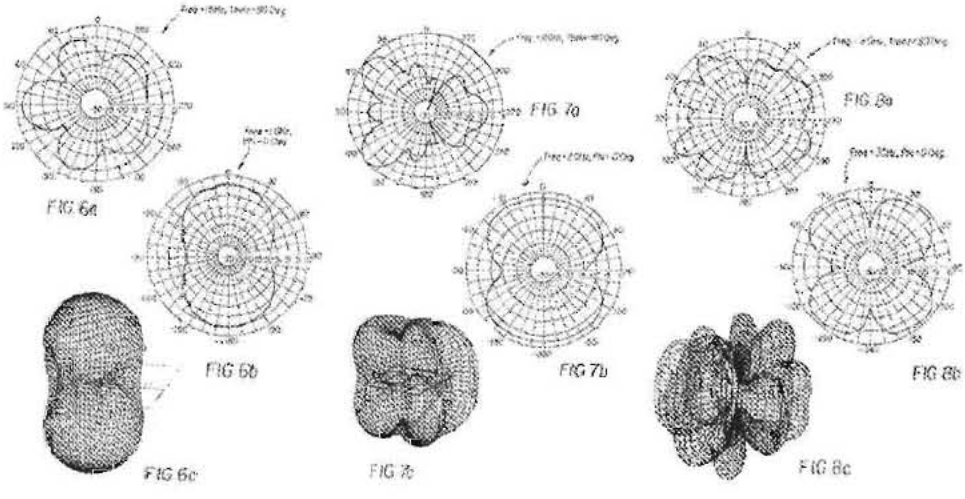


Figure 6a-6c - Yang Figure 7a-7c - Yang Figure 8a-8c - Yang

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

As shown above, Claim 1 is anticipated by Yang. Additionally, the multilevel antenna disclosed by Yang, is suitable for inclusion in a portable communications device. The disclosure of Yang describes that one of its objects is small antenna for "personal mobile use." *See* Yang, 1:26-34 ("Traditionally, wideband antennas in wireless low frequency band can only be achieved with heavily loaded wire antennas, which means that a different antenna is needed for each frequency band. As a result, these antennas are large in size and they are cumbersome and bulky

for personal mobile use. It would therefore be desirable to provide an antenna structure that overcomes the deficiencies of conventional antenna structures." Moreover the operating frequencies of the Yanagisawa antenna, 1 GHz, 2 GHz and 3 GHz, are frequencies used by mobile services. *See*, Yang, Col. 1, lines 66-67("FIGS. 6(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 1 GHz; FIGS. 7(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 2 GHz; FIGS. 8(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 3 GHz")

13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.

As shown above, Claim 1 and Claim 12 are anticipated by Yang. Additionally, the portable communication device disclosed by Yang is a handset. *See* Yang, 1:30-34, ("As a result, these antennas are large in size and they are cumbersome and bulky for personal mobile use. It would therefore be desirable to provide an antenna structure that overcomes the deficiencies of conventional antenna structures.")

14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.

As shown above, Claim 1, 12, and 13 are anticipated by Yang. Furthermore, the multi-band antenna disclosed by Yang operates at 1000 MHz, 2000 MHz and 3000 MHz. *See* Yang, 1:66-67 ("FIGS. 6(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 1 GHz; FIGS. 7(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 2 GHz; FIGS. 8(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 3 GHz").

30. A multi-band antenna according to claim 1, wherein the antenna operates at three or more frequency bands and the antenna is shared by three or more cellular services.

As shown above, Claim 1 is anticipated by Yang. Furthermore, the multi-band antenna disclosed by Yang operates at three or more frequency bands and the antenna is shared by three or more cellular services. As noted above, Yang operates at 1000 MHz, 2000 MHz and 3000 MHz, making the antenna sharable by three or more frequencies. *See* Yang, 1:66-67 ("FIGS.

6(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 1 GHz; FIGS. 7(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 2 GHz; FIGS. 8(a), (b) and (c) illustrate the radiation patterns for the antenna illustrated in FIG. 4 at a frequency of 3 GHz").

D. CLAIMS 1, 12-14, AND 30 ARE RENDERED OBVIOUS BY MISRA UNDER 35 U.S.C. § 103

Requester respectfully submits that Claims 1, 12-14 and 30 of the '431 patent are rendered obvious by Misra under 35 U.S.C. § 103. A claim chart applying Misra is submitted herewith as Exhibit CC-D.

While Misra doesn't explicitly disclose use of the antenna in a portable communication device handset, one of ordinary skill in the art would be motivated to do so based on the small size and operational characteristics of Misra. OTH-H, Declaration of Dr. Bodnar at ¶50. Misra teaches three different feeding positions for the antenna. This proposed rejection relies on the structure and operation of the corner feed embodiment as taught by Misra. Misra at pg. 66-67 and Figure 1; *see also* OTH-H, Declaration of Dr. Bodnar at ¶¶ 49-61.

Furthermore, Misra 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 a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 11. 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 in order to measure the current density, current paths and other relevant radio electric characteristics of the antennas at the resonant frequency bands. Modeling an antenna is a routine task to those of ordinary skill in the art to demonstrate how an embodiment of an antenna taught by Misra operates.

1. A multi-band antenna comprising:

Misra discloses a concentric microstrip square-ring antenna that operates in multiple bands. Misra at pg 66-67 and Table 1. Misra teaches that at least three concentric square rings can be used with multiple options for the placement of the feed line. *Id.* Requester relies on the teachings related to the corner feed embodiment for this rejection, shown below.

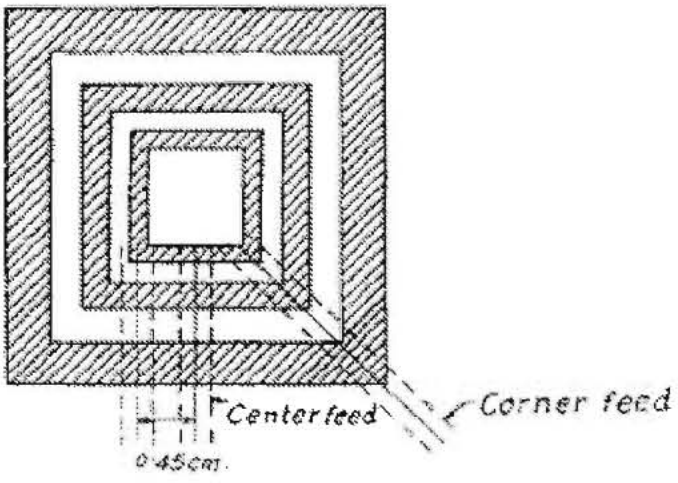
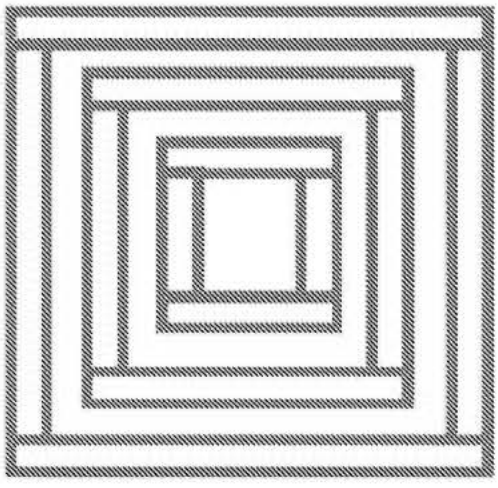


Figure 1 of Misra

a conductive radiating element including at least one multilevel structure, said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements,

The Misra multi-band antenna includes at least one multilevel structure. *See* e.g., Misra at pg. 68 ("the concentric microstrip square ring antenna has a multiple band effect.") The structure of the antenna is comprised of a plurality of directly coupled geometric elements. Misra at Figures 1, 2 and pg. 67-68 (stating the length of the sides is much greater than the width, e.g. 1.0cm x 0.2cm); *see also* OTH-H, Dr. Bodnar Declaration at ¶51. In fact, Misra provides the necessary information to calculate the approximate physical dimension of the disclosed antenna. *Id.* at ¶53. The antenna modeled by Dr. Bodnar substantially replicates those dimensions. *Id.* at ¶54.

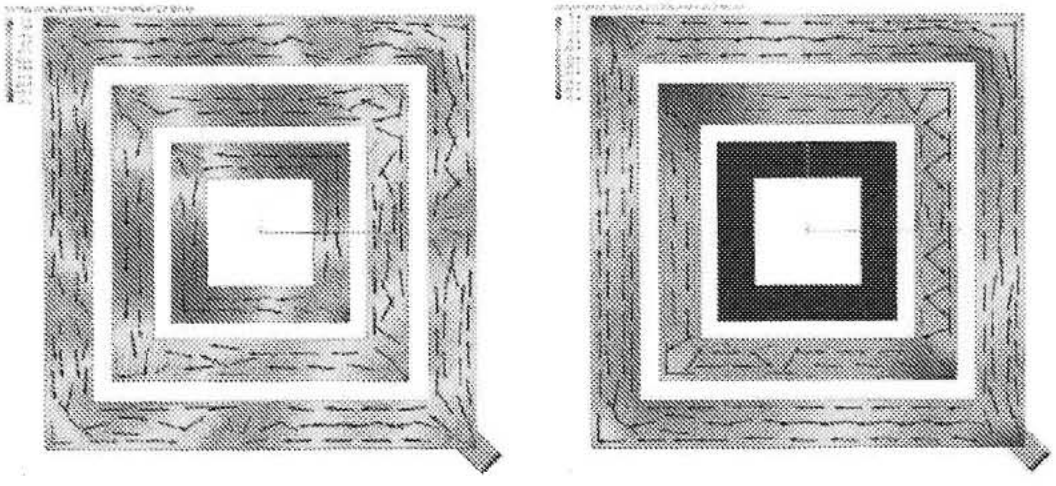
The Misra antenna comprises identifiable polygons as illustrated below. *See also e.g.*, OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Owner's Trial Demonstrative, at 35-39.



Misra showing geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5. To the extent relevant, Misra also would not be excluded under the Patent Owner's narrow claim interpretation of multilevel structure. Misra's multi band behavior is not due to a grouping of single band antennas because Misra is a single antenna that resonates at more frequencies than it has rings. Misra at pg. 67, Table 1; OTH-H, Declaration of Dr. Bodnar at ¶51-52. Nor does Misra contain any concentrated or integrated reactive elements that force the apparition of new frequencies. *Id.* At most, the rings of Misra are capacitively coupled just like the multilevel structures shown in Figures 4.12 and 3.13 of the '431 patent.

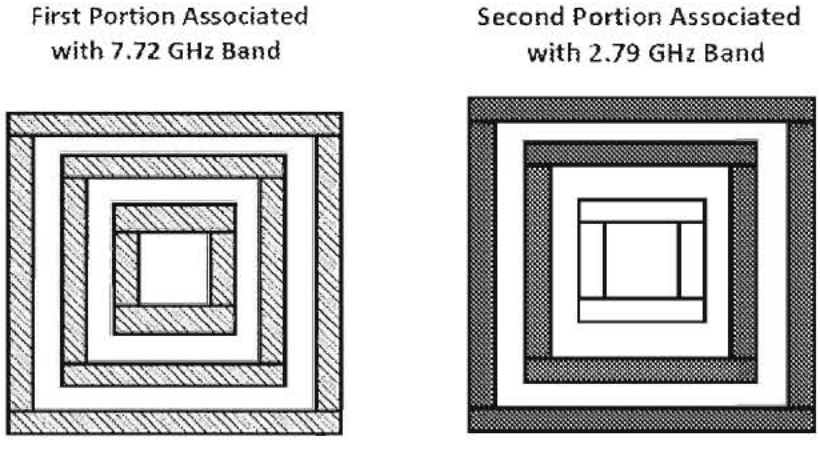
In addition, Misra also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by the Patent Owner. After one of ordinary skill in the art models the antenna taught by Misra, the current density 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:



7.72 GHz **2.79 GHz**

OTH-H, Declaration of Dr. Bodnar at Exhibit B, pgs. 24 and 26

At a minimum, the below shaded portions are associated with the respective frequency bands using the Patent Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.



Portions associated with specified frequency bands

According to the Patent Owner, the operational function that the same geometric element is reused for more than one frequency band is required of a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013, at 12. Given that some of the same geometric elements are used for different frequency bands, Misra is a multilevel antenna under the broadest reasonable interpretation or even under the Patent Owner's narrow construction requiring reuse of geometric elements.

said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band,

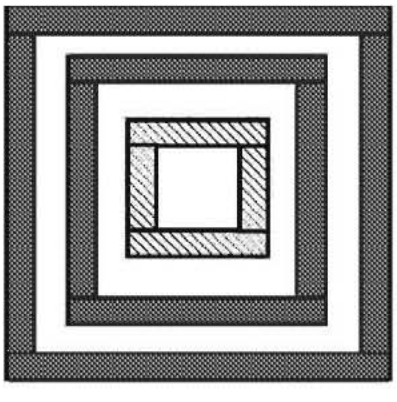
Misra discloses that the single antenna as illustrated in Figure 1 is resonant at two or more frequencies. *See* Misra at pg. 68 and Table 1. Similarly, the antenna taught by Misra, which is modeled by Dr. Bodnar, resonates at more than two frequency bands. *See* OTH-H, Dr. Bodnar Declaration at ¶55. Each of these resonant frequency bands has an associated portion of the antenna responsible for the resonance. According to the Owner, the scope of this limitation reads on portions of the antenna having a majority of current density above -20 dB. *See* e.g, OTH-G, Dr. Long's Expert Report at 52-55.

As shown in the previous figures, when the same analysis is performed on an antenna, as taught by Misra, the results show that Misra teaches this limitation in accordance with even the Owner's narrow construction of this claim. *See* OTH-H, Dr. Bodnar Declaration at ¶58 and Exhibit B.

said second portion being located substantially within the first portion,

Patent Owner argued that the scope of this claim covers at least when the second portion overlaps with the first portion, as depicted in the Patent Owner's infringement contentions. *See* OTH-B, Owner's Infringement Contentions at 3. When the same analysis is performed on the antenna taught by Misra, the results show that Misra teaches this limitation under the broadest reasonable construction or even under the Patent Owner's narrow construction.

Combination of first and second portions
(overlap indicated in brown)

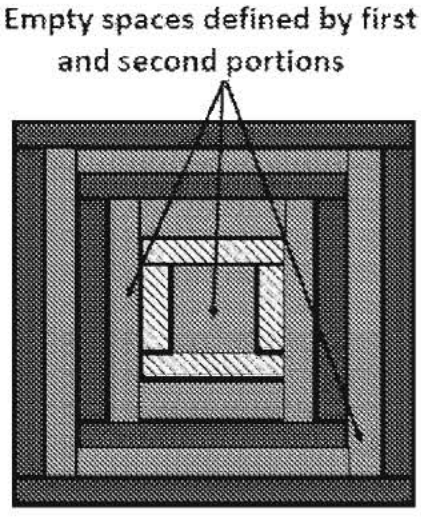


Misra

As seen in the above figure, active portions associated with the second frequency band overlap active portions associated with the first frequency band.

said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion,

As can be seen from the figure below, portions of the Misra antenna form empty spaces within the concentric square rings, which provide a circuitous current path. This is true even under the claim scope asserted by the Patent Owner for infringement. *See* OTH-B, Patent Owner's Infringement Contentions at 4.



Misra

Further, as discussed in the claim interpretation section, Patent Owner has previously construed circuitous current path to encompass two lines connected at an angle. *See* Patent Owner's Response to ACP filed January 3, 2012 in 95/001,482 at 11. Patent Owner later distanced itself from that construction but contends that straight lines connected at four angles (or bends) is within the claim scope without specifying how the specification of the '431 patent limits the number of bends. *See* Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 9-10.

As seen in the previous figures, the current starts diagonally closest to the feed line, splits at the first corner, and then bends at each subsequent corner. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 59 and Exhibit B. This results in at least four bends for the current paths of each of

the first and second portions since the current path of each travels across all four corners of at least one square.

Thus, Misra teaches a "circuitous current path" based on the broadest reasonable interpretation of that term and also within the scope of the claim as alleged for infringement by the Patent Owner.

> **and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.**

Misra teaches that the radio electric behavior is substantially similar between the first and second frequency bands. Misra at pg. 68-69. (noting that VSRW remains below 2.0 for each band of the corner fed embodiment and providing four similar radiation patterns for the corner fed embodiment).

Furthermore, when one of ordinary skill in the art models the antenna taught by Misra, the radio electric behavior can be measured including the radiation patterns and impedance. These radiation patterns of the modeled antenna would be considered substantially similar and omnidirectional at each frequency band to one of ordinary skill in the art. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 60. In addition, to one of ordinary skill in the art, the impedance for each frequency is substantially similar and all are under the VSWR 4.0 threshold that the Owner's relies on to show similarity for infringement. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 61.

> **12. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device.**

As shown above, claim 1 is rendered obvious by an antenna taught by Misra. Additionally, one of ordinary skill in the art would look to use the multilevel antenna taught by Misra in a portable communications device because of the small size of the antenna and the radio electric characteristics are suited for a portable electronic device. *See* OTH-H, Declaration of Dr. Bodnar at ¶50. Further, one of ordinary skill in the art would be motivated to use Misra in order to provide access to multiple different communication services using a single antenna. *Id.* Finally, implementation of Misra's antenna into a portable communication device is within the

level of skill of one of ordinary skill in the art and it would not require any undue experimentation. *Id.*

13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.

As shown above, claim 12 is rendered obvious by an antenna taught by Misra. Additionally, one of ordinary skill in the art would look to use the multilevel antenna taught by Misra in a portable communications device handset because of the small size of the antenna (2.42 x 2.42cm) and the radio electric characteristics of the antenna are suited for a portable electronic device. *See* OTH-H, Declaration of Dr. Bodnar at ¶50. Implementation of Misra's antenna into a handset is within the level of skill of one of ordinary skill in the art and it would not require any undue experimentation. *Id.*

14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.

As shown above, claim 13 is rendered obvious by an antenna taught by Misra. Misra also teaches that two resonant frequency bands for the corner feed are 2612-265 MHz and 2740-2773 MHz . Misra at pg. 67 and Table 1. In addition, the resonant frequencies measured by Dr. Bodnar include the frequency band centered on 2790 MHz which is within the claimed operating range. *See* OTH-H, Declaration of Dr. Bodnar at ¶55.

30. A multi-band antenna according to claim 1, wherein the antenna operates at three or more frequency bands and the antenna is shared by three or more cellular services.

As shown above, claim 1 is rendered obvious by an antenna taught by Misra. In addition, Misra discloses that the single antenna illustrated in Figure 1 operates at three or more frequencies. Misra at Table 1. Similarly, the antenna taught by Misra which is modeled by Dr. Bodnar operates at more than three frequency bands and can be shared by three or more cellular services operating at those frequency bands. *See* OTH-H, Dr. Bodnar Declaration at ¶57-59.

E. CLAIMS 1, 12-14, AND 30 ARE RENDERED OBVIOUS BY GUO UNDER 35 U.S.C. § 103

Requester respectfully submits that Claims 1, 12-14 and 30 of the '431 patent are rendered obvious by Guo under 35 U.S.C. § 103. A claim chart applying Guo is submitted herewith as Exhibit CC-E.

While Guo doesn't explicitly disclose use of the antenna in a portable communication device handset, one of ordinary skill in the art would be motivated to do so based on the small size and operational characteristics of Guo. OTH-H, Declaration of Dr. Bodnar at ¶¶77 and 87.

Guo 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. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 11. 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 Guo in order to measure the current density, current paths and other relevant radio electric characteristics of the antennas 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 Guo operates.

1. A multi-band antenna comprising:

Guo discloses a multi-band antenna with three resonant frequency bands. Guo at 1805 ("In this Letter, we report on our experimental study of a double U-slot rectangular patch antenna. The resulting antenna has 44% impedance bandwidth with good pattern characteristics. In this new structure, a third resonance is added by the second U-slot") (emphasis added); *see also* OTH-H, Dr. Bodnar Declaration at ¶ 75.

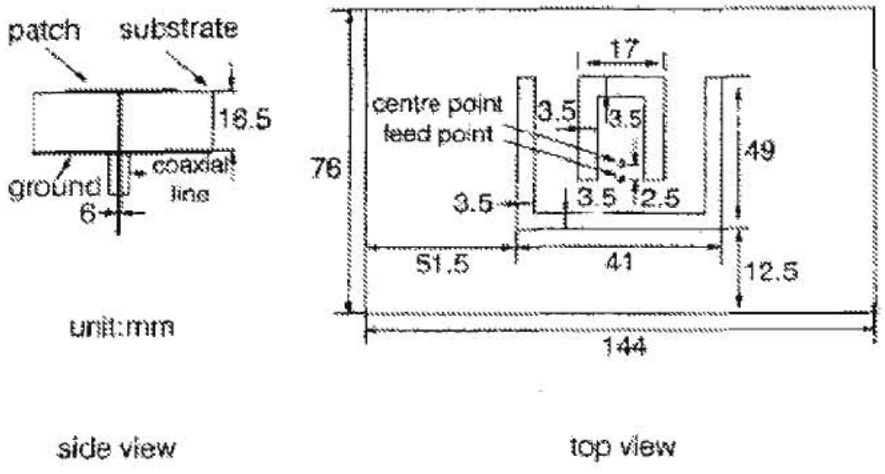
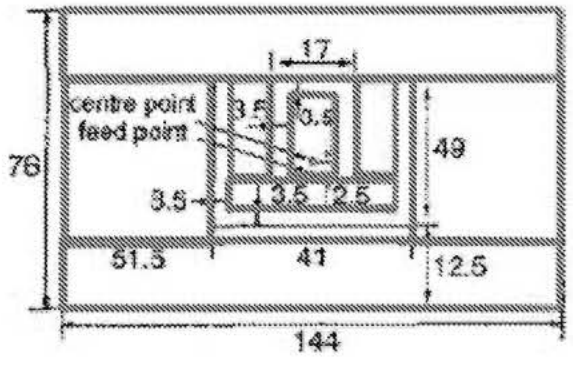


Figure 1 of Guo

a conductive radiating element including at least one multilevel structure, said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements,

Guo discloses a conductive radiating element (*i.e.*, an antenna) including at least one multilevel structure. *See*, e.g., Fig. 1, Guo, shown below, and pg. 1805. Guo's structure of the antenna is comprised of a plurality of electromagnetically coupled geometric elements. Guo at Figure 1 and pg. 1805. For example, the Guo antenna comprises identifiable polygons as illustrated below. *See also e.g.*, OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Owner's Trial Demonstrative, at 35-39.

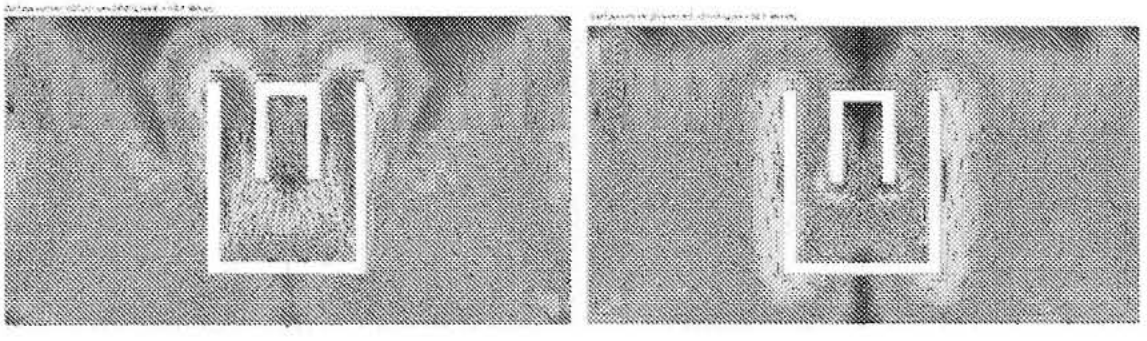


Guo annotated to show geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5-6. To the extent relevant, Guo also would not be excluded under the Patent

Owner's narrow claim interpretation of multilevel structure. Guo's multi-band behavior is not due to a grouping of single band antennas because Guo is a single antenna that resonates at multiple frequencies. *See* OTH-H, Declaration of Dr. Bodnar at ¶¶75 and 81. Nor does Guo contain any concentrated or integrated reactive elements that force the apparition of new frequencies. *See* OTH-H, Declaration of Dr. Bodnar at ¶76. The U-slots of Guo alter the resonant frequencies of the patch by altering the distance traveled by the current at certain frequencies rather than through the use of reactive elements. *Id.*

In addition, Guo 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 Guo, 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.

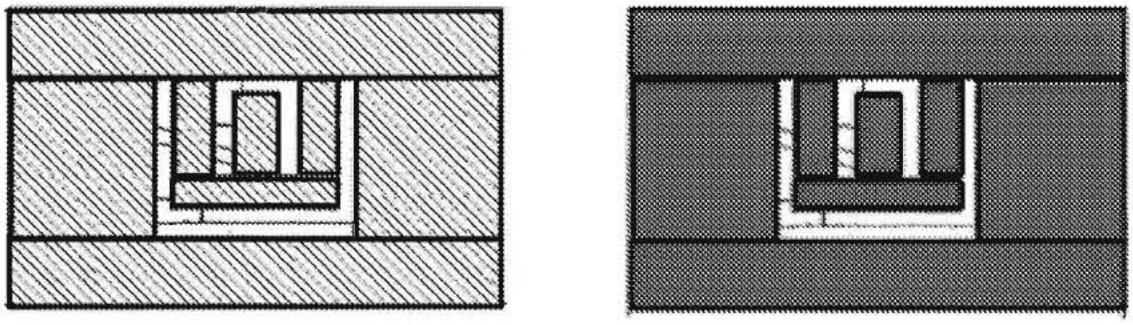


1.58 GHz **1.32 GHz**

OTH-H, Declaration of Dr. Bodnar at Exhibit B, pgs. 41 and 42

At a minimum, the below shaded portions are associated with the respective frequency bands using the Patent Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.

First Portion Associated with 1.58 GHz Second Portion Associated with 1.32 GHz



Portions associated with specified frequency bands

According to the Patent Owner, the operational function that the same geometric element is reused for more than one frequency band is required of a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013, at 12. Given that some of the same geometric elements are used for multiple frequency bands, Guo is a multilevel antenna under the broadest reasonable interpretation or even under the Patent Owner's narrow construction that requires the reuse of geometric elements.

said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band,

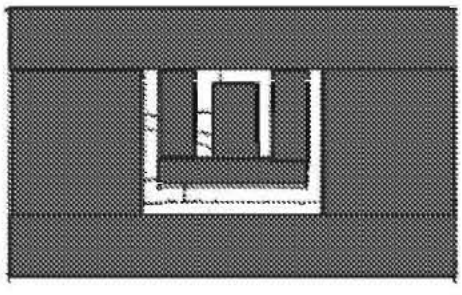
Guo discloses that certain portions of the antenna are associated with a selected frequency band. *See* Guo Figs 1-3 and pg. 1805. In particular, Figure 3 is a VSRW graph which depicts three dips between the two markers. These dips correspond to the three resonant frequency bands. *See* Figures 2, 3 and pgs. 1805-06 ("There are three dips in the VSWR curves [Figure 3] and three loops in the Smith chart [Figure 2].") Similarly, the antenna taught by Guo, which is modeled by Dr. Bodnar, resonates at three frequency bands. *See* OTH-H, Dr. Bodnar Declaration at ¶79. Each of these resonant frequency bands has an associated portion of the antenna responsible for the resonance. According to the Patent Owner, the scope of this limitation reads on portions of the antenna having a majority of current density above -20 dB. *See* e.g, OTH-G, Dr. Long's Expert Report at 52-55.

As seen in the previous figures, when the same analysis is performed on an antenna as taught by Guo, the results show that Guo teaches this limitation in accordance with even the Patent Owner's narrow construction of this claim. *See* OTH-H, Dr. Bodnar Declaration at ¶88 and Exhibit B.

said second portion being located substantially within the first portion,

Patent Owner argued that the scope of this claim covers at least when the second portion overlaps with the first portion, as depicted in the Patent Owner's infringement contentions. *See* OTH-B, Owner's Infringement Contentions at 3. When the same analysis is performed on the antenna taught by Guo, the results show that Guo teaches this limitation under the broadest reasonable construction or even under the Patent Owner's narrow construction.

Combination of first and second portions
(overlap indicated in brown)



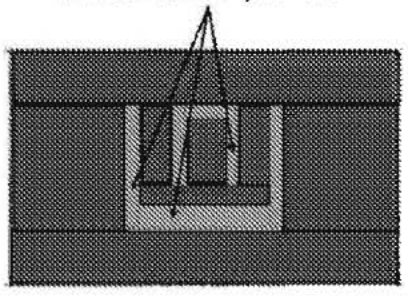
Guo

As seen in the above figures, active portions associated with the second frequency band overlaps active portions associated with the first frequency band.

said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion,

As can be seen from figure below, portions of the Guo antenna form empty spaces within the U-slots, which provide a circuitous current path. This is true even under the claim scope asserted by Patent Owner for infringement. *See* OTH-B, Owner's Infringement Contentions at 4.

Empty spaces defined by
first and second portions



Guo

Further, as discussed in the claim interpretation section, Patent Owner has previously construed circuitous current path to encompass two lines connected at an angle. *See* Patent Owner's Response to ACP filed January 3, 2012 in 95/001,482 at 11. Patent Owner later distanced itself from that construction but contends that straight lines connected at four angles (or bends) is within the claim scope without specifying how the specification of the '431 patent limits the number of bends. *See* Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 9-10.

As seen in the previous figures, the current path includes multiple angles, particularly where the current must travel around the bends of the U-slots. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 85, *see also* attached Exhibit B.

Thus, Guo teaches a "circuitous current path" based on the broadest reasonable interpretation of that term and also within the scope of the claim as alleged for infringement by the Patent Owner.

> **and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.**

Guo teaches that the radio electric behavior is substantially similar between the first and second frequency bands. Guo at pg. 1805-06. (noting that the VSWR is below 2.0 for all three bands and the radiation pattern is "stable" across all three bands).

Furthermore, when one of ordinary skill in the art models the antenna taught by Guo, the radio electric behavior can be measured including the radiation patterns and impedance. These radiation patterns of the modeled antenna would be considered substantially similar and omnidirectional at each frequency band to one of ordinary skill in the art. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 86. In addition, to one of ordinary skill in the art, the impedance for each frequency is substantially similar and all are under the VSWR 4.0 threshold that the Owner relies on to show similarity for infringement. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 88.

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

As shown above, claim 1 is rendered obvious by an antenna taught by Guo. Guo does not explicitly disclose including the antenna in a portable communications device, but doing so would have been obvious for a number of reasons. First, Guo discloses a small patch antenna with radio electric characteristics suitable for a portable communications device. *See* OTH-H, Declaration of Dr. Bodnar at ¶¶77 and 87. This would have certainly been small enough to fit inside a portable communications device at the time, such as a laptop computer.

Further, the size of the antenna is inversely proportional to the lowest resonant frequency. *Id.* at ¶89. Therefore, one of ordinary skill in the art understands that the antenna taught by Guo could easily be made even smaller to fit in smaller devices if higher resonant frequencies were desired. So long as the size reduction is proportional across all the physical dimensions, the current density, current path, impedance, and radiation patterns would all remain substantially unchanged. The only change is a proportional change to the resonant frequencies to higher frequencies. For example, one of ordinary skill in the art would know that reducing the size of all Guo's dimensions in half would double the resonant frequencies but otherwise the radio electric characteristics at the resonant frequencies would remain substantially unchanged (such as current density, radiation patterns, and impedance). *Id.* at ¶89.

13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.

As shown above, claim 12 is rendered obvious by an antenna taught by Guo. Additionally, one of ordinary skill in the art would look to use the multilevel antenna taught by Guo in a portable communications handset because of the small size of the antenna and the radio electric characteristics of the antenna are suited for a portable electronic device. *See* OTH-H, Declaration of Dr. Bodnar at ¶77. To the extent that Guo needs to be made smaller to fit in a handset, one of ordinary skill in the art would understand that the antenna disclosed in Guo would be reduced in size in order to communicate with wireless services at higher frequencies. *Id.*

14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.

As shown above, claim 13 is rendered obvious by an antenna taught by Guo. Guo also teaches that the resonant frequency bands are within the range of 1.24 GHz to 2 GHz. Guo at 1805 and Figure 3. In addition, the resonant frequencies measured by Dr. Bodnar for both the un-scaled and the scaled down version of Guo are within the claimed range. *See* OTH-H, Declaration of Dr. Bodnar at ¶81 and 89.

30. A multi-band antenna according to claim 1, wherein the antenna operates at three or more frequency bands and the antenna is shared by three or more cellular services.

As shown above, claim 1 is rendered obvious by an antenna taught by Guo. In addition, Guo discloses that the single antenna as illustrated in Figure 1 operates at three or more frequencies. Guo at 1806 and Figure 3. Similarly, the antenna taught by Guo, which is modeled by Dr. Bodnar, operates at more than three frequency bands and can be shared by three or more cellular services operating at those frequency bands. *See* OTH-H, Dr. Bodnar Declaration at ¶83.

F. CLAIMS 1 AND 12-14 ARE RENDERED OBVIOUS BY JOHNSON UNDER 35 U.S.C. § 103

Requester respectfully submits that Claims 1 and 12-14 of the '431 patent are rendered obvious by Johnson under 35 U.S.C. § 103. A claim chart applying Johnson is submitted herewith as Exhibit CC-F.

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 a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013 at 11. 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 Johnson in order to measure the current density, current path 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 Johnson operates.

Johnson teaches multiple antenna embodiments. This proposed rejection relies on the teachings for the structure and operation of the embodiment described with respect to Figure 9. Johnson 5:35-6:34 and Figures 1, 3 and 9; *see also* OTH-H, Declaration of Dr. Bodnar at ¶¶ 39-41.

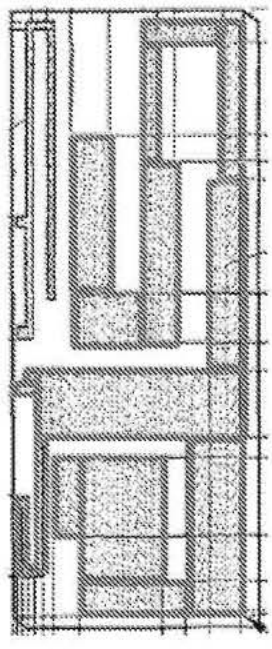
1. A multi-band antenna comprising:

Johnson discloses an exemplary embodiment wherein a "tri-band antenna" operates across "a cellular frequency 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. Thus at a minimum, conductive trace 40 is a multi-band antenna resonant at two frequency bands.

a conductive radiating element including at least one multilevel structure, said at least one multilevel structure comprising a plurality of electromagnetically coupled geometric elements,

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 Fig. 9 (reproduced below) and 5:36-39. Johnson discloses that the antenna embodiment at Figure 9 is comprised of numerous polygonal elements having four sides. *See* Johnson at 5:35-6:34.

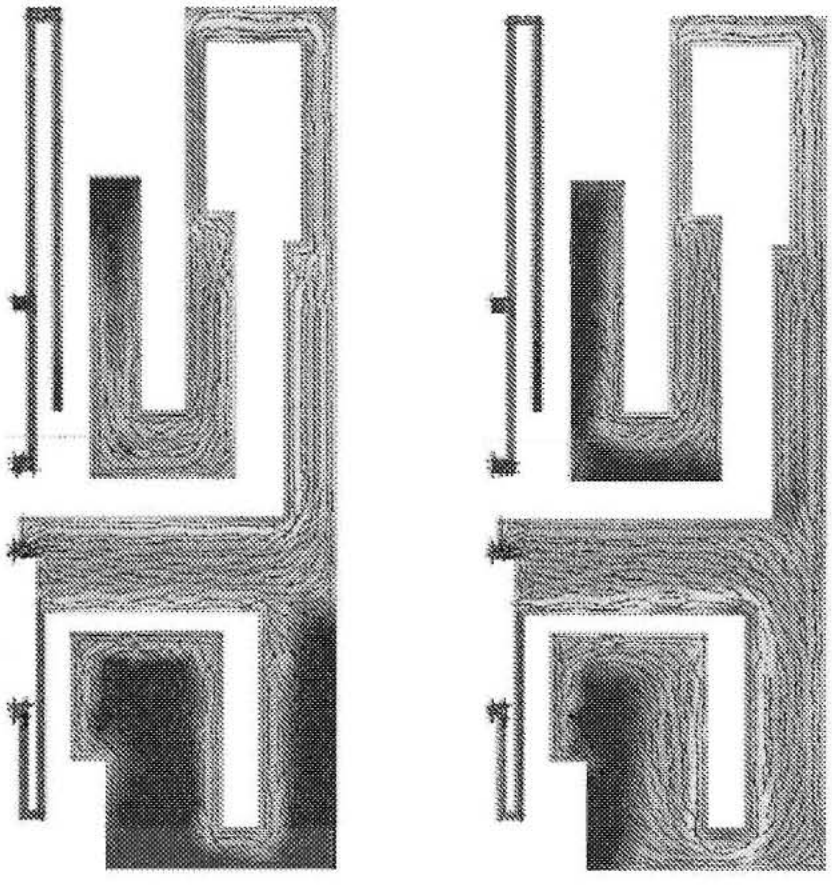
The Johnson antenna comprises identifiable polygons as illustrated below. *See also e.g* OTH-B, Owner's Infringement Contentions at 1 and OTH-C, Long Demo, at 35-39.



Johnson Figure 9 identifying geometric elements

This antenna structure is a multilevel structure because it meets all the structural requirements of a multilevel structure under the broadest reasonable interpretation. *See* Right of Appeal Notice of co-pending reexamination of the '431 patent, cntrl. #95/001,482, mailed August 9, 2012 at 5-6. To the extent relevant, Johnson also would not be excluded under the Patent 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. *See* OTH-H, 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.

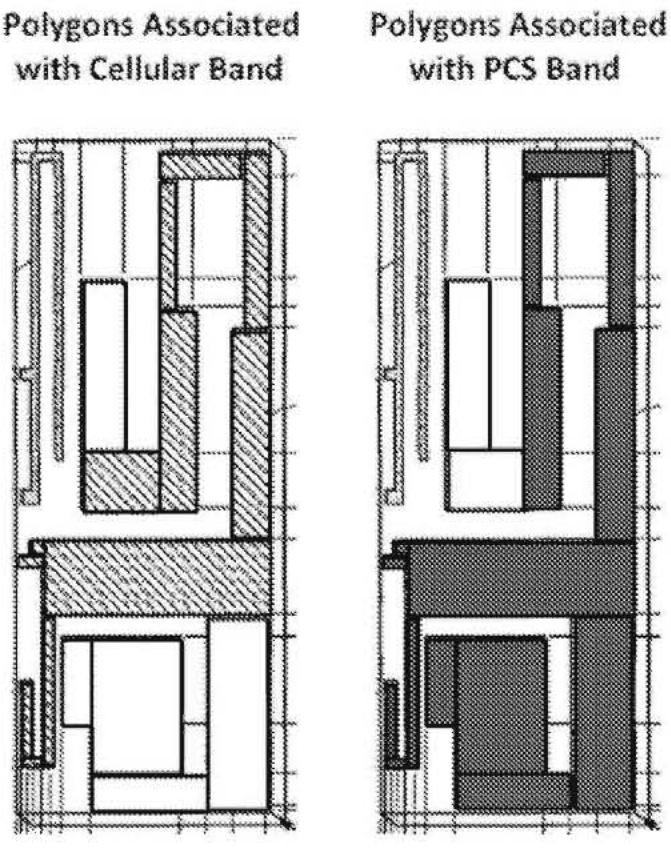
In addition, Johnson also teaches the operational function that the same antenna portion is reused at multiple frequencies, which is asserted as a necessary feature of a multilevel structure by Patent Owner. When one of ordinary skill in the art models the antenna taught by Johnson, the current density 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**

OTH-H, Declaration of Dr. Bodnar at Exhibit B, pgs. 16 and 17

At a minimum, the below shaded portions are associated with the respective frequency bands using the Patent Owner's interpretation of claim scope. *See* OTH-C, Owner's Trial Demonstrative at 54-55.



Polygons of Johnson Figure 9 associated with frequency bands

According to the Patent Owner, the operational function that the same geometric element is reused for more than one frequency band is required of a multilevel structure. *See* Patent Owner Appeal Brief to the '1482 Reexamination, filed February 22, 2013, at 11. Given that some of the same geometric elements are used for at least different frequency bands, Johnson is a multilevel antenna under the broadest reasonable interpretation or even under the Patent Owner's narrow construction that requires the reuse of geometric elements.

said plurality of geometric elements including at least two portions, a first portion being associated with a first selected frequency band and a second portion being associated with a second selected frequency band,

Johnson discloses that the single antenna illustrated in Figure 1 is resonant at two frequency bands. Johnson at 5:36-39. Similarly, the antenna taught by Johnson, which is modeled by Dr. Bodnar, resonates at two frequency bands. *See* OTH-H, Dr. Bodnar Declaration at ¶43. Each of these resonant frequency bands has an associated portion of the antenna responsible for the resonance. According to the Patent Owner, the scope of this limitation reads

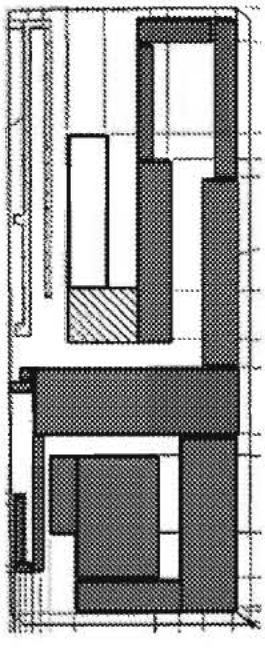
on portions of the antenna having a majority of current density above -20 dB. *See* e.g, OTH-G, Dr. Long's Expert Report at 52-55.

As seen in the previous figures, when the same analysis is performed on an antenna as taught by Johnson, the results show that Johnson teaches this limitation in accordance with even the Patent Owner's narrow construction of this claim. *See* OTH-H, Dr. Bodnar Declaration at ¶45 and Exhibit B.

said second portion being located substantially within the first portion,

Patent Owner argued that the scope of this claim covers at least when the second portion overlaps with the first portion, as depicted in Owner's infringement contentions. *See* OTH-B, Owner's Infringement Contentions at 3. When the same analysis is performed on the antenna taught by Johnson the results show that Johnson teaches this limitation under the broadest reasonable construction or even under the Owner's narrow construction

Combination of first and second portions
(overall indicated in brown)

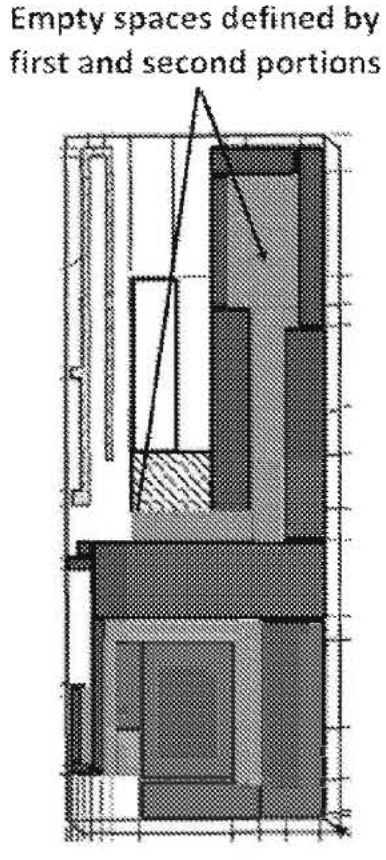


Johnson

As seen in the above figures, active portions associated with the second frequency band overlaps active portions associated with the first frequency band.

said first and second portions defining empty spaces in an overall structure of the conductive radiating element to provide a circuitous current path within the first portion and within the second portion,

As can be seen from figure below, portions of the Johnson antenna form empty spaces within the U-slots, which provide a circuitous current path. This is true even under the claim scope asserted by the Patent Owner for infringement. *See* OTH-B, Owner's Infringement Contentions at 4.



Johnson

Further, as discussed in the claim interpretation section, the Patent Owner has previously construed circuitous current path to encompass two lines connected at an angle. *See* Patent Owner's Response to ACP filed January 3, 2012 in 95/001,482 at 11. Patent Owner later distanced itself from that construction but contends that straight lines connected at four angles (or bends) is within the claim scope without specifying how the specification of the '431 patent limits the number of bends. *See* Patent Owner Rebuttal Brief to the '1482 Reexamination, filed August 16, 2013 at 9-10.

As seen in the previous figures, the current path includes more than four angles as the current must travel around more than four corners in the active portions associated with each frequency band. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 46 and Exhibit B.

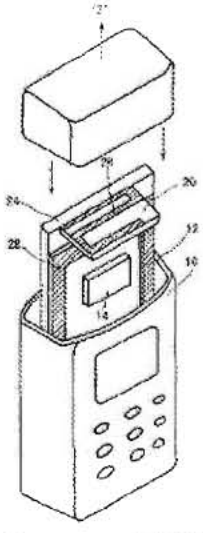
Thus, Johnson teaches a "circuitous current path" based on the broadest reasonable interpretation of that term and also within the scope of the claim as alleged for infringement by Patent Owner.

> **and the current within said first portion providing said first selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said second selected frequency band and the current within the second portion providing said second selected frequency band with radio electric behavior substantially similar to the radio electric behavior of said first selected frequency band.**

Johnson teaches that the radio electric behavior is substantially similar between the first and second frequency bands. To the extent it is viewed that Johnson does not expressly provide measurements of impedance or radiation patterns, one of ordinary skill in the art can measure those characteristics based on Johnson's teachings of the antenna structure. *See* OTH-H, Declaration of Dr. Bodnar at ¶¶ 43. 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 ¶¶ 45-48. These radiation patterns of the modeled antenna would be considered substantially similar and omnidirectional at each frequency band to one of ordinary skill in the art. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 49. In addition, to one of ordinary skill in the art, the impedance for each frequency is substantially similar and all are under the VSWR 4.0 threshold that the Owner's relies on to show similarity for infringement. *See* OTH-H, Declaration of Dr. Bodnar at ¶ 48.

> **12. The multi-band antenna set forth in claim 1, wherein said antenna is included in a portable communications device.**

As shown above, claim 1 is rendered obvious by an antenna taught by Johnson. 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* OTH-H, 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 taught that can be included in a portable communications device.

13. The multi-band antenna set forth in claim 12, wherein said portable communication device is a handset.

As shown above, claim 12 is rendered obvious by an antenna taught by Johnson. As discussed with respect to claim 11, 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 OTH-H, Declaration of Dr. Bodnar at ¶ 37.

14. The multi-band antenna set forth in claim 13, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 800 MHz-3600 MHz frequency range.

As shown above, claim 13 is rendered obvious by an antenna taught by Johnson. 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* OTH-H, 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.

CONCLUSION

The prior art documents presented in the above Request were either not previously considered by the Office or are now being presented in a new light pursuant to MPEP § 2242(II). Claims 1, 12-14, and 30 of the '431 patent are not patentable over the prior art documents cited herein. The prior art documents teach the subject matter of the '431 patent in a manner such that substantial new questions of patentability for all claims are raised by this Request.

In view of the foregoing, it is respectfully submitted that substantial new questions of patentability of Claims 1, 12-14, and 30 of the '431 patent have been raised by this Request. Accordingly, the Office is requested to grant this Request and to initiate reexamination with special dispatch.

As an aid to the application of the presented prior art to claims of the '431 patent, corresponding claim charts are provided at Exhibit CC-A through CC-F attached hereto.

Please charge any required fees to the Novak Druce Deposit Account No. 14-1437.

Respectfully submitted,

/James Murphy/
Novak Druce Connolly Bove + Quigg LLP
James Murphy
Reg. No. 55,474

NOVAK DRUCE CONNOLLY BOVE +
QUIGG LLP
1000 Louisiana Street
53rd Floor
Houston, Texas 77002
P: 713-571-3400
F: 713-456-2836