IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Inventors: Baliarda et al. Patent No.: 7,015,868 Filed: October 12, 2004 For: Multilevel Antennae	REQUEST FOR REEXAMINATION UNDER 35 U.S.C. §§ 311 *ET SEQ.*, AND 37 C.F.R. §§ 1.913 AND 1.915

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

REQUEST FOR *INTER PARTES* REEXAMINATION OF U.S. PATENT 7,015,868

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TABLE OF EXHIBITS

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. 5,926,139 to Korisch issued on July 20, 1999 ("Korisch")
PA-B	U.K. Patent No. 2317994 to Kitchener issued on February 28, 2001 ("Kitchener")
PA-C	U.S. Patent No. 6,140,975 to Cohen issued on October 31, 2000 ("Cohen")

B. RELEVANT PATENT MATERIALS (PAT)

PAT-A	U.S. Patent No. 7,015,868 ("the '868 patent")

C. CLAIM CHARTS (CC)

CC-A	Claim Chart comparing Claims 1, 3, 6, 14, 23, 26, and 32-35 of the '868 patent to the disclosure of Korisch
CC-B	Claim Chart comparing Claim 12 of the '868 patent to the disclosure of Korisch in view of Kitchener
CC-C	Claim Chart comparing Claim 1, 3, 6, 12, 23, and 32-35 of the '868 patent to the disclosure of Kitchener
CC-D	Claim Chart comparing Claims 14 and 26 of the '868 patent to the disclosure of Kitchener in view of Korisch
CC-E	Claim Chart comparing Claim 1, 3, 6, 12, 14, 23, and 32-35 of the '868 patent to the disclosure of Cohen
CC-F	Claim Chart comparing Claim 12 of the '868 patent to the disclosure of Cohen in view of Kitchener
CC-G	Claim Chart comparing Claims 14 and 26 of the '868 patent to the disclosure of Cohen in view of Korisch

D. OTHER DOCUMENTS (OTH)

OTH-A	Second Amended Complaint filed December 8, 2009 in the case of *Fractus S.A. v. Samsung Electronics Co. Ltd. et al.,* Case No. 6:09cv203 (E.D. Tex.)

OTH-B	Preliminary Infringement Contentions for the '868 patent in the case of *Fractus S.A. v. Samsung Electronics Co. Ltd. Et al.,* Case No. 6:09cv203 (E.D. Tex.)[1]

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

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REQUEST FOR *INTER PARTES* REEXAMINATION OF U.S. PATENT 7,015,868

Dear Sir:

Pursuant to 37 C.F.R. § 1.915(b)(8), the Real Party in Interest, Samsung Electronics Co. Ltd. (hereinafter "Requester") hereby respectfully requests reexamination pursuant to 35 U.S.C. §§ 311 *et seq.* and 37 C.F.R. § 1.902 *et seq.*, of Original Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of U.S. Patent No. 7,015,868 ("the '868 patent") filed October 12, 2004 and issued March 21, 2006 to Baliarda, *et al. See* Exhibit PAT-A.

I. STATEMENT UNDER 37 C.F.R. § 1.915(B)(3) OF EACH SUBSTANTIAL NEW QUESTION OF PATENTABILITY

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 '868 patent under 35 U.S.C. § 102 and 35 U.S.C. § 103.

Pursuant to 37 C.F.R. § 1.915(b)(8), Requester hereby respectfully requests reexamination pursuant to 35 U.S.C. §§ 311 *et seq.* and 37 C.F.R. § 1.902 *et. seq.*, of Original Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the '868 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 '868 patent is enforceable.[2] By asserting the SNQs herein, Requester specifically asserts that Original Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the '868 patent are in fact not patentable.

Accordingly, the U.S. Patent and Trademark Office ("the Office") should reexamine and find Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the '868 patent unpatentable and cancel these claims, rendering them null, void, and otherwise unenforceable.

II. REQUIREMENTS FOR *INTER PARTES* REEXAMINATION UNDER 37 C.F.R. § 1.915

Requester satisfies each requirement for *Inter Partes* reexamination of the '868 patent pursuant to 37 C.F.R. § 1.915. A full copy of the '868 patent is submitted herein as Exhibit PAT-A in accordance with 37 C.F.R. § 1.915(b)(5).

Pursuant to 37 C.F.R. § 1.915(b)(7), Requester certifies that the estoppel provisions of 37 C.F.R. § 1.907 do not prohibit the filing of this *Inter Partes* reexamination.

Pursuant to 37 C.F.R. §1.915(b)(4), a copy of every patent or printed publication relied upon to present an SNQ is submitted herein at Exhibits PA-A through PA-C, citation of which may be found on the accompanying Form PTO-SB/08A as Exhibit PTO-SB/08A in accordance with 37 C.F.R. § 1.915(b)(2). Each of the cited prior art publications constitute effective prior art as to the claims of the '868 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 '868 patent or is being presented in a new light under MPEP § 2642 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

[2] As alleged by Patent Owner in the below defined Underlying Litigation, and as required by 37 C.F.R. § 1.913, the '868 patent is still within its period of enforceability for reexamination purposes, to the extent that the '868 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.

publications to Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the ‘868 patent, is presented below and in attached claim charts in accordance with 37 C.F.R. § 1.915 (b)(3).

A copy of this request has been served in its entirety on the patent owner in accordance with 37 C.F.R. § 1.915(b)(6) at the following address:

HOWISON & ARNOTT, L.L.P
P.O. BOX 741715
DALLAS TX 75374-1715

In accordance with 37 C.F.R. § 1.915(a), a credit card authorization to cover the Fee for reexamination of $8,800.00 is attached. If this authorization is missing or defective, please charge the Fee to the Novak Druce and Quigg Deposit Account No. 14-1437.

III. OVERVIEW OF THE ‘868 PATENT AND PROSECUTION HISTORY

A. INTRODUCTION

The ‘868 patent is directed to a multilevel antenna structure formed by a set of similar geometric elements. ‘868 patent at Abstract. In particular, a multilevel antenna may operate at several frequency bands simultaneously and purportedly result in a size reduction when compared to a conventional antenna. ‘868 patent at Col. 6, lines 19-34. The ‘868 patent, in its specification, describes that “fractal or multifractal type antenna” exhibit a multifrequency behavior and in certain cases can be done in a “small size.” ‘868 patent at Col. 1, lines 13-19. Patent Owner admits that the prior art discloses fractal antennae (“Spanish Patent number 9,501,019”) and multitriangular antennae (“Spanish Patent number 9,800,954”) which operate in multiple frequency bands simultaneously. ‘868 patent at Col. 1, lines 36-41. Furthermore, the Patent Owner suggests that the problem with those antennae was of a “practical nature which limit the behaviour of said antennae and reduce their applicability in real environments.” ‘868 patent at Col. 1, lines 42-46. The Patent Owner has not shown, in any form, how its alleged invention is novel over the antennae of the prior art. Accordingly, as will be set forth in detail below, claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the ‘868 patent are not patentable, and should be rejected in view of the proposed SNQs raised in this Request, rendering these claims, null, void, and otherwise unenforceable.

1. THE ‘868 PATENT APPLICATION PROSECUTION HISTORY

On October 12, 2004, the Patent Owner filed Application No. 10/963,080 (“the ‘080 Application”) which is a continuation of Application No. 10/102,568 (“the ‘568 Application”).

In its filing, the Patent Owner pursued claims 1-38 with claim 1 being the only independent claim. A Preliminary Amendment was filed on December 8, 2004 amending claim 1. Specifically, claim 1 was amended as follows:

> 1. (Currently Amended) ~~An~~ <u>A multi-band</u> antenna including at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements heaving the same number of sides or faces, wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling, wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements, and wherein not all the polygonal or polyhedral elements have the same size <u>and the perimeter of the multilevel structure has a different number of sides than the polygons that compose it</u>.

A Non-Final Office Action issued on June 15, 2005 ("Office Action"). In the Office Action, *inter alia,* claims 1 and 18 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, claim 1 was rejected for the use of the term "it" and claim 18 was rejected because "the ground plane" lacked proper antecedent basis. Claims 1-7, 13, 14, 18, 21-27, and 29 were rejected as being anticipated by WO publication (WO 01/82410) to Puente Baliarda ("Puente Baliarda") which was assigned to Fractus, S.A. (the same assignee as the '868 Patent). Claims 8-12, 15 and 16 were rejected as being unpatentable over Puente Baliarda in view of U.S. Patent 6,650,294 to Ying *et al.* ("Ying"). Claims 17 and 32-38 were rejected as being unpatentable over Puente Baliarda in view of U.S. Patent 6,476,766 to Cohen ("Cohen"). Claims 19, 20, 28, 30, and 31 were indicated as being allowable if rewritten to overcome the 35 U.S.C. § 112, second paragraph, rejection, in independent form and including any intervening claims.

A Response to the Non-Final Office Action was filed on August 18, 2005 ("Response"). In the Response, claim 1 was amended as follows:

> 1. (Currently Amended) An antenna including at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements heaving the same number of sides or faces, wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling, wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements, and wherein

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

In the Response, the Patent Owner argued that the '080 Application was a continuation of the '568 Application which is a further continuation of PCT Application PCT/ES99/00296 ("the PCT Application") having a filing date of September 20, 1999. The Patent Owner argued that Puente Baliarda was not prior art. A telephonic Examiner Interview was conducted on August 24, 2005. A Notice of Allowance issued on September 1, 2005 along with an Examiner Amendment. In the Examiner Amendment, claim 1 was amended to recite "A multi-band antenna," claim 2 was canceled, and claims 24, 27, 33, and 38 were amended to revise the claim dependency. Claim 1 was indicated as allowable because:

> Claim 1 is allowable over the art of record because the prior art does not teach the region or area of contact between the polygonal or polyhedral elements is less than 50% of the perimeter or area of the elements, and wherein not all the polygonal or polyhedral elements have the same size and the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure, and in combination with the remaining claimed limitations.

Notice of Allowance, p. 3. The '868 patent issued on March 21, 2006. On September 5, 2006, a petition was granted to replace "heaving" in claim 1 with "having" by way of a Certificate of Correction. On June 26, 2007, a petition was granted to add a claim of priority under 35 U.S.C. §§ 120 and 365(c) for the benefit of priority to the prior-filed PCT Application (PCT/ES99/00296), by way of a Certificate of Correction.

2. Overview of the Claims

The '868 patent contains one independent claim. Independent Claim 1 reads as follows:

> 1. A multi-band antenna including at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements having the same number of sides or faces, wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling, wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements, and wherein not all the polygonal or polyhedral elements have the same size and the perimeter of the

multilevel structure has a different number of sides than the polygons that compose the multilevel structure.

Dependent claims 3, 6, 12, 14, 23, 26, and 32-35 read as follows:

3. The antenna according to claim 1, wherein not all the regions or areas of contact between said polygonal or polyhedral elements have the same size.

6. The antenna according to claim 1, wherein said at least one multilevel structure is formed by polygons of a single type, selected from the group consisting of four-sided polygons, pentagons, hexagons, heptagons, octagons, decagons, and dodecagons.

12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.

14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.

23. The antenna according to claim 1, wherein said antenna is being shared by several communication services or systems.

26. The antenna according to claim 1, wherein said antenna includes an interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for impedances, filters or diplexers.

32. The antenna according to any one of claims 1, 5, 13, 15, or 16 wherein said antenna is included in a portable communications device.

33. The antenna according to claim 32, wherein said portable communications device is a handset.

34. The antenna according to claim 33, 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.

35. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 890 MHz-3600 MHz frequency range.

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

The ‘868 patent is presently the subject of *Fractus S.A. v. Samsung Electronics Co. Ltd. et al.,* Case No. 6:09cv203 (E.D. Tex.) (“the Underlying Litigation”). *See* 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.

Further, pursuant to the policy of the Office concerning revised reexamination procedures to provide for a scheduling-type order of expected substantive action dates in Requests ordered after the Office's 2005 fiscal year, Requester respectfully seeks such a scheduling order upon the granting of this Request.

C. 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 ‘868 patent. *See* OTH-B, Patents Owner’s Infringement Contentions. 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. Furthermore, each term of the claims in the ‘868 patent is to be given its “broadest reasonable construction” consistent with the specification. MPEP § 2111; *In re Swanson*, No. 07-1534 (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)).

Although the District Court has yet to rule on the scope of these claim limitations, the Federal Circuit noted in *Trans Texas* that the Office has traditionally applied a broader standard than a Court does when interpreting claim scope. MPEP § 2111. The Office applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997). The rationale underlying the “broadest reasonable construction” standard is that it reduces the possibility that a claim, after issue or certificate of reexamination, will be interpreted more broadly than is justified. 37 C.F.R § 1.555(b); MPEP § 2111.

Because the standards of claim interpretation used in the courts in patent litigation are different from the claim interpretation standards used in the Office in claim examination proceedings (including reexamination), any claim interpretations submitted herein for the purpose of demonstrating an SNQ are neither binding upon Requester in any litigation related to the '868 patent; nor do such claim interpretations necessarily correspond to the construction of claims under the legal standards that are mandated to be used by the Courts in patent litigation. *See* 35 U.S.C. § 314; *See also* MPEP § 2686.04 II (determination of an SNQ is made independently of a court's decision on validity because of different standards of proof and claim interpretation employed by the District Courts and the Office); *See also Trans Texas Holding*, 498 F.3d at 1297-98; *In re Zletz*, 893 F.2d 319, 322, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

The interpretation and/or construction of the claims in the '868 patent presented either implicitly or explicitly herein should not be viewed as constituting, in whole or in part, Requester's own interpretation and/or construction of such claims, but instead should be viewed as constituting an interpretation and/or construction of such claims as may be raised by the Patent Owner's infringement contentions. Requester urges the Office to follow the Patent Owner's infringement contentions for purposes of the reexamination because such contentions constitute an admission by the Patent Owner. 37 CFR 1.104(c)(3), MPEP § 2617(III). In fact, Requester expressly reserves the right to present its own interpretation of such claims at a later time, which interpretation may differ, in whole or in part, from that presented herein.

D. Patent Owner's Infringement Contentions

The Requester has considered the specification of the '868 patent for determining the scope of the claim elements, however, where the specification is unclear or does not provide sufficient claim support, the Requester identifies excerpts of Patent Owner's Infringement Contentions to demonstrate Patent Owner's broad construction of the claim elements. *See* OTH-B. The Patent Owner's interpretation of the claims are quite broad and the Patent Owner reads the claims to cover antennas that are not described, or even similar to antennas described, in the specification of the '868 patent. The Requester does not agree with the Patent Owner's claim interpretation and/or claim construction as applied by Patent Owner and shown in the Patent

Owner's infringement contentions, but the Requester requests that the Office follow the Patent Owner's infringement contentions for purposes of the reexamination because such contentions constitute an admission by the Patent Owner. 37 CFR 1.104(c)(3), MPEP § 2617(III).

As seen in the infringement contentions, the Patent Owner's application of some of the claim language to product details appears arbitrary and no explanation is given. For instance, the Patent Owner has drawn its own subjectively-determined lines on antennas in order to divide a single metal strip into "polygonal elements"[3]. In other instances, the Patent Owner draws an arrow from certain claim elements to parts of the accused device without providing any rationale how the part of the accused device pointed to would read on the claim element. Additionally, in some instances, as discussed in further detail in this Request, the specification of the '868 patent does not provide a clear definition of the elements of the claims. As a result, the Requester is relying on the Patent Owner's Infringement Contentions to attempt to interpret the elements.

Although the Requester does not agree with the Patent Owner's infringement allegations, Requester nonetheless supplies excerpts of the infringement contentions to provide the Examiner with examples of how the Patent Owner views its own claims. Please note that the Requester expressly reserves the right to present its own interpretation of such claims at a later time, which interpretation may differ, in whole or in part, from that presented herein.

IV. SUBSTANTIAL NEW QUESTIONS OF PATENTABILITY UNDER 37 CFR § 1.915 (B)

Section IV presents a summary of both the prior art and its application in the SNQs, and Section V, below, presents a more detailed application of the prior art while also explicitly laying out the reasons why a person of skill in the art would make the proposed combination.

A. KORISCH RAISES AN SNQ WITH RESPECT TO CLAIMS 1, 3, 6, 14, 23, 26, AND 32-35 OF THE '868 PATENT

Korisch was filed in July 1997 making it prior art under 35 U.S.C. § 102. Korisch was not cited in the '868 patent and is not cumulative to any prior art previously considered. Specifically, during examination, the Examiner asserted that:

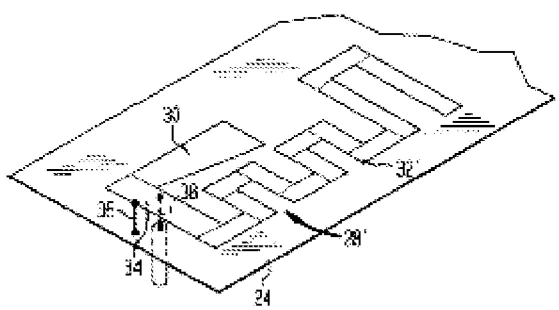
[3] In the Infringement Contentions, the Patent Owner has also improperly unfolded and flattened the accused three-dimensional antennas into a two-dimensional representation.

Claim 1 is allowable over the art of record because the prior art does not teach the region or area of contact between the polygonal or polyhedral elements is less than 50% of the perimeter or area of the elements, and wherein not all the polygonal or polyhedral elements have the same size and the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure, and in combination with the remaining claimed limitations.

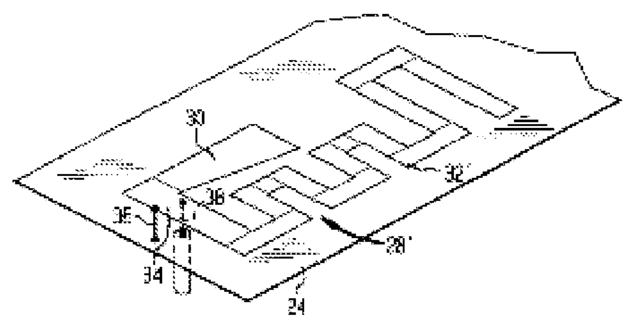
Because Korisch discloses the above technical feature, along with each element of claims 1, 3, 6, 12, 14, 23, 26, and 32-35, an Examiner would consider Korisch important in deciding the patentability of the ‘868 patent.

Specifically, Korisch discloses a multi-band antenna having at least one multilevel structure (*i.e.*, unitary second layer 28 of Figure 3 and/or 28’ of Figure 4 which are annotated by the Requester to show four-sided polygonal elements as shown below in Examples A-C) wherein the multilevel structure comprises a set of polygonal elements (*i.e.*, four-sided polygons) having the same number of sides (*i.e.*, four sides). Korisch at Col. 1, lines 6-9 and Col. 2, lines 46-53.

Example A:

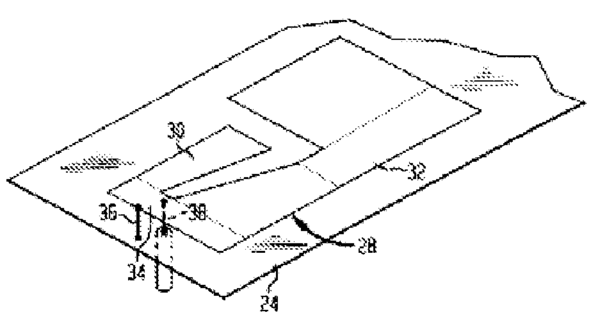


Example B:



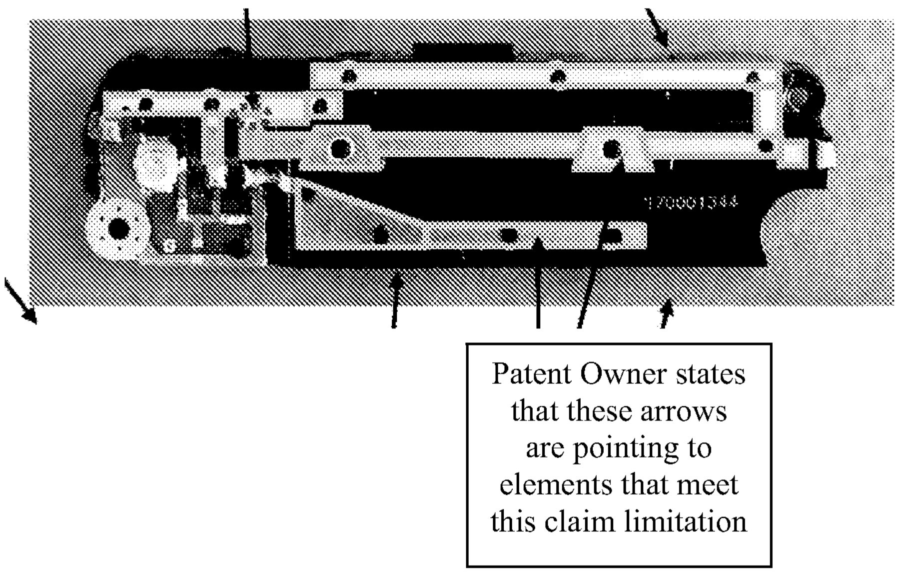
Example C:

FIG. 3



As shown above, for at least 75% of the polygonal elements, the contact areas between the polygonal elements is less than 50% of the perimeter of the polygonal elements. Specifically, the contact areas are typically on the shorter sides and/or do not extend the length of the longer side of the four-sided polygonal elements.

While the specification of the '868 patent does not provide a clear definition of the elements of this claim,[4] the Patent Owner has provided Infringement Contentions that will be used to interpret this clause, since the Infringement Contentions are presumably within the broadest reasonable interpretation, at least from the Patent Owner's viewpoint.



Infringement Contentions for the Samsung Instinct M800 at p. 2 (annotated by Patent Owner to show four-sided polygons)

With this being the guidance offered by the Patent Owner as to the meaning of this claim limitation, apparently all that is required is a random assortment of same-sided polygons; in the Infringement Contentions it is a group of various shaped four-sided polygons subjectively superimposed on to the antenna. Therefore, Korisch discloses all the limitations as defined by the Patent Owner. Specifically, Examples A-C shown above, disclose this. As shown, there is a multilevel structure having an overall shape of more than four sides that is composed of various four-sided polygons. Korisch at Figure 4 (as annotated by Requester and shown above).

[4] *See* Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 1569 (Fed. Cir. 1988) (holding that the prior-art reference "is at least at the same level of technical detail as the disclosure in the '491 patent [the patent-in-suit]" and if more detail "is essential for an anticipating reference, then the disclosure in the '491 patent would fail to satisfy the enablement requirement of 35 U.S.C.").

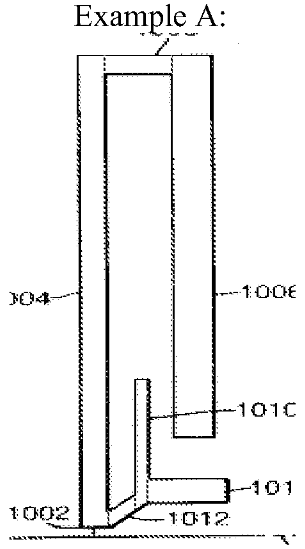
In addition, Korisch discloses the polygonal elements are electromagnetically coupled to another element through at least one point of contact. For example, portion 34 of the multilevel structure is coupled to portion 30 of the multilevel structure along the red line annotated by Requester as shown in Examples A-C (as annotated by Requester). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 19. Not all of the polygonal elements are the same size as shown above in Examples A-C (as annotated by the Requester). Furthermore, the perimeter of the multilevel structure has a different number of sides (*i.e.*, Examples A and B have thirty perimeter sides and Example C has eleven perimeter sides) than each polygonal element comprising four-sided polygons.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Korisch raises an SNQ with respect to claims 1, 3, 6, 14, 23, 26, and 32-35 of the '868 patent since Korisch teaches the technical feature of the '868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 3, 6, 14, 23, 26, and 32-35 of the '868 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

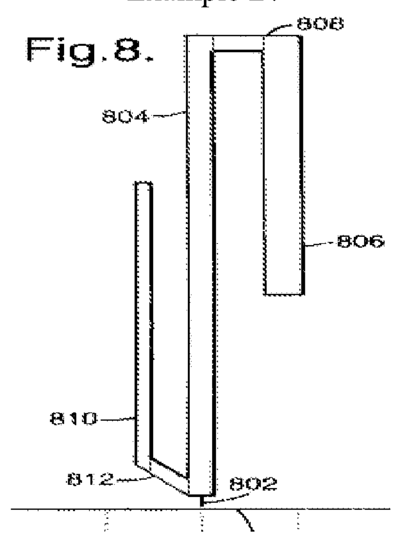
B. KORISCH IN VIEW OF KITCHENER RAISES AN SNQ WITH RESPECT TO CLAIM 12 OF THE '868 PATENT

Korisch was filed in July 1997 making it prior art under U.S.C. § 102. Likewise, Kitchener was published in August 1998 making it prior art under 35 U.S.C. § 102. Neither Korisch nor Kitchener was cited in the '868 patent and neither is cumulative to any prior art previously considered. Moreover, the combination of these references teaches the elements of claim 12, thus an Examiner would consider the combination of Korisch and Kitchener important in deciding the patentability of the '868 patent. Specifically, Korisch teaches the elements of claim 1. To the extent that Korisch does not disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12, in the alternative Korisch in view of Kitchener teaches an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12. Kitchener discloses at least one multilevel structure mounted in a monopole configuration. Specifically, Kitchener recites "Figure 5 shows a three dimensional dual resonant monopole." Kitchener at p. 5, line 14. Kitchener further recites that "The first embodiment [of Figure 5] is a two dimensional equivalent of the three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 3-5. The antennae illustrated in Figures 8 and 10 are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Kitchener at p. 7, lines 13-28. Specifically, Kitchener recites “Figure 8 is an alternative to this design [Figure 6] that there are no third and fifth arms and that second arm 806 is parallel with the first member 804....Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found improving matching.” Kitchener at p. 7, lines 21-28. *See also* Kitchener, Figures 8 and 10.

Example A:



Example B:



In view of the above, and the detailed application of the prior art against the claim presented below and the attached claim chart, Korisch in view of Kitchener raises an SNQ with respect to claim 12 of the ‘868 patent since Korisch in view of Kitchener teaches the technical feature of the ‘868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claim 12 of the ‘868 patent, cancel this claim, rendering it null, void, and otherwise unenforceable.

C. KITCHENER RAISES AN SNQ WITH RESPECT TO CLAIMS 1, 3, 6, 12, 23, AND 32-35 OF THE ‘868 PATENT

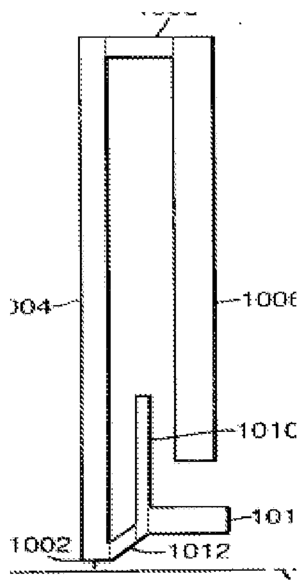
Kitchener was published in August 1998 making it prior art under 35 U.S.C. § 102. Kitchener was not cited in the ‘868 patent and is not cumulative to any prior art previously considered. Specifically, during examination, the Examiner asserted that:

> Claim 1 is allowable over the art of record because the prior art does not teach the region or area of contact between the polygonal or polyhedral elements is less than 50% of the perimeter or area of the elements, and wherein not all the

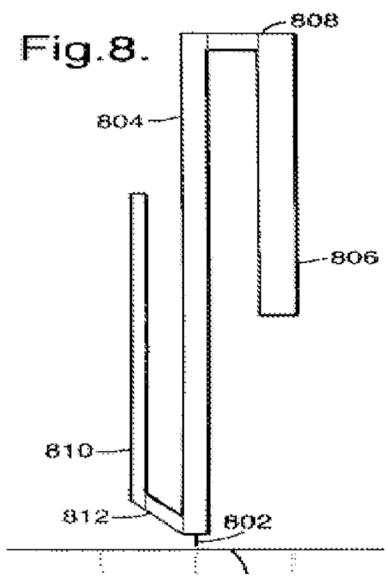
polygonal or polyhedral elements have the same size and the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure, and in combination with the remaining claimed limitations.

Because Kitchener discloses the elements cited in the reason for allowance, along with each element of claims 1, 3, 6, 12, 23, and 32-35, an Examiner would consider Kitchener important in deciding the patentability of the '868 patent. Specifically, Kitchener discloses a multi-band antenna having at least one multilevel structure (*i.e.*, the overall structures shown in figures 8, 10, and 20 and annotated by the Requester to show four-sided polygonal elements as shown below in Examples A-C) wherein the multilevel structure comprises a set of polygonal elements (*i.e.*, four-sided polygons) having the same number of sides (*i.e.*, four sides).

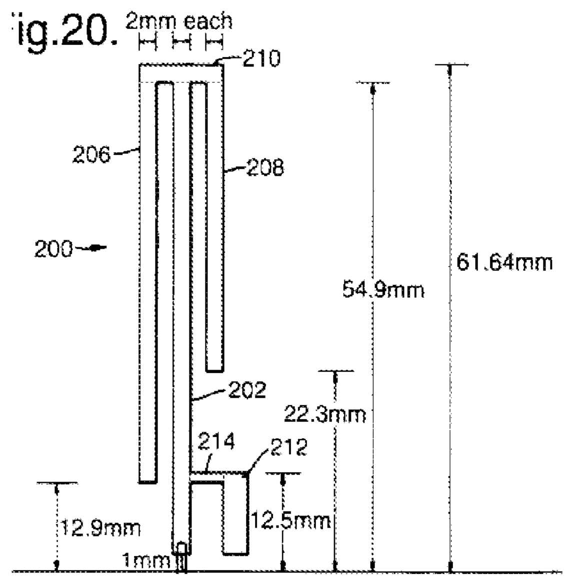
Example A:



Example B:

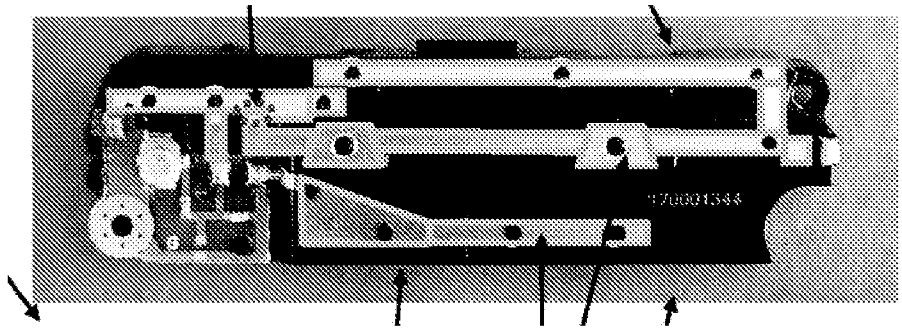


Example C:



As shown above, for at least 75% of the polygonal elements, the contact areas between the polygonal elements is less than 50% of the perimeter of the elements. Specifically, the contact areas are typically on one of the shorter sides and/or do not extend the length of the longer side of the four-sided polygonal elements.

While the specification of the '868 patent does not provide a clear definition of the elements of this claim, the Patent Owner has provided Infringement Contentions that will be used to interpret this clause, since the Infringement Contentions are presumably within the broadest reasonable interpretation, at least from the Patent Owner's viewpoint.



Patent Owner states that these arrows are pointing to elements that meet this claim limitation

Infringement Contentions for the Samsung Instinct M800 at p. 2 (annotated by the Patent Owner to show four-sided polygons)

With this being the guidance offered by the Patent Owner as to the meaning of this claim limitation, apparently all that is required is a random assortment of same-sided polygons; in the Infringement Contentions it is a group of various shaped four-sided polygons subjectively superimposed on to the antenna. Therefore, Kitchener discloses all the limitations as defined by the Patent Owner. Specifically, Examples A-C shown above, disclose this. As shown, there is a multilevel structure having an overall shape of more than four sides that is composed of various four-sided polygons. Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16. (as annotated by Requester and shown above).

In addition, Kitchener discloses the polygonal elements are electromagnetically coupled to another element through at least one point of contact. For example, portion 1012 is coupled to polygonal elements such as arms 1004 and 1010 along the red lines in annotated Figure 10, portion 812 is coupled to polygonal elements such as arms 810 and 802 along the red lines in annotated Figure 8, and central arm 202 is coupled to polygonal elements such as arms 210 and 214 along the red lines in annotated Figure 20. Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16. Not all of the polygonal elements are the same size as shown above in Examples A-C (as annotated by Requester). Furthermore, the perimeter of the multilevel structures have a different number of sides (*i.e.*, Example A has sixteen perimeter sides, Example B has thirteen perimeter sides, and Example C has eighteen perimeter sides) with each polygonal element comprising four-sided polygons.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Kitchener raises an SNQ with respect to claims 1, 3, 6, 12, 23, 26, and 32-35, of the ‘868 patent since Kitchener teaches the technical feature of the ‘868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 3, 6, 12, 23, 26, and 32-35 of the ‘868 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

D. Kitchener in view of Korisch Raises an SNQ with Respect to Claims 14 and 26 of the ‘868 Patent

Kitchener was published in August 1998 making it prior art under 35 U.S.C. § 102. Likewise, Korisch was filed in July 1997, also making it prior art under 35 U.S.C. § 102. Neither Kitchener nor Korisch was cited in the ‘868 patent and neither is cumulative to any prior art previously considered. Moreover, the combination of these references teaches the elements of claims 14 and 26, thus an Examiner would consider the combination of Kitchener and Korisch important in deciding the patentability of the ‘868 patent. Specifically, Kitchener teaches the elements of claim 1. To the extent that Kitchener does not disclose an antenna in a patch antenna configuration as recited in claim 14 and does not disclose an interconnection circuit as recited in claim 26, in the alternative Kitchener in view of Korisch teach an antenna in a patch antenna configuration as recited in claim 14 and teach an interconnection circuit as recited in claim 26. Korisch discloses an antenna in a patch configuration and having an interconnection circuit that links the antenna to an input/output connector, and used to match impedances of the antenna and the input/output connector. Korisch at Col. 2, line 54 – Col. 3, line 9; and Col. 3, lines 20-46.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Kitchener in view of Korisch raises an SNQ with respect to claims 14 and 26 of the ‘868 patent since Kitchener in view of Korisch teaches the technical feature of the ‘868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 14 and 26 of the ‘868 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

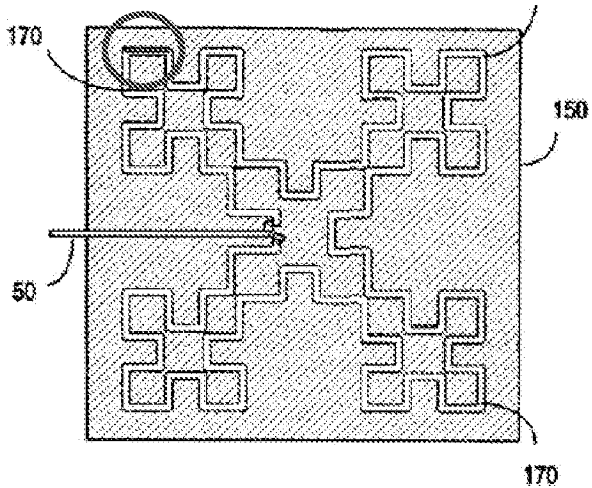
E. COHEN RAISES AN SNQ WITH RESPECT TO CLAIMS 1, 3, 6, 12, 14, 23, AND 32-35 OF THE '868 PATENT

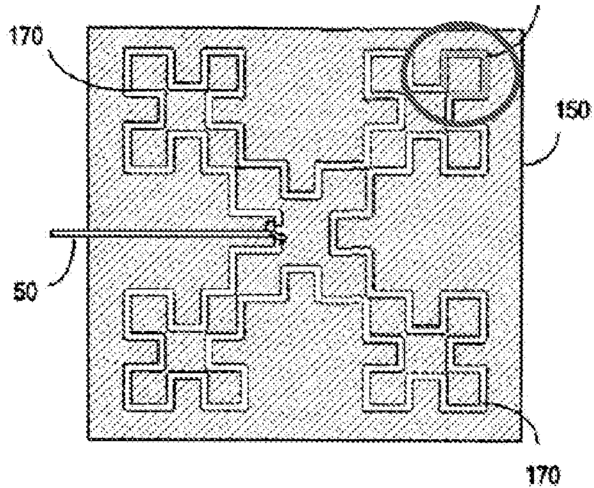
Cohen was filed November 7, 1997 and issued October 31, 2000 making it prior art under 35 U.S.C. § 102. Cohen was cited in the '868 patent and is not cumulative to any prior art previously considered. US Patent No. 6,476,766 ("the '766 patent"), with Cohen as the inventor, was cited as a secondary reference in an obviousness rejection during the prosecution of the '868 patent. However, the '766 patent does not claim any priority to Cohen and is in a separate patent family. In addition, Cohen is being presented in a new light since the Requester is interpreting the claims in view of the Patent Owner's infringement contentions, which were not before the Office during the prosecution of the '868 patent. During examination, the Examiner asserted that:

> Claim 1 is allowable over the art of record because the prior art does not teach the region or area of contact between the polygonal or polyhedral elements is less than 50% of the perimeter or area of the elements, and wherein not all the polygonal or polyhedral elements have the same size and the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure, and in combination with the remaining claimed limitations.

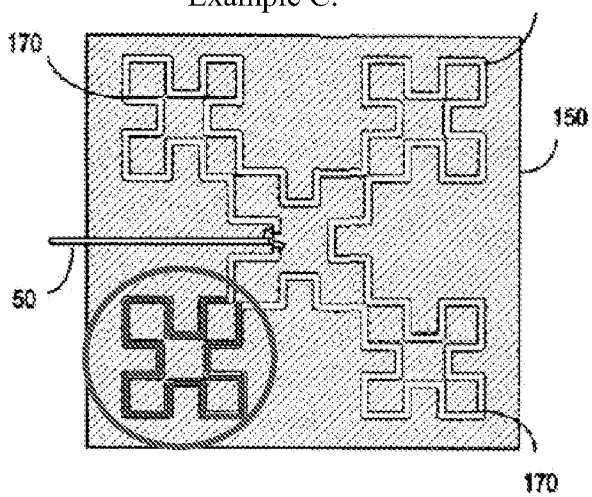
Because Cohen discloses the above technical feature, along with each element of claims 1, 3, 6, 12, 14, 23, and 32-35, an Examiner would consider Cohen important in deciding the patentability of the '868 patent. Specifically, Cohen discloses a multi-band antenna having at least one multilevel structure (*i.e.*, the conductive trace 170 of FIG. 7C-1 and annotated by the Requester to show four-sided and twenty-sided polygonal elements as shown below in Examples A-C) wherein the multilevel structure comprises a set of polygonal elements (*i.e.*, four-sided and twenty-sided polygons) having the same number of sides (*i.e.*, four sides and twenty sides). Cohen at Figures 7C-1 and 2B; and Col.18, lines 54-59.

Example A: Example B:





Example C:



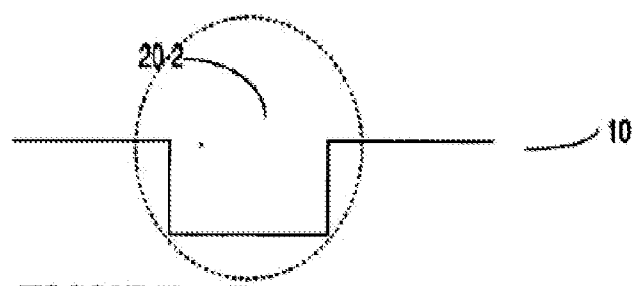
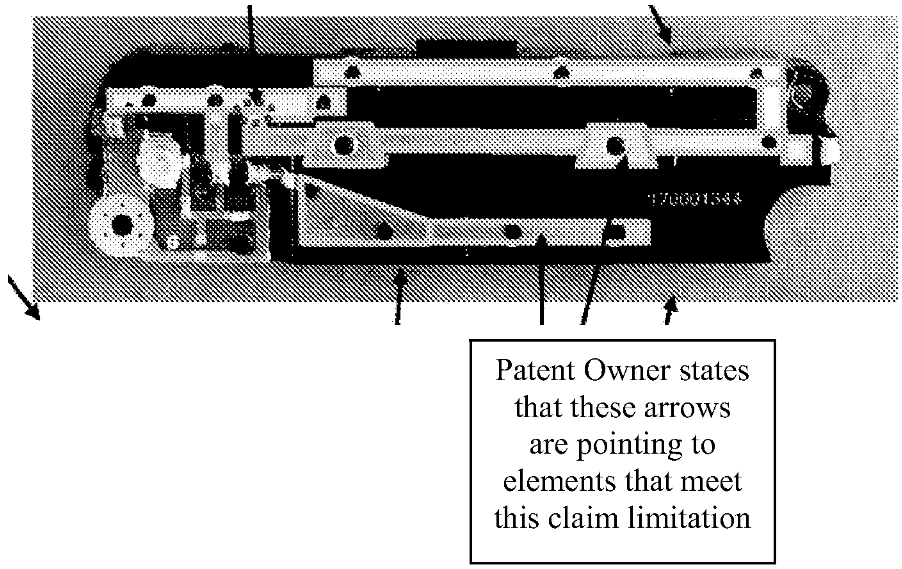


FIGURE 2B (PRIOR ART)

As shown above, for at least 75% of the polygonal elements, the contact areas between the polygonal elements is less than 50% of the perimeter of the elements. While the specification of the ‘868 patent does not provide a clear definition of the elements of this claim, the Patent Owner has provided Infringement Contentions that will be used to interpret this clause, since the Infringement Contentions are presumably within the broadest reasonable interpretation, at least from the Patent Owner’s viewpoint.



Infringement Contentions for the Samsung Instinct M800 at p. 2 (annotated by the Patent Owner to show four-sided polygons)

With this being the guidance offered by the Patent Owner as to the meaning of this claim limitation, apparently all that is required is a random assortment of same-sided polygons; in the Infringement Contentions it is a group of various shaped four-sided polygons subjectively superimposed on to the antenna. Therefore, Cohen discloses all the limitations as defined by the Patent Owner. Specifically, Examples A-C shown above, disclose this. As shown, there is a multilevel structure having an overall shape of more than four sides that is composed of various four-sided polygons. Cohen at Figure 7C-1 (as annotated by Requester and shown above); and Col.18, lines 54-59.

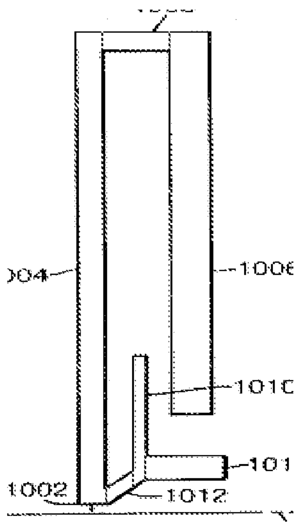
In addition, Cohen discloses the polygonal elements are electromagnetically coupled to another element through at least one point of contact (*i.e.*, connecting at corner portions as shown above in Examples A-C). Cohen at Figure 7C-1 (an annotated by Requester and shown above); and Col. 12, lines 1-4. Not all of the polygonal elements are the same size as shown in Examples A-C (*see* larger center structure). Furthermore, the perimeters of the multilevel structures have a different number of sides (*i.e.*, 100 perimeter sides) with each multilevel structure comprising four-sided or twenty-sided polygons.

In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Cohen raises an SNQ with respect to claims 1, 3, 6, 12, 14, 23, and 32-35 of the '868 patent since Cohen teaches the technical feature of the '868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 1, 3, 6, 12, 14, 23, and 32-35 of the '868 patent, cancel these claims, rendering them null, void, and otherwise unenforceable.

F. COHEN IN VIEW KITCHENER OF RAISES AN SNQ WITH RESPECT TO CLAIM 12 OF THE '868 PATENT

Cohen was filed November 7, 1997 and issued October 31, 2000 making it prior art under 35 U.S.C. § 102. Likewise, Kitchener was published in August 1998 making it prior art under 35 U.S.C. § 102. Neither Cohen nor Kitchener was cited in the '868 patent and neither is cumulative to any prior art previously considered. Moreover, the combination of these references teaches the elements of claim 12, thus an Examiner would consider the combination of Cohen and Kitchener important in deciding the patentability of the '868 patent. Specifically, Cohen teaches the elements of claim 1. To the extent that Cohen does not disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12, in the alternative Cohen in view of Kitchener teaches an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12. Kitchener discloses at least one multilevel structure mounted in a monopole configuration. Specifically, Kitchener recites "Figure 5 shows a three dimensional dual resonant monopole." Kitchener at p. 5, line 14. Kitchener further recites that "The first embodiment [of Figure 5] is a two dimensional equivalent of the three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 3-5. The antennae illustrated in Figures 8 and 10 are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Kitchener at p. 7, lines 13-28. Specifically, Kitchener recites "Figure 8 is an alternative to this design [Figure 6] that there are no third and fifth arms and that second arm 806 is parallel with the first member 804....Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found improving matching." Kitchener at p. 7, lines 21-28. *See also* Kitchener, Figures 8 and 10 (as annotated by the Requester and shown below).

Example A: Example B:



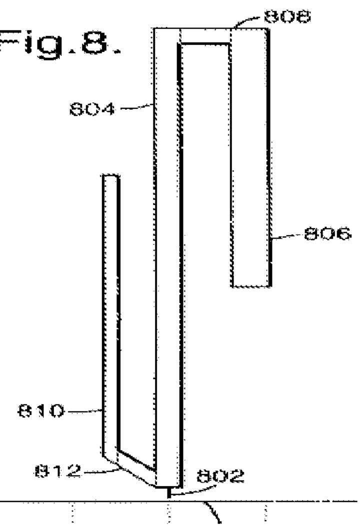


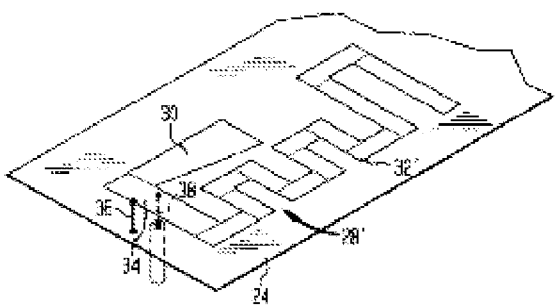
Fig.8.

In view of the above, and the detailed application of the prior art against the claim presented below and the attached claim chart, Cohen in view of Kitchener raises an SNQ with respect to claim 12 of the '868 patent since Cohen in view of Kitchener teaches the technical feature of the '868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claim 12 of the '868 patent, cancel this claim, rendering it null, void, and otherwise unenforceable.

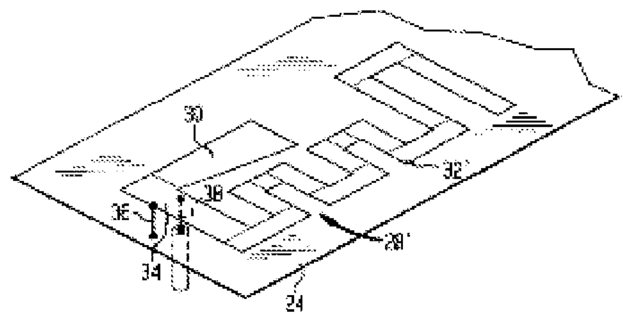
G. COHEN IN VIEW KORISCH OF RAISES AN SNQ WITH RESPECT TO CLAIMS 14 AND 26 OF THE '868 PATENT

Cohen was filed November 7, 1997 and issued October 31, 2000 making it prior art under 35 U.S.C. § 102. Likewise, Korisch was filed in July 1997, also making it prior art under 35 U.S.C. § 102. Cohen was cited in the '868 patent and Korisch was not cited in '868 patent. Neither is cumulative to any prior art previously considered. Moreover, the combination of these references teaches the elements of claims 14 and 26, thus an Examiner would consider the combination of Cohen and Korisch important in deciding the patentability of the '868 patent. Specifically, Cohen teaches the multilevel structured antenna of claim 1. To the extent that Cohen does not disclose an antenna wherein at least one multilevel structure is mounted in a patch configuration as recited in claim 14, in the alternative Cohen in view of Korisch teaches an antenna wherein at least one multilevel structure is mounted in a patch configuration as recited in claim 14. Korisch discloses at least one multilevel structure (*i.e.*, the unitary second layer 28 in Figure 3 and 28' in Figure 4, as annotated by the Requester and shown below as Examples A-C) mounted substantially parallel to a ground plane (*i.e.*, the first layer 23 in Figures 3 and 4) in a patch antenna configuration as shown below in Figure 5. Korisch at Figures 3 and 4 (annotated by the Requester and shown below in Examples A-C; Figure 5 (shown below); Col. 2, line 54 – Col. 3, line 9; and Col. 3, lines 20-46. Regarding claim 26, to the extent that Cohen does not disclose an interconnection circuit that links the antenna to an input/output connector and which is used to incorporate adaptation networks for impedances, filters, or diplexers, in the alternative Cohen in view of Korisch teaches an interconnection circuit that links the antenna to an input/output connector and which is used to incorporate adaptation networks for impedances, filters, or diplexers. Korisch discloses a multilevel structured antenna on a printed circuit board and having an interconnection circuit that links the antenna to an input/output connector, and matches the impedances of the antenna and the input/output connector. Korisch at Figures 3 and 4 (as annotated by the Requester and shown below in Examples A-C); Col. 2, line 54 – Col. 3, line 9; Col. 3, lines 20-46.

Example A:



Example B:



Example C:

FIG. 3

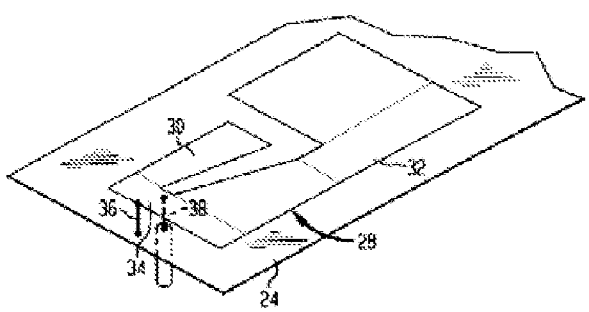
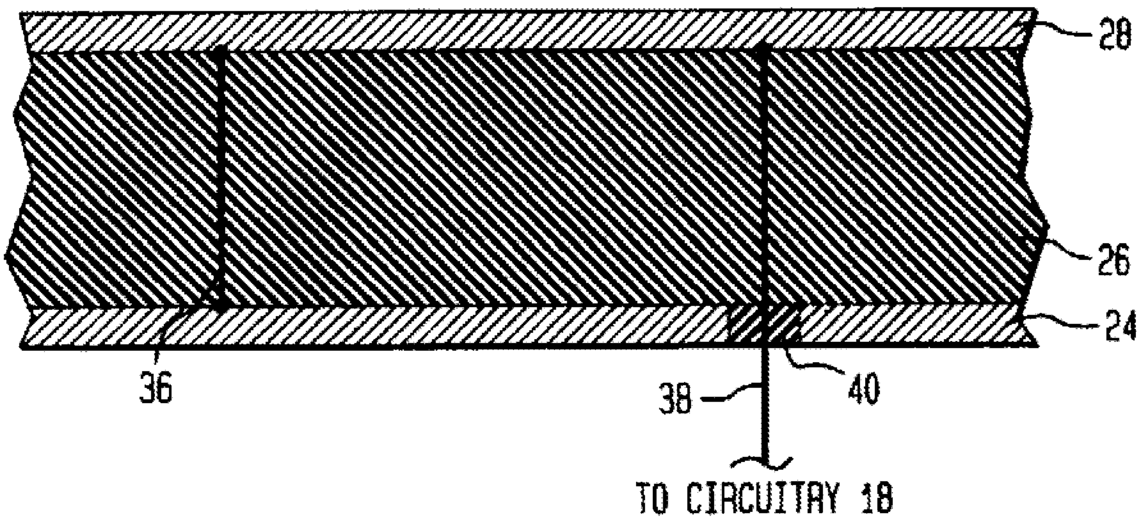


FIG. 5



In view of the above, and the detailed application of the prior art against the claims presented below and the attached claim charts, Cohen in view of Korisch raises an SNQ with respect to claims 14 and 26 of the ‘868 patent since Cohen in view of Korisch teaches the technical feature of the ‘868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claims 14 and 26 of the ‘868 patent, cancel these claim, rendering them null, void, and otherwise unenforceable.

V. MANNER OF APPLYING THE CLAIMS AS REQUIRED BY 37 CFR § 1.915 (B)

Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the ‘868 patent are fully anticipated under 35 U.S.C. § 102 and/or are unpatentable under 35 U.S.C. § 103 in view of the several different prior art references cited herein, which were not previously considered by the Examiner during the examination of the ‘868 patent application or which are discussed in a new light from the prosecution of the ‘868 patent application. Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the ‘868 patent are set forth in detail in the attached claim charts (Exhibits CC-A through CC-G) that compare the limitations of the claims of the ‘868 patent to the pertinent prior art references. As the claim charts demonstrate, Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 are unpatentable under 35 U.S.C. § 102 and/or 35 U.S.C. § 103 in view of the prior art references presented herein.

A. CLAIMS 1, 3, 6, 14, 23, 26, AND 32-35 ARE RENDERED ANTICIPATED BY KORISCH UNDER 35 U.S.C. § 102

Please see attached Claim Chart, Exhibit CC-A, for a comparison of Claims 1, 3, 6, 14, 23, 26, and 32-35 of the '868 patent with Korisch

Requester respectfully submits that Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the '868 patent are rendered anticipated by Korisch under 35 U.S.C. § 102. A claim chart applying Korisch is submitted herewith as Exhibit CC-A.

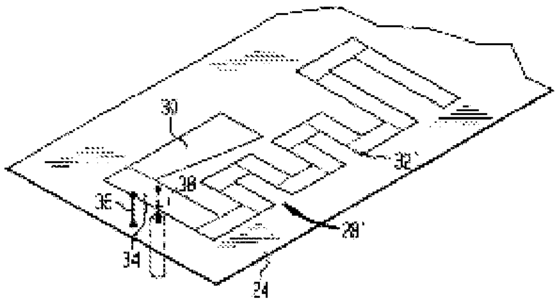
1. A multi-band antenna including:

Korisch discloses a multi-band antenna (*i.e.*, an antenna operating in two frequency bands). Specifically, Korisch recites that "This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device." Korisch at Col. 1, lines 6-9. *See also* Korisch at Col. 2, lines 46-53.

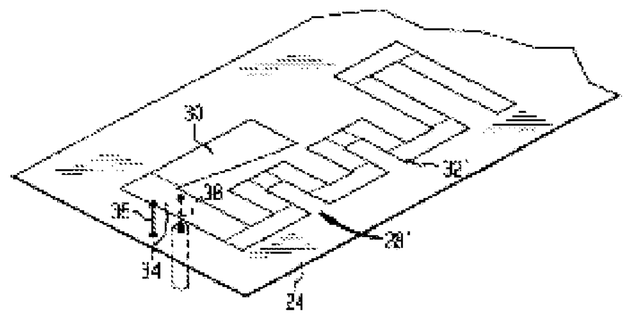
at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements having the same number of sides or faces,

Korisch discloses at least one multilevel structure (*i.e.*, unitary second layer 28 of Figure 3 and/or 28' of Figure 4) wherein the multilevel structure comprises a set of polygonal or polyhedral elements (*i.e.*, four-sided polygons as annotated by the Requester and shown below in Examples A-C) having the same number of sides or faces (*i.e.*, four sides). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

Example A:

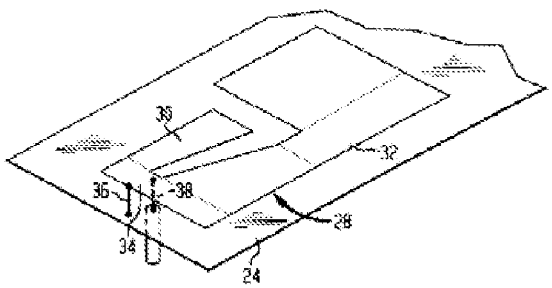


Example B:

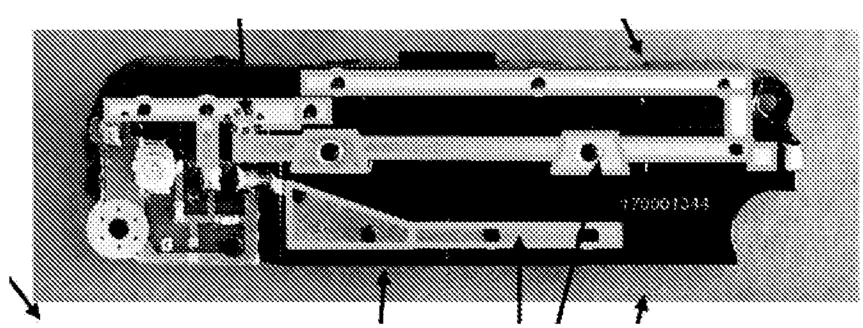


Example C:

FIG. 3



Examples A and B illustrate Figure 4 of Korisch, annotated by Requester to show fourteen four-sided polygons. Example C illustrates Figure 3 of Korisch, annotated by Requester to show five four-sided polygons. While the specification of the '868 patent does not provide a clear definition of the elements of this claim, the Patent Owner has provided Infringement Contentions that will be used to interpret this clause, since the Infringement Contentions are presumably within the broadest reasonable interpretation, at least from the Patent Owner's viewpoint.



Patent Owner states that these arrows are pointing to elements that meet this claim limitation

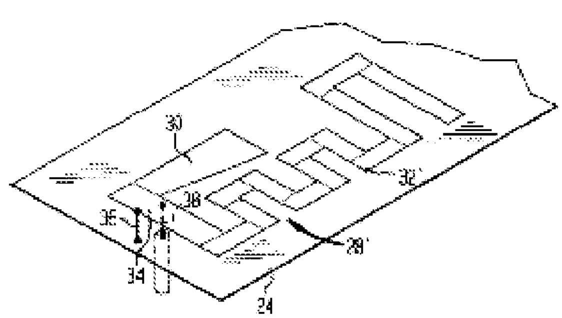
Infringement Contentions for the Samsung Instinct M800 at p. 2 (annotated by the Patent Owner to show four-sided polygons)

With this being the guidance offered by the Patent Owner as to the meaning of this claim limitation, apparently all that is required is a random assortment of same-sided polygons; in the Infringement Contentions it is a group of various shaped four-sided polygons subjectively superimposed on to the antenna. Therefore, Korisch discloses all the limitations as defined by the Patent Owner. Specifically, Examples A-C, as annotated by the Requester and shown above, disclose this. As shown, there is a multilevel structure having an overall shape of more than four sides that is composed of various four-sided polygons. Korisch at Figures 3 and 4.

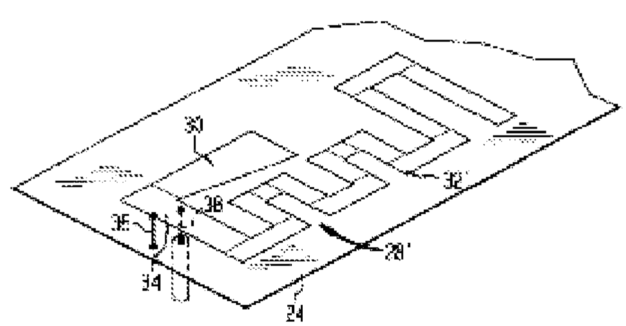
wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling,

Korisch discloses each of the elements is electromagnetically coupled to at least one other element directly through at least one point of contact (*e.g.*, portion 34 of the multilevel structure is coupled to portion 30 of the multilevel structure and portion 32, 32' of the multilevel structure as annotated by the Requester and shown below as Examples A-C). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

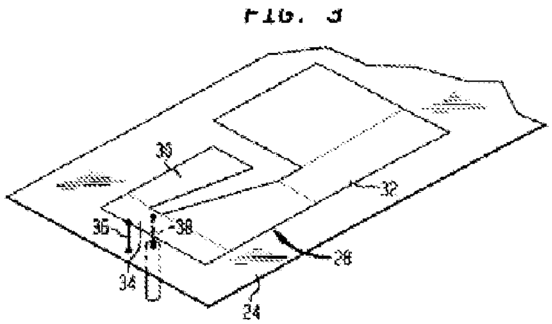
Example A:



Example B:



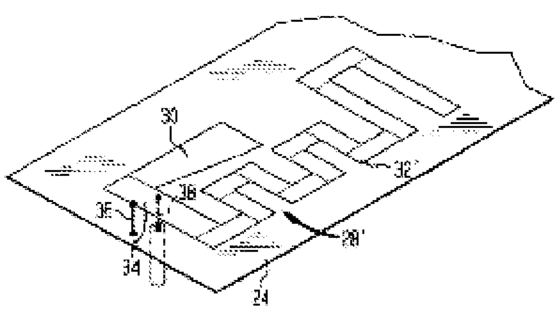
Example C:



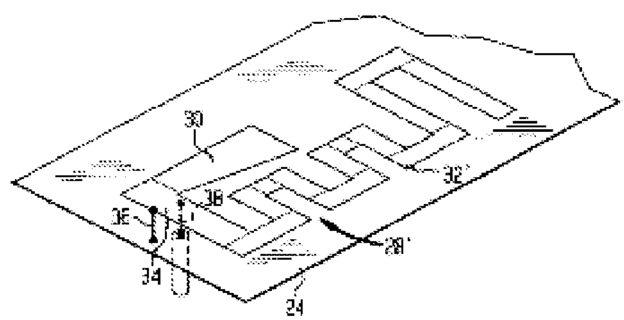
wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements,

Korisch discloses wherein for at least 75% of the polygonal or polyhedral elements (*i.e.*, the polygons shown in Examples A-C above), the region or area of contact between the polygonal or polyhedral elements is less than 50% of the perimeter or area of the elements (*i.e.*, as annotated by the Requester and shown below in Examples A-C). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

Example A:

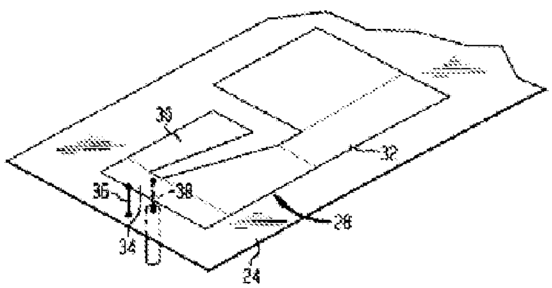


Example B:



Example C:

FIG. 3



For example, starting with the first polygonal element of Example A (e.g., the polygonal element labeled as “30” in Figure 4), the only contact area is on one of the two shorter sides of the polygonal element. Thus, given that there is only one contact area on one of the two shorter sides of the polygonal element, this polygonal element clearly meets the 50% limitation. The next polygonal element (e.g., the polygonal element sharing the contact area with polygonal element 30) has two contact areas. The first contact area is the common contact area shared with element 30 and is on one of the longer sides. As shown in the figure, the first contact area does not extend the length of the longer side. The second contact area is on one of the two shorter sides of the polygonal element. Thus, as shown, the contact areas of this polygonal element clearly meet the 50% limitation. The next element (e.g., the polygonal element sharing the contact area of the previous polygonal element) has two contact areas. The first contact area is the common contact area shared with the previous polygonal element and is on one of the longer sides but does not extend the length of the side. The second contact area is on one of the two shorter sides of the polygonal element. Thus, as shown, the contact areas of this polygonal element clearly meet the 50% limitation.

The next eight polygonal elements are similar in that each has two contact areas: one contact area on part of one of the two longer sides of the polygonal element and the other on one of the two shorter sides of the polygonal element. Since the contact area on one of the two longer sides does not extend the length of the side and since the other contact area is on one of the shorter sides, the contact area of these polygonal elements clearly meet the 50% limitation. The next polygonal element has two contact areas: one on part of one of the two longer sides of the polygonal element and the other on one of the two shorter sides of the polygonal elements. As shown in the figure, the first contact area does not extend the length of the side. The second contact area is on one of the two shorter sides of the polygonal element. Thus, as shown, the contact areas of this polygonal element clearly meet the 50% limitation.

The next polygonal element has two contact areas with both being on part of one of the two longer sides of the polygonal elements. Since the contact areas on one of the two longer sides do not extend the length of the side, the contact areas of this polygonal element clearly meet the 50% limitation. The last polygonal element has only one contact area on one of the two shorter sides, thus the contact area of this polygonal element clearly meets the 50% limitation. As a result, all of the polygonal elements in Example A meet the 50% limitation of claim 1.

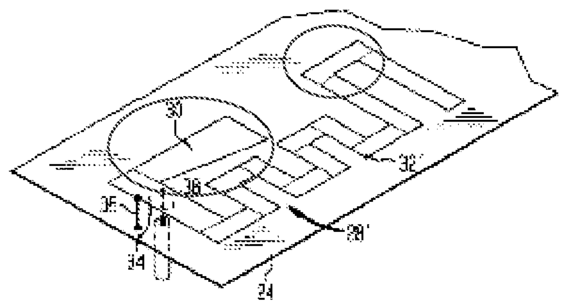
Example B is similar to Example A, but may contain, arguably, two polygonal elements that may not meet the 50% limitation. However, two out of fourteen polygonal elements is less than 25% of the polygonal elements; thus Example B clearly shows that, at a minimum, 86% of polygonal elements meet the 50% limitation.

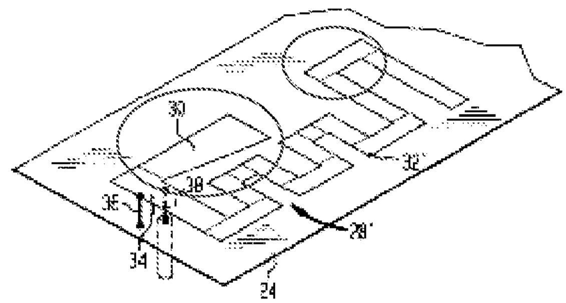
Example C has five four-sided polygonal elements. Starting with the first polygonal element (e.g., the polygonal element labeled as "30" in Figure 3), the only contact area is on one of the two shorter sides of the polygonal element. Thus, given that there is only one contact area, on one of the two shorter sides of the polygonal element, this polygonal element clearly meets the 50% limitation. The next polygonal element (e.g., the polygonal element sharing the contact area with polygonal element 30) has two contact areas on one of the two longer sides of the polygonal element. The two contact areas do not extend the length of the longer side, thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element has a contact area on each of the two shorter sides of the polygonal element, thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element has two contact areas, one on one of the two shorter sides and one on part of one of the two longer sides, but not extending the length of the side. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. As a result, all of the polygonal elements in Example C meet the 50% limitation.

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

Korisch discloses that not all of the polygonal or polyhedral elements have the same size (*i.e.*, as annotated by the Requester and shown below in Examples A-C below with different sized polygonal elements in the circles). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

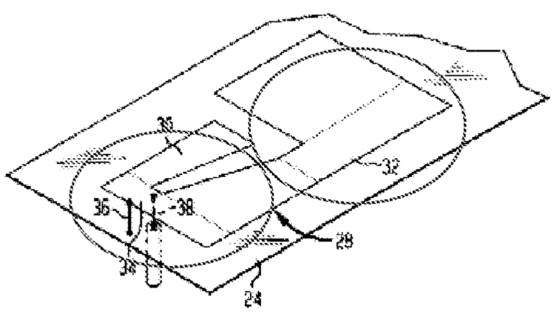
Example A: Example B:





Example C:

FIG. 3



Examples A and B illustrate Figure 4 of Korisch and Example C illustrates Figure 3 of Korisch, each annotated by Requester to show the four-sided polygons and to show that the polygonal elements in the circles have different sizes.

the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure.

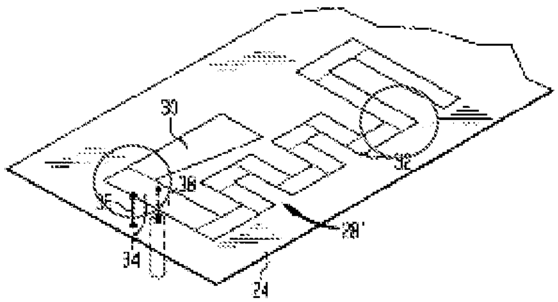
Korisch discloses the perimeter of the multilevel structure has a different number of sides (*i.e.*, as shown above, Examples A and B having thirty perimeter sides and Example C has eleven perimeter sides) than the polygons that compose the multilevel structure (*i.e.*, as annotated by the Requester and shown below in Examples A-C), each polygonal element comprises a four-sided polygon). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

3. The antenna according to claim 1, wherein not all the regions or areas of contact between said polygonal or polyhedral elements have the same size.

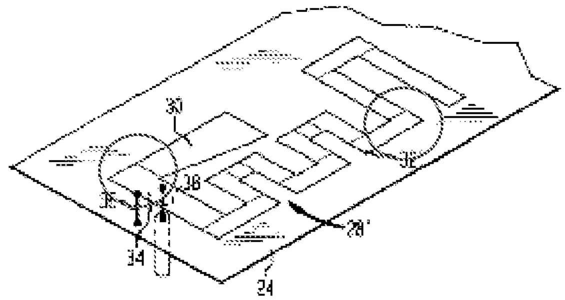
Korisch discloses that not all of the regions or areas of contact between said polygonal or polyhedral elements have the same size (*i.e.*, as annotated by the Requester and shown below in

Examples A-C, the contact areas in the circled areas are of different sizes). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

Example A:

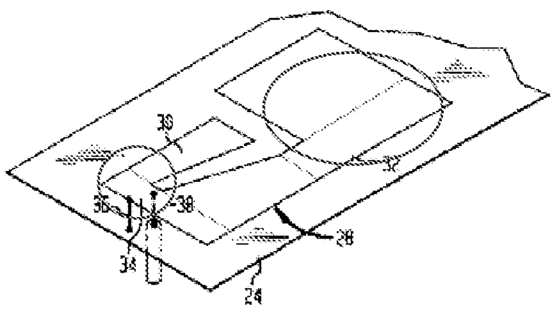


Example B:



Example C:

FIG. 3

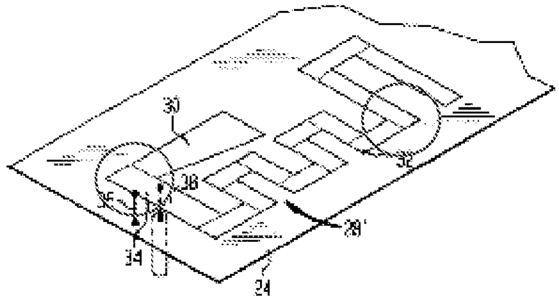


Examples A and B illustrate Figure 4 of Korisch and Example C illustrates Figure 3 of Korisch, each annotated by Requester to show the four-sided polygons and to show that the contact areas of the polygonal elements in the circles have different sizes.

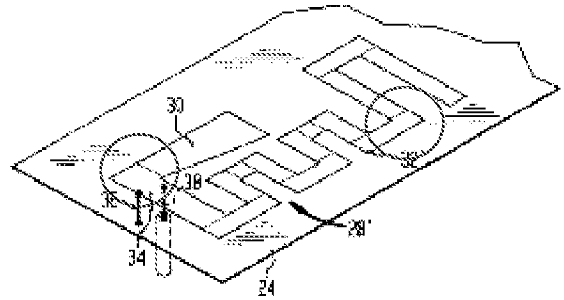
6. The antenna according to claim 1, wherein said at least one multilevel structure is formed by polygons of a single type, selected from the group consisting of four-sided polygons, pentagons, hexagons, heptagons, octagons, decagons, and dodecagons.

Korisch discloses that at least one multilevel structure is formed by polygons of a single type – four-sided polygons (*i.e.*, as annotated by the Requester and shown below in Examples A-C, the multilevel structures are formed by four-sided polygons). Korisch at Figures 3 and 4; and Col. 2, line 66 – Col. 3, line 52.

Example A:

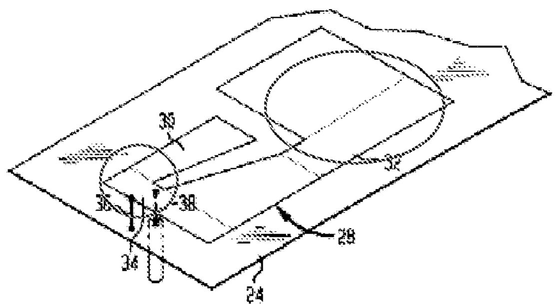


Example B:



Example C:

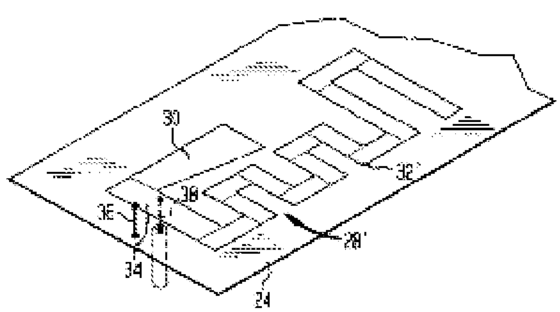
FIG. 3



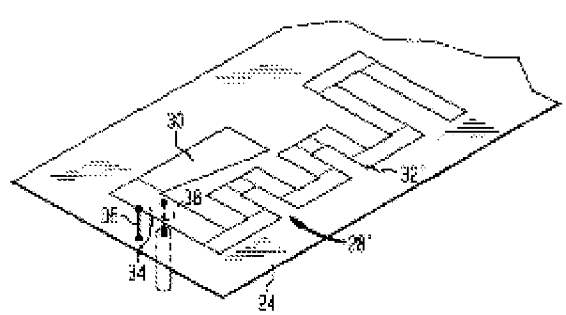
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.

Korisch discloses at least one multilevel structure (*i.e.*, the unitary second layer 28 in Figure 3 and unitary second layer 28' in Figure 4) is mounted substantially parallel to a ground plane (*i.e.*, the first layer 24 in Figures 3 and 4) in a patch antenna configuration as shown below in Figure 5. Korisch at Figures 3 and 4 (annotated by the Requester and shown below in Examples A-C; Figure 5; Col. 2, line 54 – Col. 3, line 9; and Col. 3, lines 20-46.

Example A:



Example B:



Example C:

FIG. 3

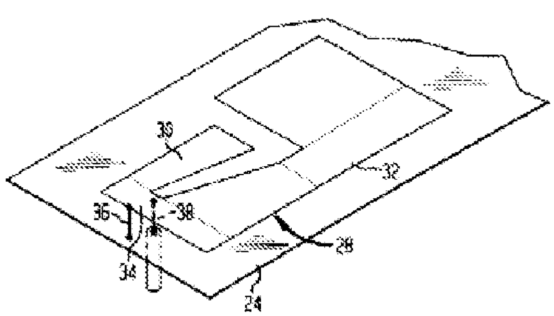
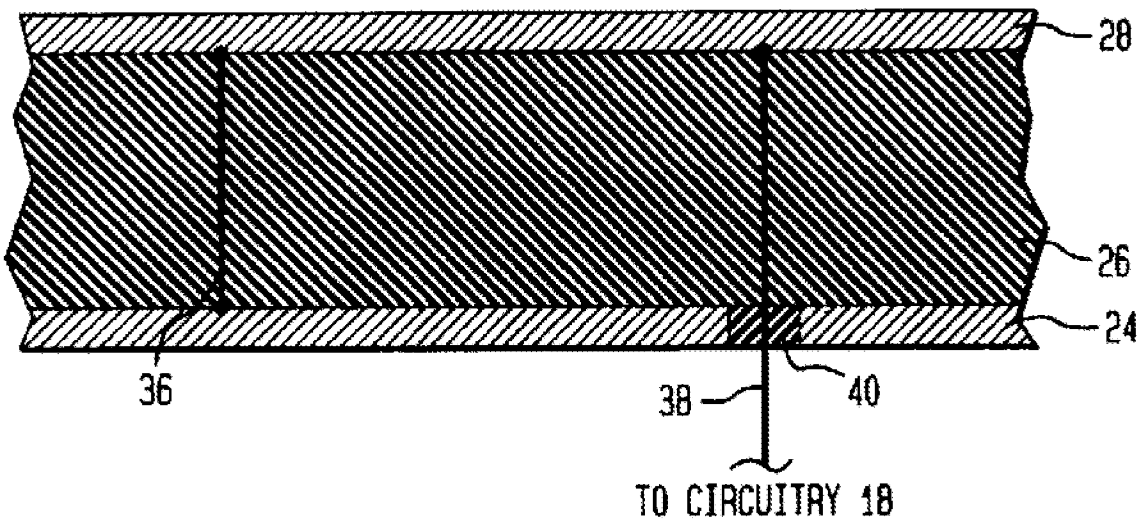


FIG. 5



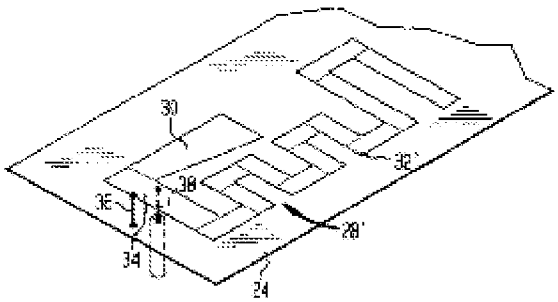
23. The antenna according to claim 1, wherein said antenna is being shared by several communication services or systems.

Korisch discloses an antenna (operating at two frequency bands) being shared by several communication services or systems (*i.e.*, cellular telephones operating in the frequency band of 824-896 MHz and personal communications system (PCS) operating in the frequency band of 1850-1990 MHz). Korisch at Col. 1, lines 6-20 and Col. 1 line 61 – Col. 2, line 13.

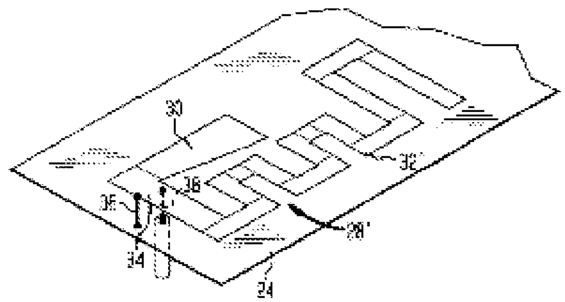
26. The antenna according to claim 1, wherein said antenna includes an interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for impedances, filters or diplexers.

Korisch discloses an antenna (*i.e.*, antenna 20) having an interconnection circuit (*i.e.*, a grounding pin 36 and a connecting pin 38) that links the antenna to an input/output connector (*i.e.*, to ground and to the transceiver circuitry 18), and which is used to incorporate adaptation networks for impedances, filters or diplexers (*i.e.*, "The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands."). Korisch at Col. 3, lines 44-46. *See also,* Korisch at Figures 3 and 4 (as annotated by the Requester); Figure 5; and Col. 3, lines 20-46.

Example A:



Example B:



Example C:

FIG. 3

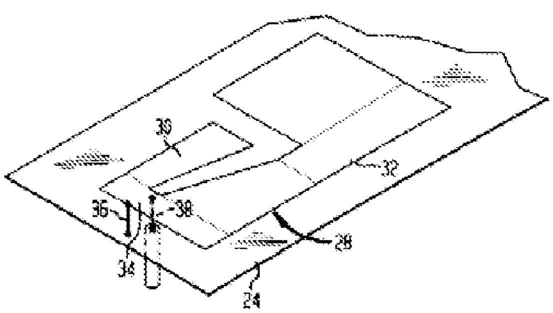
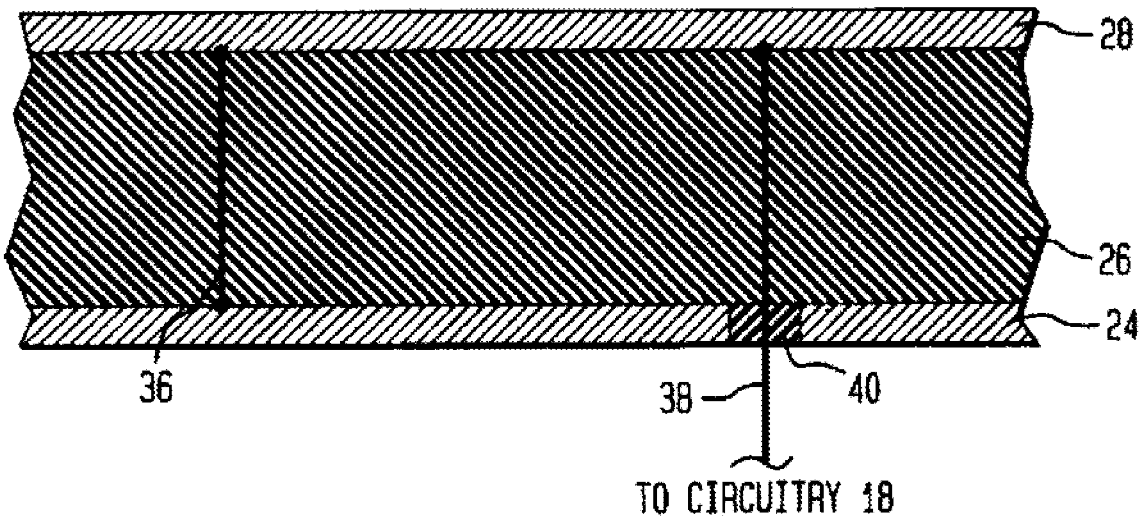


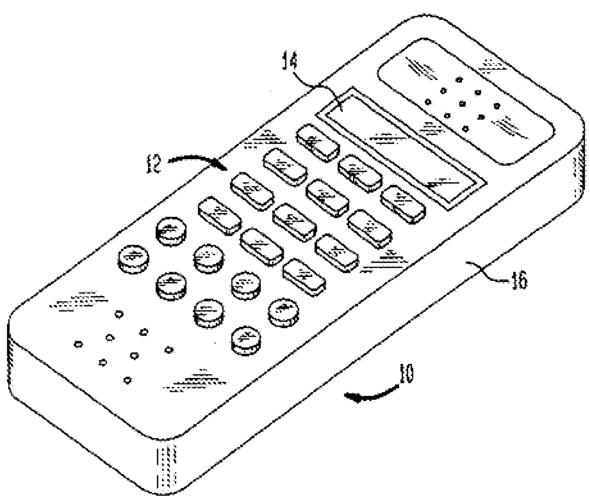
FIG. 5



32. The antenna according to any one of claims 1, 5, 13, 15, or 16 wherein said antenna is included in a portable communications device.

Korisch discloses an antenna included in a portable communication device (*i.e.*, communication device 10 in Figure 1 shown below). Korisch at Figure 1; Col. 1, lines 5-9; Col. 2, lines 46-53; and Col. 3, line 52 – Col. 4, line 15. Specifically, Korisch recites "Referring now to the drawings, FIG. 1 shows a handheld portable communications device designated generally by the reference numeral 10 …" Korisch at Col. 2, lines 46-50.

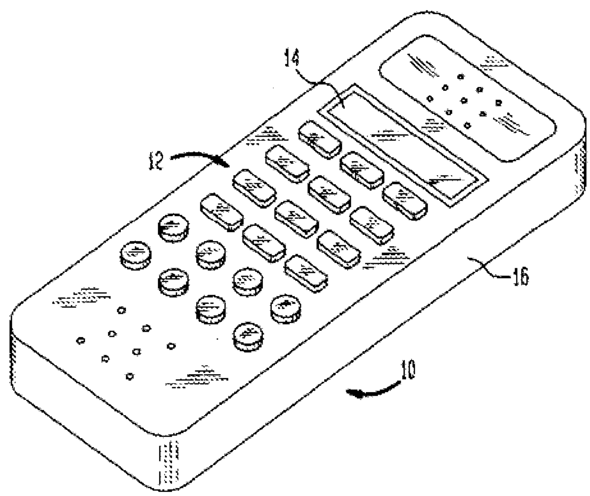
FIG. 1



33. The antenna according to claim 32, wherein said portable communications device is a handset.

Korisch discloses the portable communications device being a handset (*i.e.*, handheld communications device 10). Korisch at Figure 1 (shown below); Col. 1, lines 5-9; Col. 2, lines 46-53; and Col. 3, line 52 – Col. 4, line 15. Specifically, Korisch recites "Referring now to the drawings, FIG. 1 shows a handheld portable communications device designated generally by the reference numeral 10 …" Korisch at Col. 2, lines 46-50.

FIG. 1



34. The antenna according to claim 33, 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.

Korisch discloses an antenna (operating at two frequency bands) being shared by several communication services or systems (*i.e.*, cellular telephones operating in the frequency band of 824-896 MHz and personal communications system (PCS) operating in the frequency band of 1850-1990 MHz) in which both frequency bands operate within the 800–3600 MHz range. Korisch at Col. 1, lines 6-20 and Col. 1 line 61 – Col. 2, line 13.

35. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 890 MHz-3600 MHz frequency range.

Korisch discloses an antenna (operating at two frequency bands) being shared by several communication services or systems (*i.e.*, cellular telephones operating in the frequency band of 824-896 MHz and personal communications system (PCS) operating in the frequency band of 1850-1990 MHz) with at least one of the frequency bands operating within the 890–3600 MHz range. Korisch at Col. 1, lines 6-20 and Col. 1 line 61 – Col. 2, line 13.

B. CLAIM 12 IS RENDERED OBVIOUS BY KORISH IN VIEW OF KITCHENER UNDER 35 U.S.C. § 102

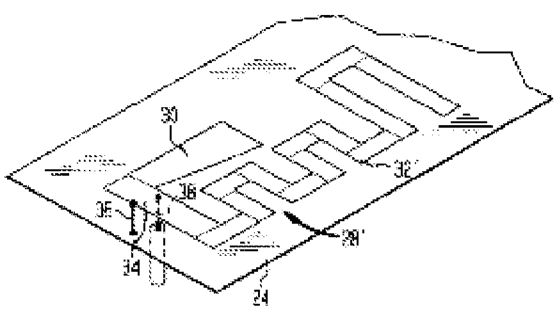
Please see attached Claim Chart, Exhibit CC-B, for a comparison of Claim 12 of the '868 patent with Korisch and Kitchener

Requester respectfully submits that Claim 12 of the '868 patent is rendered obvious by Korisch in view of Kitchener under 35 U.S.C. § 103. A claim chart applying Korisch and Kitchener is submitted herewith as Exhibit CC-B.

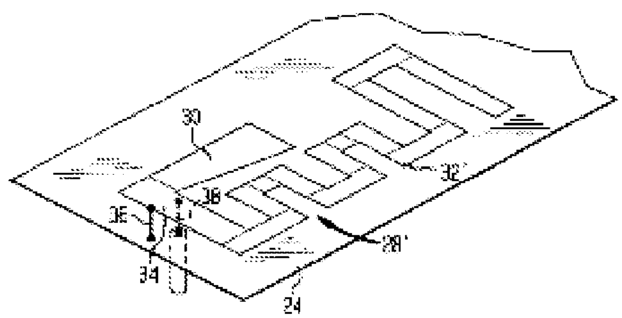
Reasons to combine:

To the extent Korisch does not specifically disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12, Korisch discloses a multilevel structured printed antenna on a printed circuit board. Korisch at Examples A-C (Figures 3 and 4 annotated by the Requester and shown below); Col. 2, line 54 – Col. 3, line 9; and Col. 3, lines 20-46.

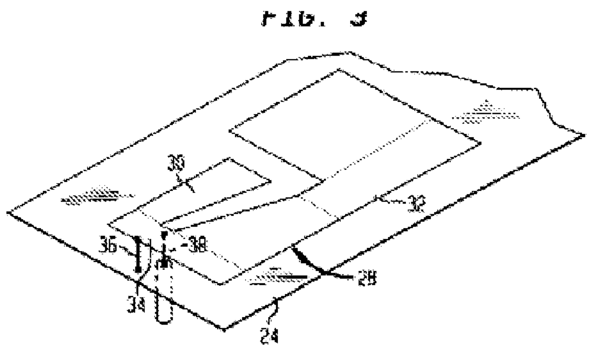
Example A:



Example B:

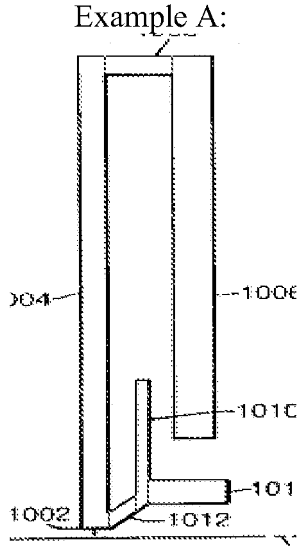


Example C:

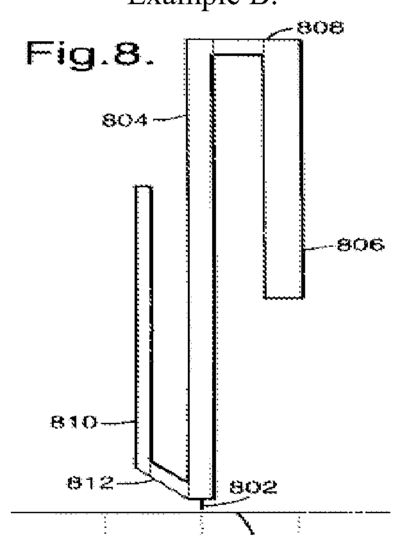


Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). Kitchener at p. 7, lines 2-5 and p. 8, lines 4-8. In addition, Kitchener discloses an antenna wherein at least one multilevel structure is mounted in a monopole configuration. Specifically, the antennae illustrated in Examples A and B (Figures 8 and 10 as annotated by the Requester and shown below) are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Kitchener at p. 7, lines 13-28. Since Korisch and Kitchener disclose multilevel structure antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Korisch and Kitchener to have a multilevel structure antenna on a printed circuit board in a monopole configuration.

Example A:



Example B:



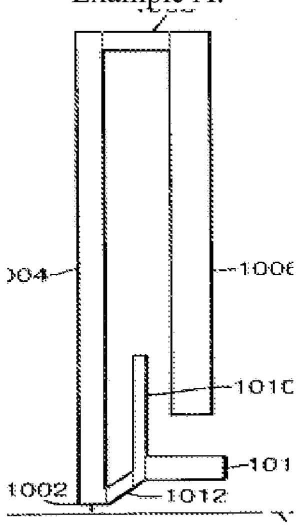
Since Kitchener and Korisch disclose multilevel structured antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Kitchener and Korisch to have an antenna with at least one multilevel structure mounted in a monopole configuration.

In view of the above, and the detailed application of the prior art against the claim presented below and the attached claim chart, Korisch in view of Kitchener raises an SNQ with respect to claim 12 of the '868 patent since Korisch in view of Kitchener teaches the technical feature of the '868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claim 12 of the '868 patent, cancel this claim, rendering it null, void, and otherwise unenforceable.

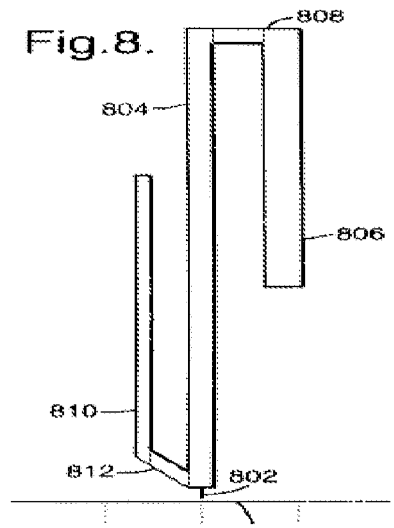
12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.

To the extent Korisch does not disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration, Kitchener discloses wherein at least one multilevel structure is mounted in a monopole configuration. Specifically, Kitchener recites "Figure 5 shows a three dimensional dual resonant monopole." Kitchener at p. 5, line 14. Kitchener further recites that "The first embodiment [of Figure 5] is a two dimensional equivalent of the three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 3-5. The antennae illustrated in Figures 8 and 10 are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Kitchener at p. 7, lines 13-28. Specifically, Kitchener recites "Figure 8 is an alternative to this design [Figure 6] that there are no third and fifth arms and that second arm 806 is parallel with the first member 804....Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found improving matching." Kitchener at p. 7, lines 21-28. *See also* Kitchener, Figures 8 and 10 (as annotated by the Requester).

Example A:



Example B:



Thus, it would be obvious to one of ordinary skill in the art at the time of the invention to replace the multilevel structured printed antenna of Korisch with the multilevel structured printed antenna of Kitchener since Korisch and Kitchener disclose multilevel structured antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Korisch and Kitchener to have an antenna with at least one multilevel structure mounted in a monopole configuration.

C. Claims 1, 3, 6, 12, 23, and 32-35 are Rendered Anticipated by Kitchener Under 35 U.S.C. § 102

Please see attached Claim Chart, Exhibit CC-C, for a comparison of Claims 1, 3, 6, 12, 23, and 32-35 of the '868 patent with Kitchener

Requester respectfully submits that Claims 1, 3, 6, 12, 23, and 32-35 of the '868 patent are rendered anticipated by Kitchener under 35 U.S.C. § 102. A claim chart applying Kitchener is submitted herewith as Exhibit CC-C.

1. A multi-band antenna including:

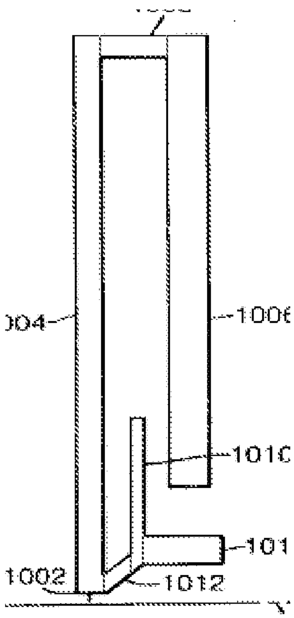
Kitchener discloses a multi-band antenna (*i.e.*, an antenna operating in at least two frequency bands). Kitchener at p. 1, lines 14-15; p. 2, lines 19-21; p. 8, lines 15-18; p. 10, lines

9-10; and p. 11, lines 16-18.

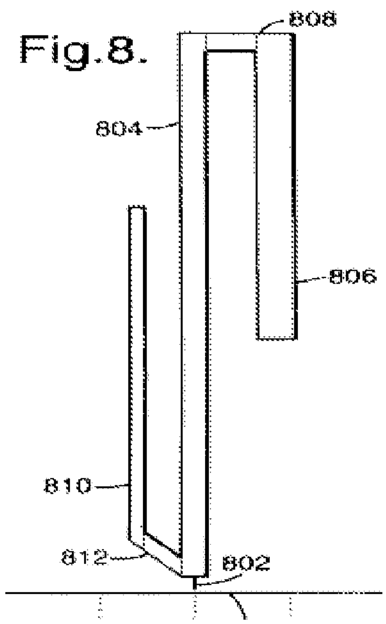
at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements having the same number of sides or faces,

Kitchener discloses at least one multilevel structure (*i.e.*, the overall structures shown in Figures 8, 10, and 20) wherein the multilevel structure comprises a set of polygonal or polyhedral elements (*i.e.*, four-sided polygons as annotated by the Requester and shown below in Examples A-C) having the same number of sides or faces (*i.e.*, four sides). Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16.

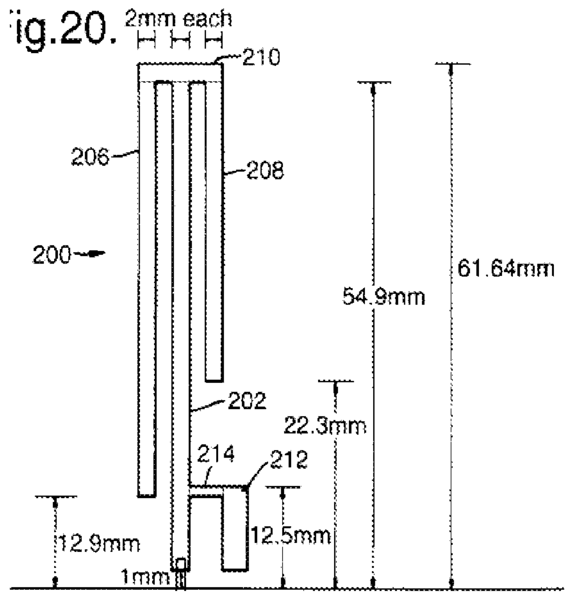
Example A:



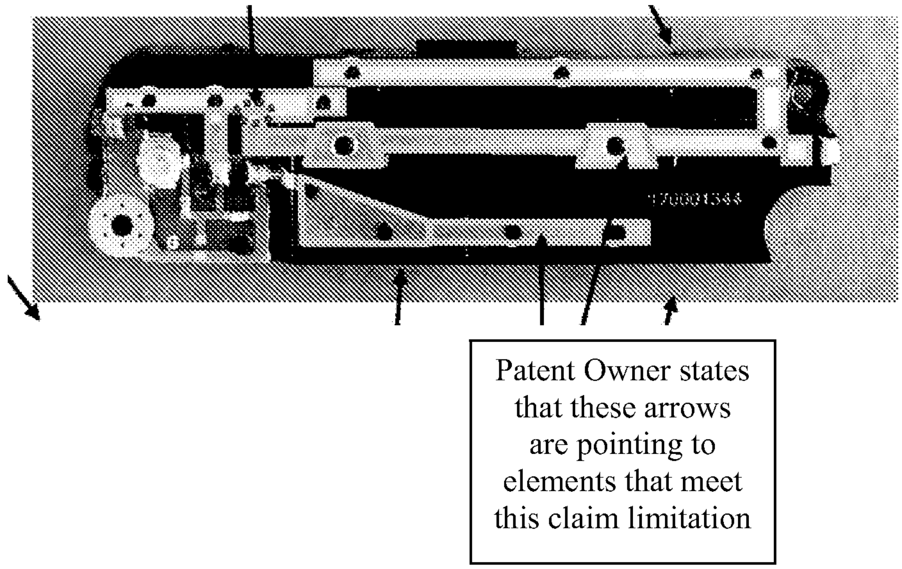
Example B:



Example C:



Example A illustrates Figure 10 of Kitchener, annotated by Requester to show six four-sided polygons. Example B illustrates Figure 8 of Kitchener, annotated by Requester to show five four-sided polygons. Example C illustrates Figure 20, annotated by Requester to show six four-sided polygons. While the specification of the '868 patent does not provide a clear definition of the elements of this claim, the Patent Owner has provided Infringement Contentions that will be used to interpret this clause, since the Infringement Contentions are presumably within the broadest reasonable interpretation, at least from the Patent Owner's viewpoint.



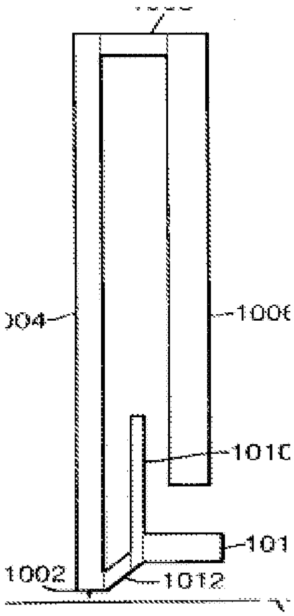
Infringement Contentions for the Samsung Instinct M800 at p. 2 (annotated by the Patent Owner to show four-sided polygons)

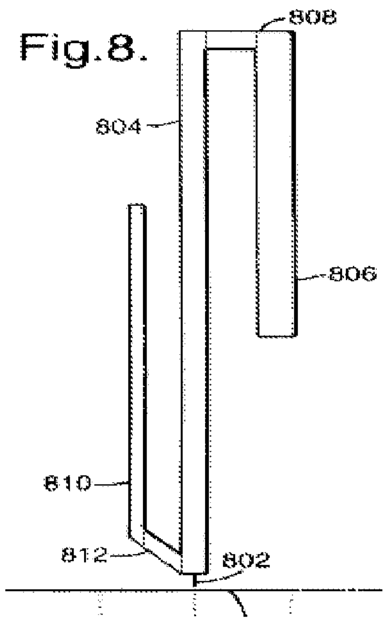
With this being the guidance offered by the Patent Owner as to the meaning of this claim limitation, apparently all that is required is a random assortment of same-sided polygons; in the Infringement Contentions it is a group of various shaped four-sided polygons subjectively superimposed on to the antenna. Therefore, Kitchener discloses all the limitations as defined by the Patent Owner. Specifically, Examples A-C shown above, disclose this. As shown, there is a multilevel structure having an overall shape of more than four sides that is composed of various four-sided polygons. Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16. (as annotated by Requester and shown above).

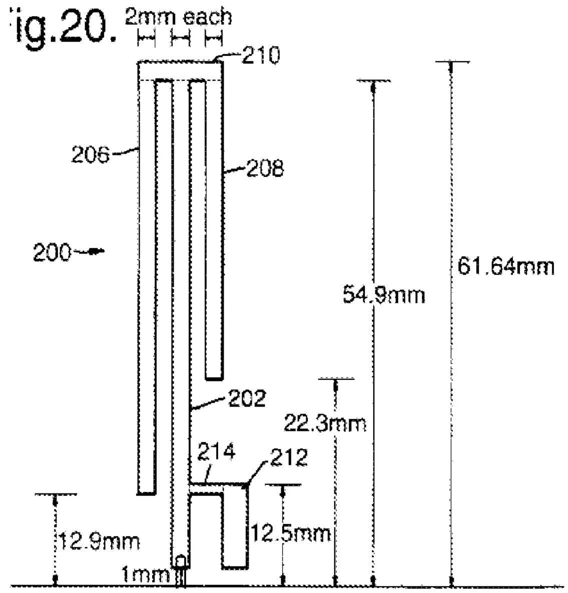
wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling,

Kitchener discloses each of the elements is electromagnetically coupled to at least one other element directly through at least one point of contact (*i.e.*, portion 1012 is coupled to polygonal elements such as arms 1004 and 1010 along the red lines in annotated Figure 10, portion 812 is coupled to polygonal elements such as arms 810 and 802 along the red lines in annotated Figure 8, and central arm 202 is coupled to polygonal elements such as arms 210 and 214 along the red lines in annotated Figure 20). Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16.

Example A: Example B: Example C:







wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements,

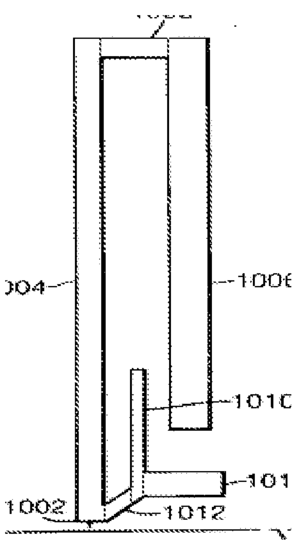
Kitchener discloses wherein at least 75% (100% of the polygonal elements shown below in Examples A-C) of the polygonal or polyhedral elements (*i.e.*, the polygons shown below in Examples A-C), the region or area of contact between the polygonal or polyhedral elements is less than 50% of the perimeter or area of the elements (*i.e.*, as shown below in Examples A-C). By visual inspection, one of ordinary skill in the art can see that, at a minimum 75% of the polygonal elements, have contact regions that are less than 50% of the perimeter of the polygonal elements. *See Kitchener* at Figures 8, 10, and 20 (as annotated by the Requester). As shown below, the contact regions of the polygonal elements are generally on the shorter side or sides of the polygonal elements. As a result, by definition, the contact area is less than 50% of the perimeter of the polygonal elements. Kitchener at p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16.

For example, starting with the first polygonal element (e.g., the polygonal element labeled as "1014" in Figure 10) of Exhibit A (as annotated by the Requester and shown below), the only contact area is on one of the two shorter sides of the polygonal element. Thus, given that there is only one contact area on one of the two shorter sides of the polygonal element, this polygonal element clearly meets the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "1010") has two contact areas, each on the longer sides of the polygonal element and as shown, much less than half of the length. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "1012") has two contact areas, each on the shorter sides of the polygonal element. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "1004") has two contact areas, each on one of the longer sides of the polygonal element. Since the contact areas do not extend the length of the side, the contact areas clearly meet the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "1012") has two contact areas, each on the shorter sides of the polygonal element. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "1006") has one contact area on one of the longer sides of the polygonal element. Since the contact area does not extend the length of the side, the contact area clearly meets the 50% limitation. As a result, all of the contact areas meet the 50% limitation.

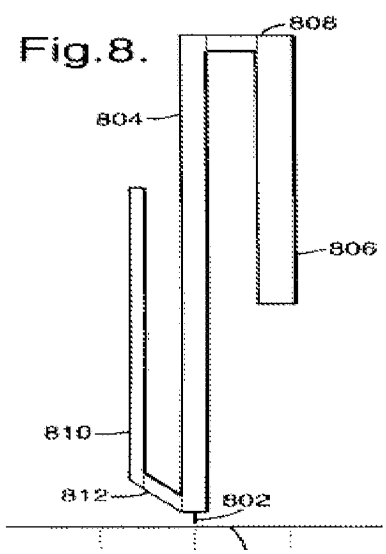
As shown in Example B (as annotated by the Requester and shown below), Figure 8 is similar to Figure 10 in that all of the contact areas of the polygonal elements meet the 50% limitation. Starting with the first polygonal element of Exhibit B (e.g., the polygonal element labeled as "810") has only one contact area on one of the longer sides of the polygonal element. Since the contact area does not extend the length of the side, the contact area clearly meets the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "812") has two contact areas, each on the shorter sides of the polygonal element. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "804") has two contact areas, each on the longer sides of the polygonal element and as shown, much less than half of the length. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal element (e.g., the polygonal element labeled as "808) has two contact areas, each on the shorter sides of the polygonal element. Thus, the contact areas of this polygonal element clearly meet the 50% limitation. The next polygonal elements (e.g., the polygonal element labeled at "806") has only one contact area on one of the longer sides of the polygonal element. Since the contact area does not extend the length of the side, the contact area clearly meets the 50% limitation. As a result, all of the contact areas meet the 50% limitation.

As shown in Example C (as annotated by the Requester and shown below), Figure 20 unlike Figures 8 and 10, includes some dimensions. As shown, elements 206, 202 and 208 each includes a single contact area (2 mm) on one short side of the polygonal elements, thus these elements clearly meet the 50% limitation. Element 210 has one side with three contact areas (three 2 mm contact areas), but the contact areas do not extend the length of the side, thus this element clearly meets the 50% limitation. Similarly, element 212 has a 0.4 mm contact area which is a small part of the length of the polygonal elements, thus this element clearly meets the 50% limitation. Lastly, element 214 is rectangular with the shorter sides having 0.4 mm contact areas, thus this element clearly meets the 50% limitation. As a result, all of the polygonal elements in Figure 20 (as annotated by Requester and shown below) show that the contact area is less than 50% of the perimeter.

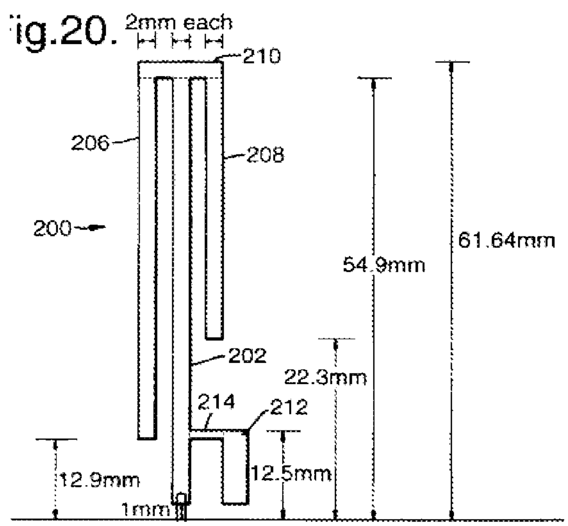
Example A:



Example B:



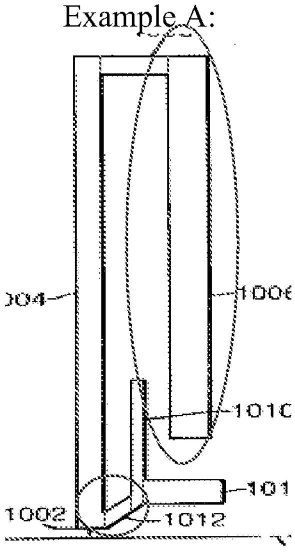
Example C:

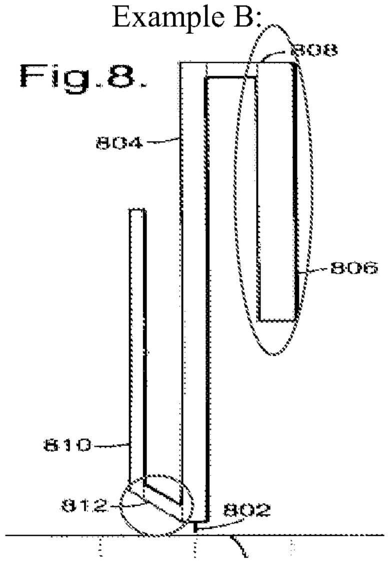


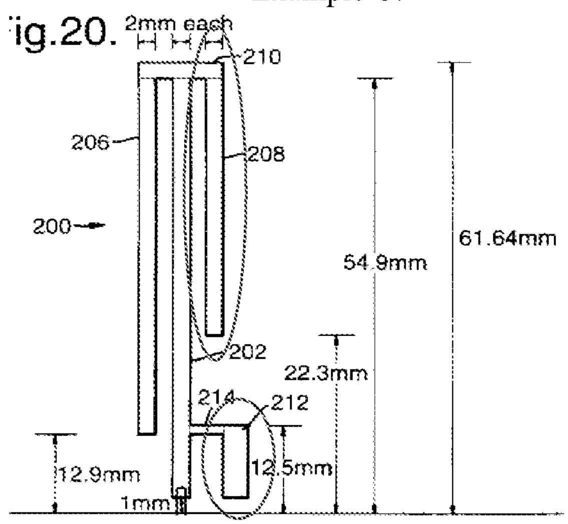
and wherein not all the polygonal or polyhedral elements have the same size and

Kitchener discloses that not all of the polygonal or polyhedral elements have the same size (*i.e.*, as annotated by the Requester and shown below in Examples A-C, the polygonal elements in the circles, added by the Requester, have different sizes). Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16.

Example A: Example B: Example C:



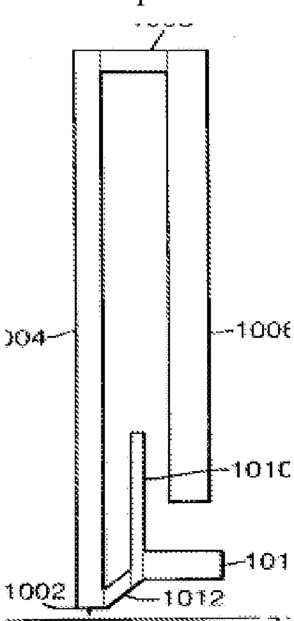


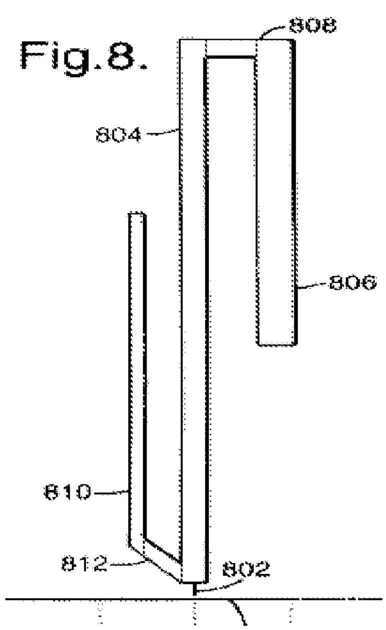


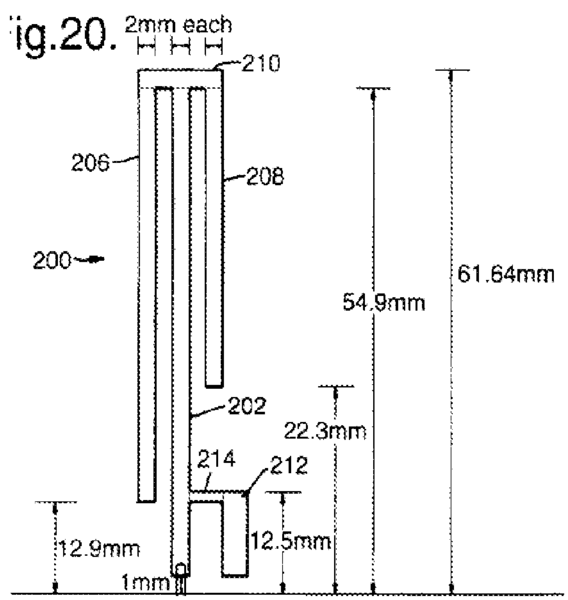
the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure.

Kitchener discloses the perimeter of the multilevel structure has a different number of sides (*i.e.*, as shown below, Example A has sixteen perimeter sides, Example B has thirteen perimeter sides and Example C has eighteen perimeter sides) than the polygons that compose the multilevel structure (*i.e.*, as annotated by the Requester and shown below in Examples A-C, each multilevel structure comprises four-sided polygons). Kitchener at Figures 8, 10, and 20; p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16.

Example A: Example B: Example C:



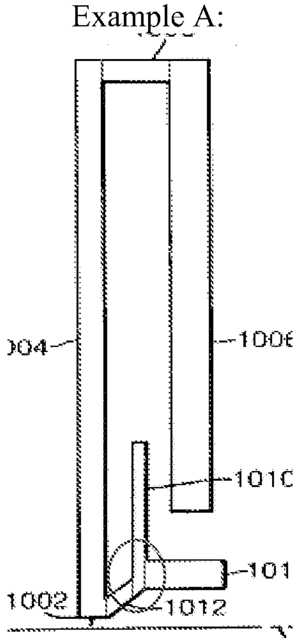




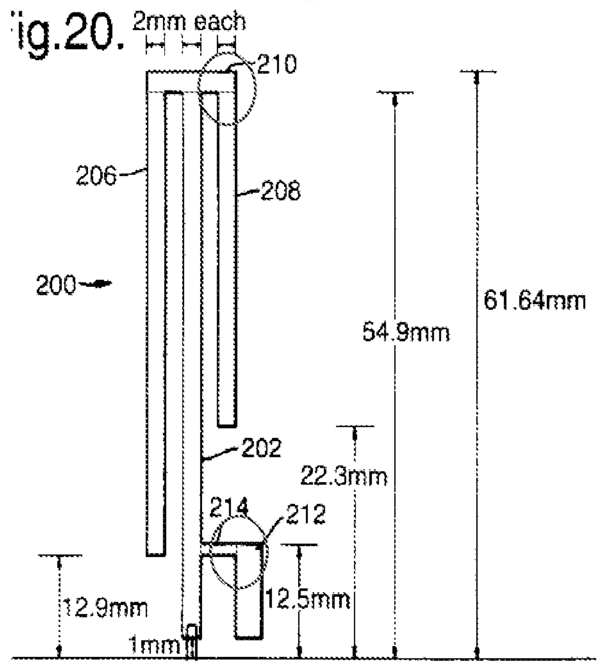
3. The antenna according to claim 1, wherein not all the regions or areas of contact between said polygonal or polyhedral elements have the same size.

Kitchener discloses that not all of the regions or areas of contact between said polygonal or polyhedral elements have the same size (*i.e.*, as annotated by the Requester and shown below in Example A, two different sized contact areas are in the single circle and, as annotated by the Requester and shown below in Example C, with different sized contact areas in each circle). With respect to Example C, the upper circle includes a contact area of 2 mm and the lower circle includes a contact area of 0.4 mm. Kitchener at Figures 10 and 20; p. 7, lines 26-28; and p. 11, lines 8-16.

Example A:



Example C:

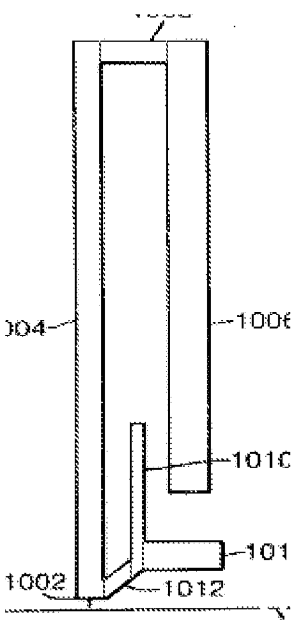


Examples A and C illustrate Figures 10 and 20 of Kitchener, respectively, and each is annotated by Requester to show the four-sided polygons and to show that the contact areas of the polygonal elements in the circles (for example, the two contacts in the circle in Example A and the contacts in each of the circles in Example C with the circles added by Requester) have different sizes.

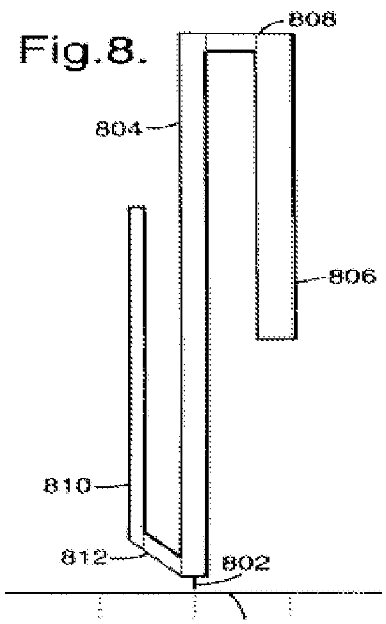
6. The antenna according to claim 1, wherein said at least one multilevel structure is formed by polygons of a single type, selected from the group consisting of four-sided polygons, pentagons, hexagons, heptagons, octagons, decagons, and dodecagons.

Kitchener discloses that at least one multilevel structure is formed by polygons of a single type – four-sided polygons (*i.e.*, as annotated by the Requester and shown below in Examples A-C, the multilevel structures are formed by four-sided polygons). Kitchener at Figures 8, 10, and 20 (as annotated by the Requester); p. 7, lines 13-23; p. 7, lines 26-28; and p. 11, lines 8-16.

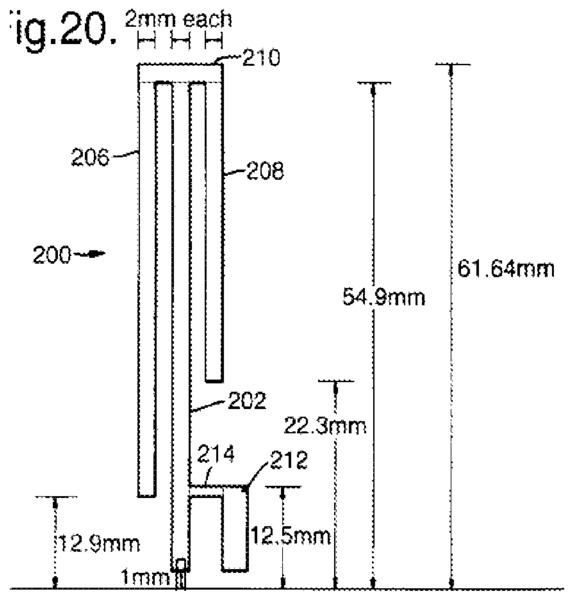
Example A:



Example B:



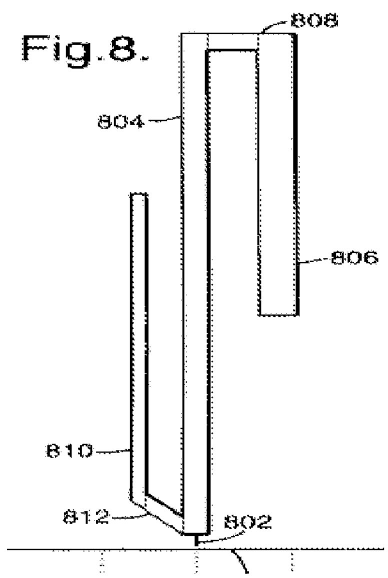
Example C:



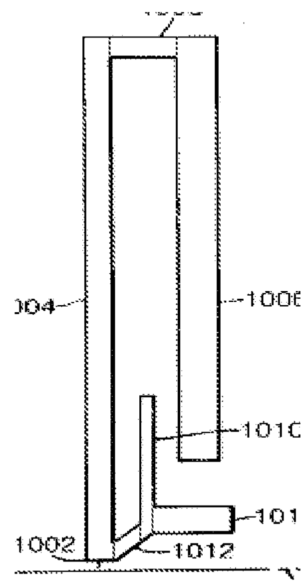
12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.

Kitchener discloses wherein at least one multilevel structure is mounted in a monopole configuration. Specifically, Kitchener recites "Figure 5 shows a three dimensional dual resonant monopole." Kitchener at p. 5, line 14. Kitchener further recites that "The first embodiment [of Figure 5] is a two dimensional equivalent of the three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 3-5. The antennae illustrated in Figures 8 and 10 are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Kitchener at p. 7, lines 13-28. Specifically, Kitchener recites "Figure 8 is an alternative to this design [Figure 6] that there are no third and fifth arms and that second arm 806 is parallel with the first member 804....Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found improving matching." Kitchener at p. 7, lines 21-28. *See also* Kitchener, Figures 8 and 10.

Example A:



Example B:



23. The antenna according to claim 1, wherein said antenna is being shared by several communication services or systems.

Kitchener discloses an antenna (operating at two frequency bands) which are shared by several communication services or systems (*i.e.*, cellular telephones operating in the frequency band of 824-896 MHz and personal communications system (PCS) operating in the frequency band of 1850-1990 MHz). Kitchener at p. 1, lines 14-15; p. 2, lines 19-21; p. 8, lines 15-18; p. 9, lines 4-6; p. 10, lines 9-10; and p. 11, lines 17-18.

32. The antenna according to any one of claims 1, 5, 13, 15, or 16 wherein said antenna is included in a portable communications device.

Kitchener discloses an antenna included in a portable communication device (*i.e.*, "It is a further object of the present invention to provide a multi-resonant antenna for use in **mobile telephone equipment** operable according to multiple operating frequencies."). Kitchener at p. 2 lines 19-21 (emphasis added). *See also* Kitchener at p. 6, lines 11-15; p. 8, lines 5-7; and p. 11, lines 30-32.

33. The antenna according to claim 32, wherein said portable communications device is a handset.

Kitchener discloses the portable communications device being a handset (*i.e.*, "Flexible dielectric substances can be employed which, in the case of a mobile communications handset, would enable the antenna to be flexible."). Kitchener at p. 8, lines 5-7 (emphasis added). *See also* Kitchener at p. 2, lines 19-21; p. 6, lines 11-15; and p. 11, lines 30-32.

34. The antenna according to claim 33, 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.

Kitchener discloses an antenna (operating at two frequency bands) being shared by several communication services or systems (*i.e.*, mobile telephones operating in the frequency band of 824-896 MHz and operating in the frequency band of 1850-1990 MHz) in which both frequency bands operate within the 800–3600 MHz range. Kitchener at p. 1, lines 14-15; p. 2, lines 19-21; p. 8, lines 15-18; p. 9, lines 4-6; p. 10, lines 9-10; and p. 11, lines 17-18.

35. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 890 MHz-3600 MHz frequency range.

Kitchener discloses an antenna (operating at two frequency bands) being shared by several communication services or systems (*i.e.*, mobile telephones operating in the frequency band of 824-896 MHz and operating in the frequency band of 1850-1990 MHz) with at least one of the frequency bands operating within the 890–3600 MHz range. Kitchener at p. 1, lines 14-15; p. 2, lines 19-21; p. 8, lines 15-18; p. 9, lines 4-6; p. 10, lines 9-10; and p. 11, lines 17-18.

D. CLAIMS 14 AND 26 ARE RENDERED OBVIOUS BY KITCHENER, IN VIEW OF KORISCH, UNDER 35 U.S.C. § 103

Please see attached Claim Chart, Exhibit CC-D, for a comparison of Claims 14 and 26 of the '868 patent with Kitchener and Korisch

Requester respectfully submits that Claims 14 and 26 of the '868 patent are rendered obvious by Kitchener in view of Korisch under 35 U.S.C. § 103. A claim chart applying Kitchener and Korisch is submitted herewith as Exhibit CC-D.

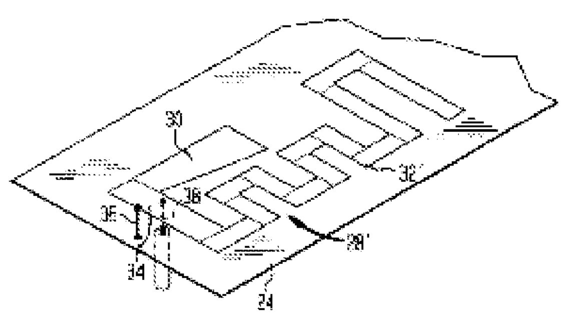
Reasons to combine:

To the extent Kitchener does not specifically disclose a multilevel structure antenna in a patch antenna configuration as recited in claim 14 and does not specifically disclose an interconnection circuit as recited in claim 26, Kitchener discloses a patch antenna configuration as recited in claim 14 and discloses an interconnection circuit as recited in claim 26. Specifically, Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). Kitchener at p. 7, lines 2-5 and p. 8, lines 4-8. Korisch discloses a multilevel structure antenna on a printed circuit board in a patch configuration and having an interconnection circuit that links the antenna to an input/output connector and matches impedances of the antenna and the input/output connector. Korisch at Col. 2, line 54 – Col. 3, line 9; and Col. 3, lines 20-46. Since Kitchener and Korisch disclose multilevel structure antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Kitchener and Korisch to have a multilevel structure antenna on a printed circuit board in a patch configuration and to match impedances.

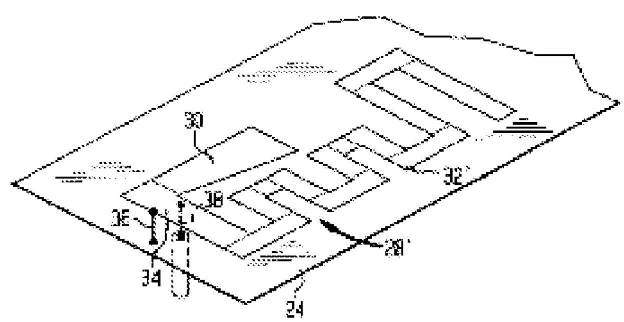
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.

To the extent Kitchener does not disclose a patch antenna having at least one multilevel structure mounted substantially parallel to a ground plane in a patch antenna configuration, Korisch discloses at least one multilevel structure (*i.e.*, the unitary second layer 28 in Figure 3 and 28' in Figure 4, as annotated by the Requester and shown below in Examples A-C) mounted substantially parallel to a ground plane (*i.e.*, the first layer 23 in Figures 3 and 4) in a patch antenna configuration as shown below in Figure 5.

Example A:



Example B:



Example C:

FIG. 3

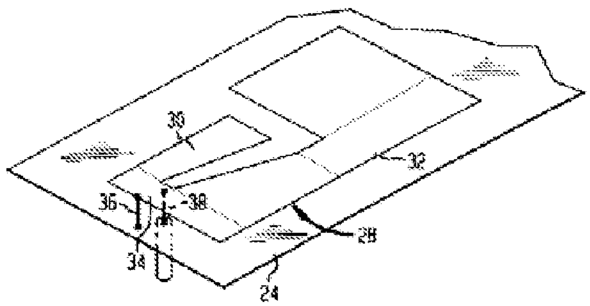
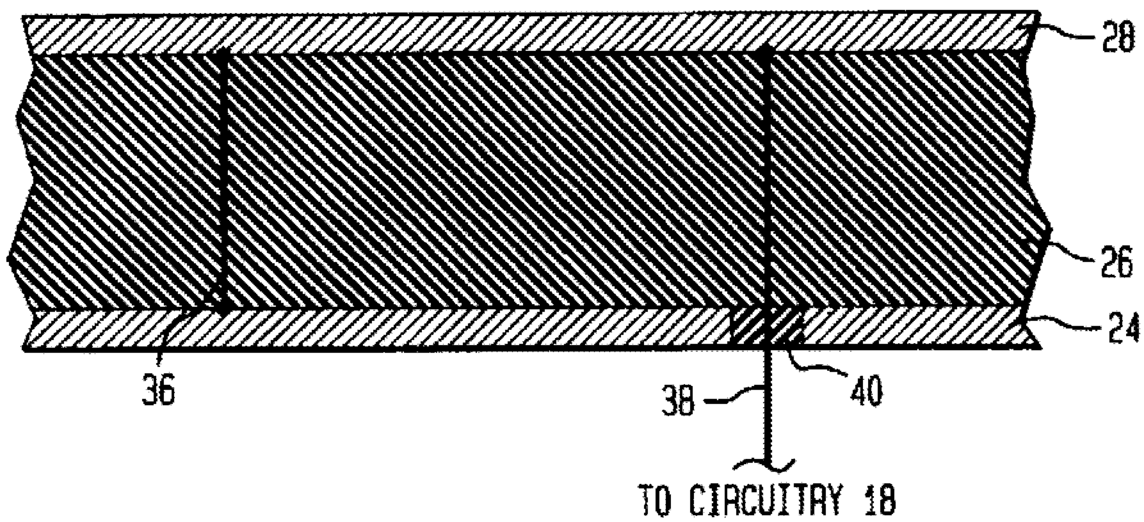


FIG. 5

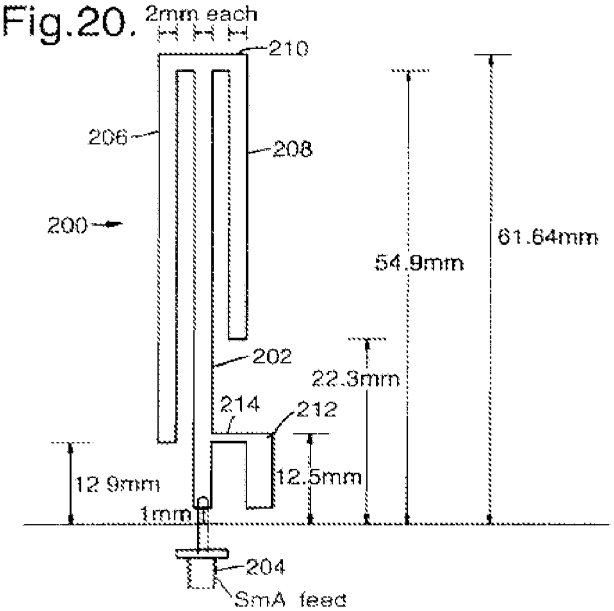


The antenna in Korisch is a multilevel structured printed antenna on a printed circuit board. Korisch at Figures 3 and 4 (as annotated by the Requester and shown above in Examples A-C); Figure 5; Col. 2, line 54 – Col. 3, line 9; Col. 3, lines 20-46. Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). Kitchener at p. 7, lines 2-5 and p. 8, lines 4-8. Thus, it would be obvious to one of ordinary skill in art at the time of invention to replace the multilevel structured printed antenna of Korisch with the multilevel structured printed antenna of Kitchener since Korisch and Kitchener are both directed to multilevel structured printed antennae on printed circuit boards, and thereby have an antenna having the at least one multilevel structure in a patch antenna configuration.

26. The antenna according to claim 1, wherein said antenna includes an interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for impedances, filters or diplexers.

Kitchener discloses a multilevel structured antenna being connected to a SmA connector feed 204. Kitchener at Figure 20 (shown below); and p. 11, lines 8-12.

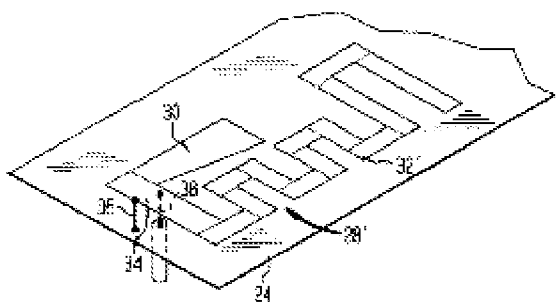
Fig.20.



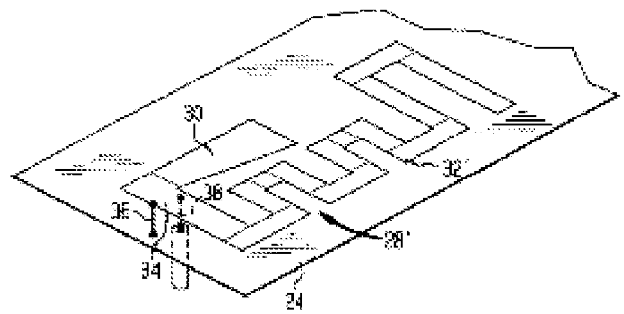
Kitchener at Figure 20. Korisch discloses a multilevel structured antenna (*i.e.*, antenna 20) having an interconnection circuit (*i.e.*, a grounding pin 36 and a connecting pin 38) that links the antenna to an input/output connector (*i.e.*, to ground and to the transceiver circuitry 18), and which is used to incorporate adaptation networks for impedances, filters or diplexers (*i.e.*, "The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands."). Korisch at Col. 3, lines 44-46. *See also* Korisch at Figures 3 and 4 (as annotated by the Requester and shown below in Examples A-C); Figure 5; and Col. 3, lines 20-46. The antenna in Korisch is a multilevel structured printed antenna on a printed circuit board. Korisch at Figures 3 and 4; Col. 2, line 54 – Col. 3, line 9; Col. 3, lines 20-46. Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). Kitchener at p. 7, lines

2-5 and p. 8, lines 4-8. Thus, it would be obvious to one of ordinary skill in art at the time of invention to replace the multilevel structured printed antenna of Korisch with the multilevel structured printed antenna of Kitchener (Kitchener at p. 7, lines 2-5 and p. 8, lines 4-8) since Korisch and Kitchener are both directed to multilevel structured printed antennae on printed circuit boards, and thereby have an interconnection circuit to maintain the antenna impedance at 50 ohms for both frequency bands.

Example A:



Example B:



Example C:

FIG. 3

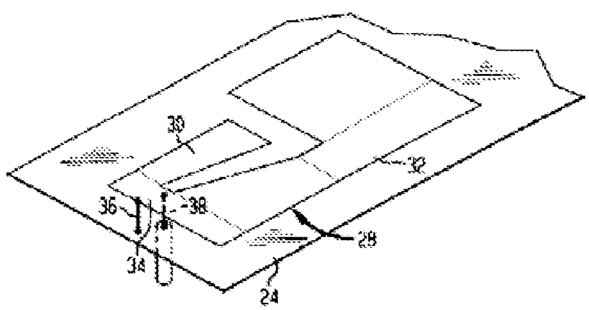
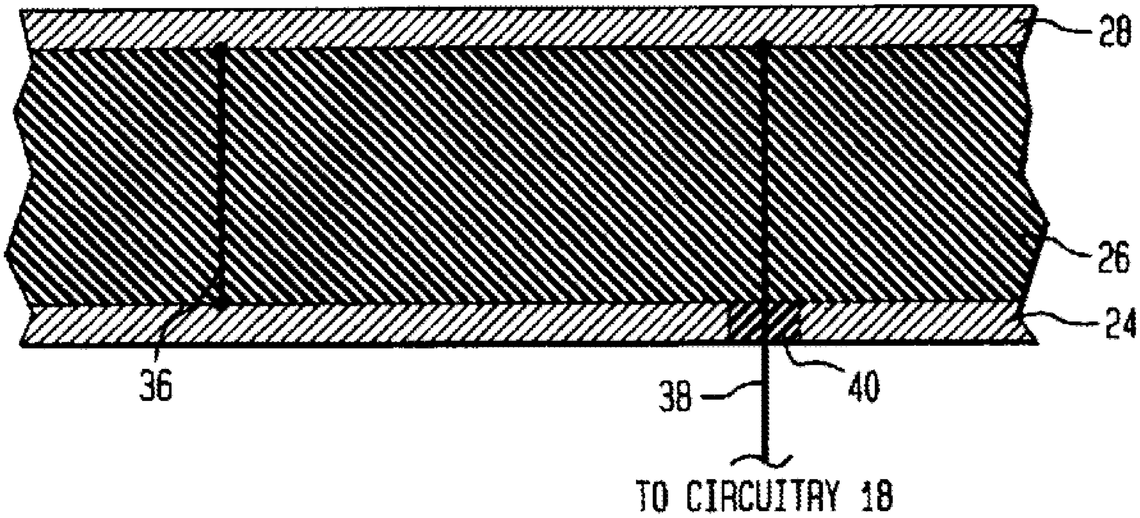


FIG. 5



E. CLAIMS 1, 3, 6, 12, 14, 23, AND 32-35 ARE RENDERED ANTICIPATED BY COHEN UNDER 35 U.S.C. § 102

Please see attached Claim Chart, Exhibit CC-E, for a comparison of Claims 1, 3, 6, 12, 14, 23, and 32-35 of the '868 patent with Cohen

Requester respectfully submits that Claims 1, 3, 6, 14, 23, and 32-35 of the '868 patent are rendered anticipated by Cohen under 35 U.S.C. § 102. A claim chart applying Cohen is submitted herewith as Exhibit CC-E.

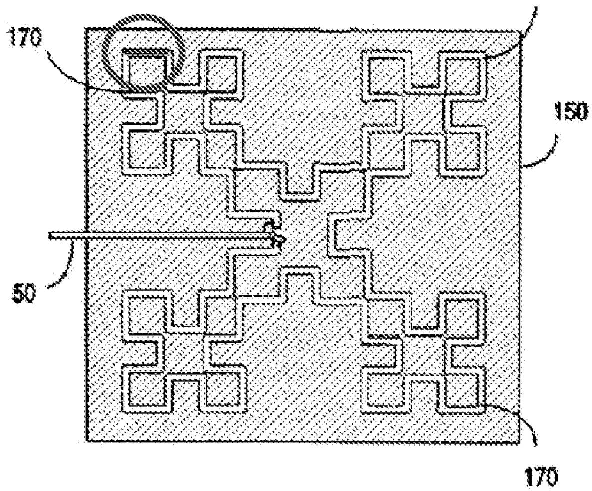
1. A multi-band antenna including:

Cohen discloses a multi-band antenna (*i.e.,* an antenna operating in two frequency bands). *See* Cohen at Col.11, lines 12-17, ("[A]ntenna of FIG. 5B exhibits more resonance frequencies than the antenna of FIG. 5B *[sic 5A]* …"); *See also* Cohen at Col.22, lines 46-47, ("[A]ntennas are **multiband**."). (Emphasis added).

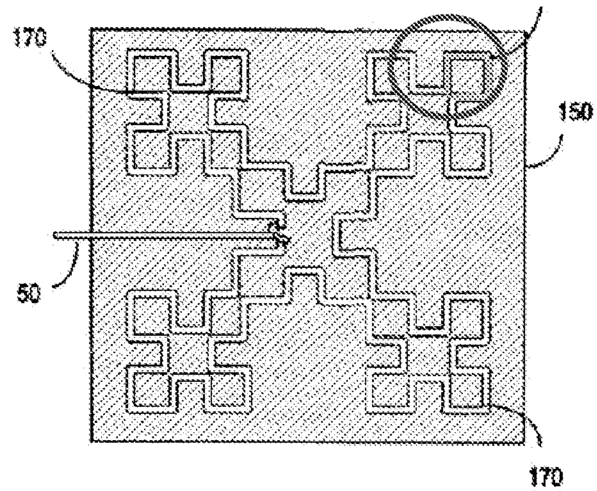
at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements having the same number of sides or faces,

Cohen discloses at least one multilevel structure (*i.e.,* totality of conductive traces 170 of Figure 7C-1 as annotated by the Requester and shown below in Example A) having 100 sides wherein the multilevel structure comprises various sets of polygonal or polyhedral elements (*i.e.,* four-sided polygons or a 20-sided polygon, each as annotated by the Requester and shown below in Examples A-C) having the same number of sides or faces (*i.e.,* a single element with four sides, a four-sided polygon with four sides, or a 20-sided polygon with 20 sides). Cohen at Figures 7C-1 and 2B; and Col.18, lines 54-59.

Example A:



Example B:



Example C:

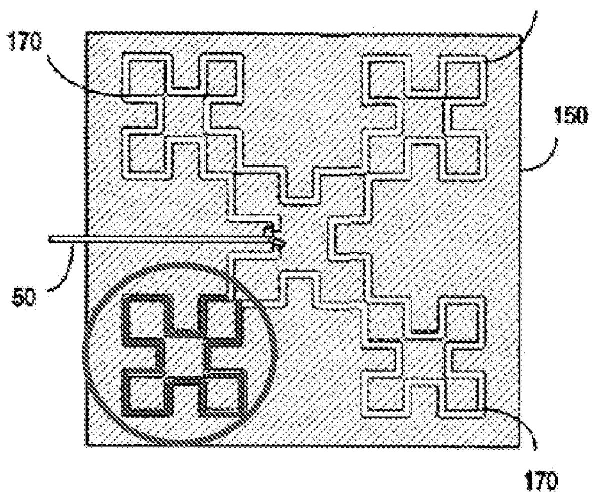


FIG. 2B

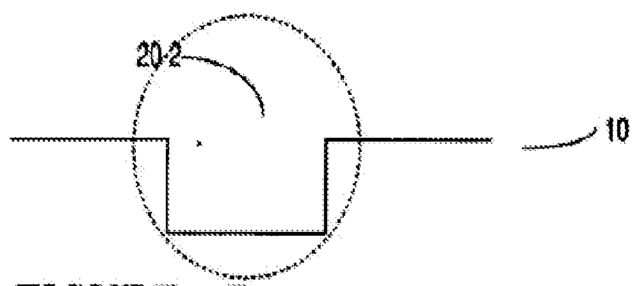
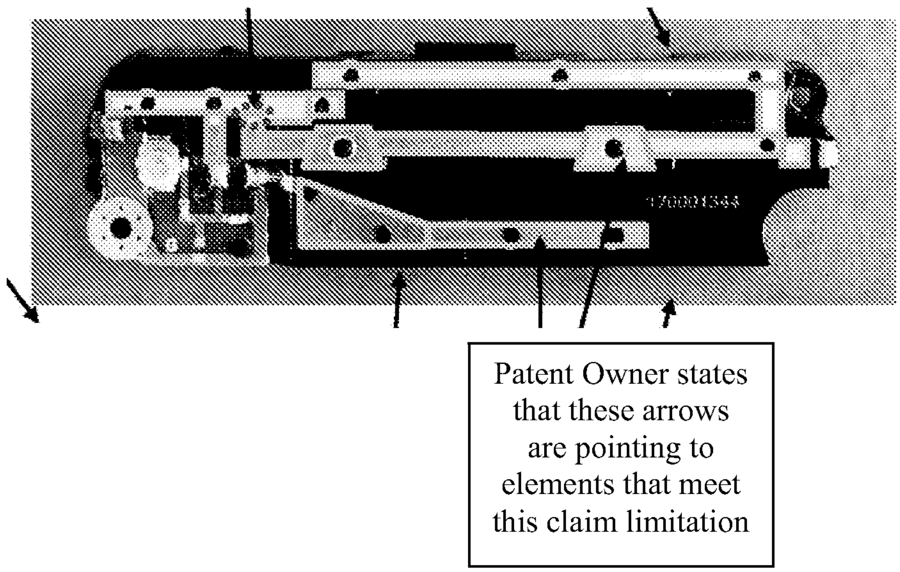


FIGURE 2B (PRIOR ART)

Example A illustrates Figure 7C-1 of Cohen, annotated by Requester to show one-hundred four-sided polygons. Example B illustrates Figure 7C-1 of Cohen, annotated by Requester to show twenty-five four-sided polygons. Example C illustrates Figure 7C-1 of Cohen, annotated by Requester to show five twenty-sided polygons. Figure 2B illustrates a three-sided box Minkowski motif that is depicted in Figure. 7C-1.

While the specification of the '868 patent does not provide a clear definition of the elements of this claim, the Patent Owner has provided Infringement Contentions that will be used to interpret this clause, since the Infringement Contentions are presumably within the broadest reasonable interpretation, at least from the Patent Owner's viewpoint.



Infringement Contentions for the Samsung Instinct M800 at p. 2 (annotated by the Patent Owner to show four-sided polygons)

With this being the guidance offered by the Patent Owner as to the meaning of this claim limitation, apparently all that is required is a random assortment of same-sided polygons; in the Infringement Contentions it is a group of various shaped four-sided polygons subjectively superimposed on to the antenna. Therefore, Cohen discloses all the limitations as defined by the Patent Owner. Specifically, Examples A-C as annotated by the Requester and shown above, disclose this. As shown, there is a multilevel structure having an overall shape of more than four sides or twenty-five sides that is composed of various same-sided polygons. Cohen at Figure 7C-1; and Col.18, lines 54-59.

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

Cohen discloses each of the elements being electromagnetically coupled to at least one other element directly through at least one point of contact (*i.e.,* all points are directly coupled by being part of the same continuous piece of metal as annotated by the Requester and shown below in Figure 7C-1). Cohen at Figure 7C-1; Col. 12, lines 1-4; and Col. 12, lines 34-40. Cohen also discloses elements being electromagnetically coupled to at least one other element through a small separation providing coupling. *See* Cohen at Col. 12, lines 5-8, (Regarding Figure 7C-1, "Applicant notes that while various corners of the Minkowski rectangle motif may appear to be touching in this and perhaps other figures herein, in fact no touching occurs.").

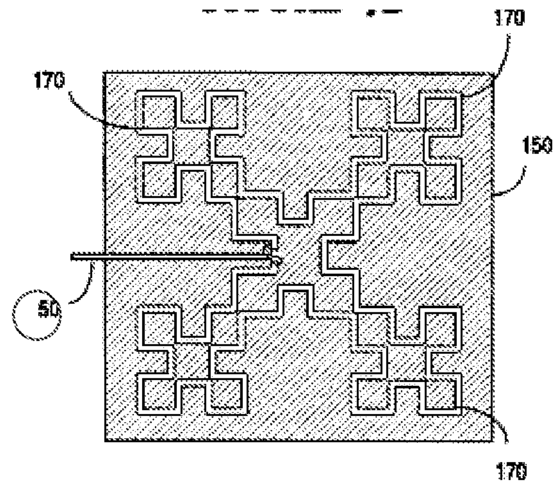


FIGURE 7C-1

FIG. 7C-1, as annotated by Requester to show the direct electromagnetic coupling of elements in the circle.

wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements,

Cohen discloses wherein at least 75% of the polygonal or polyhedral elements (*i.e.,* the polygons shown below in Examples A-C), the region or area of contact between the polygonal or polyhedral elements is significantly less than 50% of the perimeter or area of the elements (*i.e.,* as shown below in Examples A-C). Cohen, Figure 7C-1.

Example A:

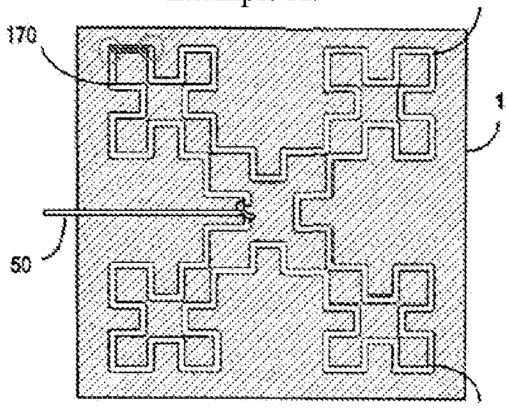


FIG. 7C-1 (annotated by Requester to show points of contact for 1 of 100 elements of a four-sided polygon whereby the areas of contact between the elements are significantly less than 50% of the perimeter or area of a four-sided polygon element)

Example B:

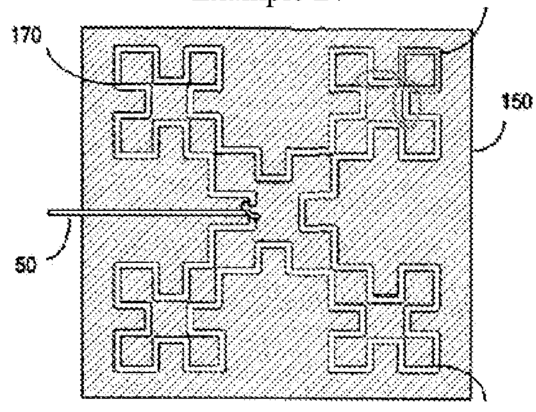


FIG. 7C-1 (annotated by Requester to show points of contact for 1 of 25 four-sided polygons whereby the areas of contact between the four-sided polygons are significantly less than 50% of the perimeter or area of the four-sided polygons)

Example C:

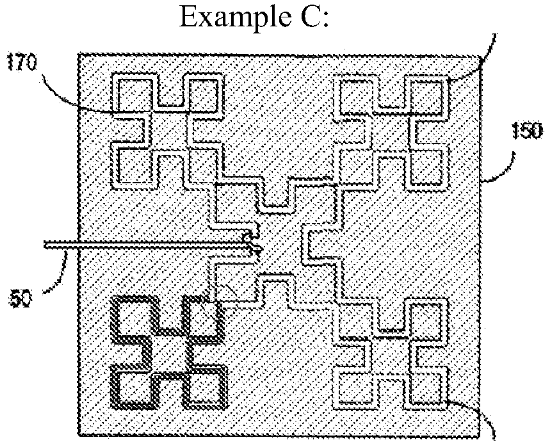


FIG. 7C-1 (annotated by Requester to show points of contact for 1 of 5 twenty-sided polygons whereby the areas of contact are significantly less than 50% of the perimeter or area of a twenty-sided polygon)

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

Cohen discloses that not all of the polygonal or polyhedral elements have the same size (*i.e.,* as annotated by the Requester and shown below Examples A-C with different sized polygonal elements in the circled regions). Cohen at FIG. 7C-1; Col. 18, lines 54-59; Col. 19, lines 19-23; and Col. 5, lines 4-8 (disclosing scaling of repeated design element). Further, as shown below in Example A, the bottom right polygonal element of A differs in size compared to the polygonal element of B (*e.g.,* the element above the cable 50) due to scaling. As shown below in Example B, the bottom right polygonal element of A differs in size compared to the polygonal element of B (*e.g.,* the element below the cable 50) due to scaling. As shown below in Example C, the polygonal element A differs in size compared to the polygonal element B due to scaling.

Example A:

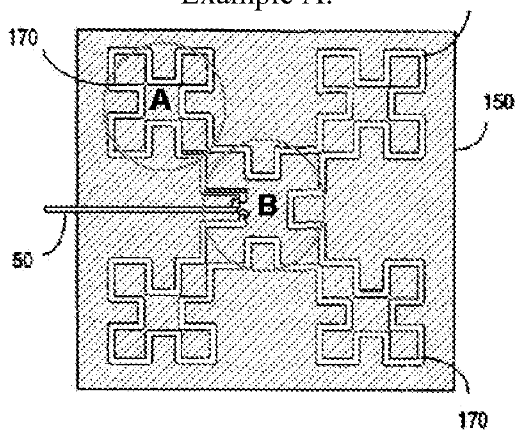


FIG. 7C-1 (annotated by Requester to show single element in region A is not the same size as a single element in region B because of scaling)

Example B:

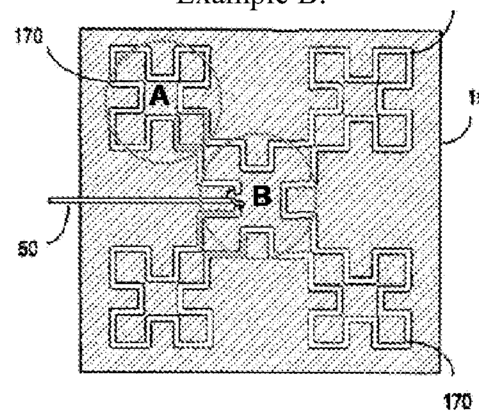


FIG. 7C-1 (annotated by Requester to show single element in region A is not the same size as a single element in region B because of scaling)

Example C:

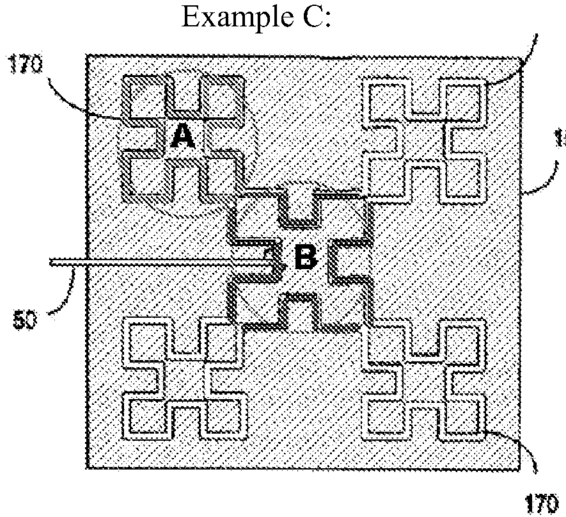


FIG. 7C-1 (annotated by Requester to show twenty-sided polygon in region A is not the same size as twenty-sided polygon in region because of scaling).

the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure.

Cohen discloses the perimeter of the multilevel structure has a different number of sides (*i.e.,* as shown above, 100 sides) than the polygons that compose the multilevel structure (*i.e.,* as annotated by the Requester and shown in Examples A-C, each multilevel structure comprises 4 or 20-sided polygons). Cohen at Figure 7C-1.

Example A:

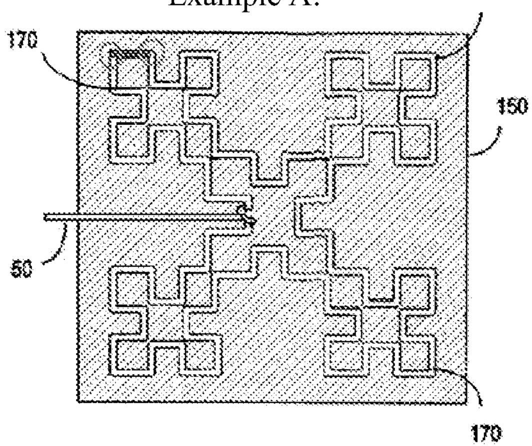


FIG. 7C-1 (annotated by Requester)

Example B:

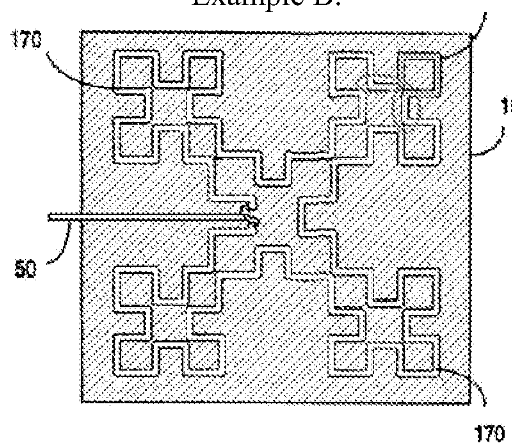


FIG. 7C-1 (annotated by Requester)

Example C:

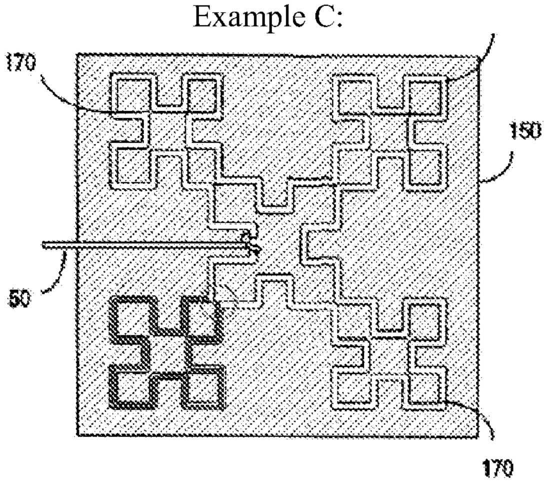


FIG. 7C-1 (annotated by Requester)

3. The antenna according to claim 1, wherein not all the regions or areas of contact between said polygonal or polyhedral elements have the same size.

Cohen discloses that not all of the regions or areas of contact between said polygonal or polyhedral elements have the same size (*i.e.*, as annotated by the Requester and shown below, the contact areas in the circled areas are of different sizes). Cohen at Figure 7C-1; Col. 12, lines

9-13; Col. 18, lines 54-59; Col. 19, lines 19-23; and Col. 5, lines 4-8 (disclosing scaling of repeated design element).

Example B:

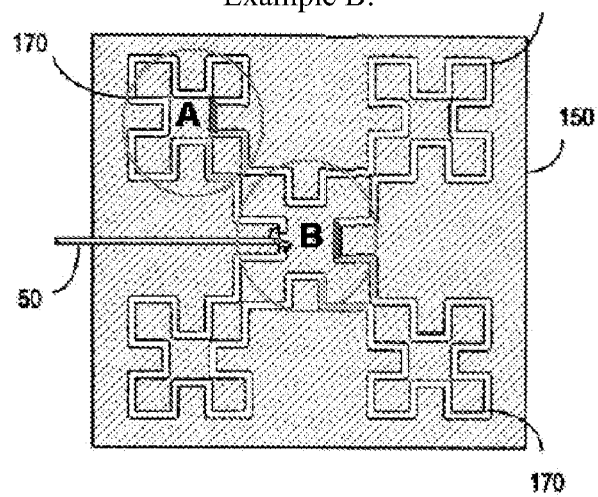


FIG. 7C-1 (annotated by Requester to show areas of contact).

6. The antenna according to claim 1, wherein said at least one multilevel structure is formed by polygons of a single type, selected from the group consisting of four-sided polygons, pentagons, hexagons, heptagons, octagons, decagons, and dodecagons.

Cohen discloses that the multilevel structure is formed by polygons of a single type – four-sided polygons (*i.e.*, as annotated by the Requester and shown below in Examples A and B, the multilevel structures are formed by four-sided polygons). Cohen at Figure 7C-1.

Example A:

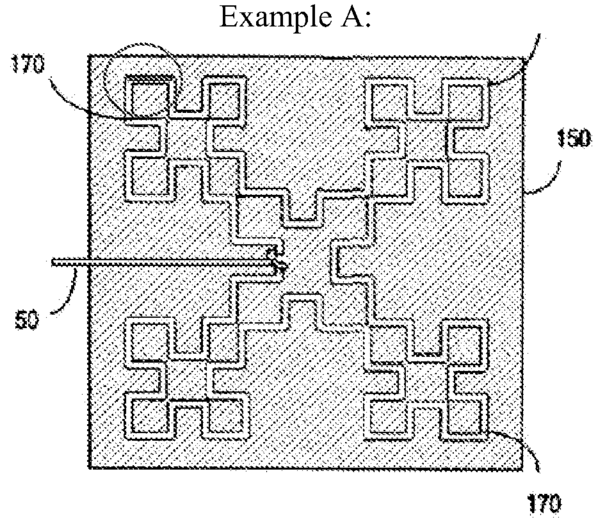


FIG. 7C-1 (annotated by Requester to show one element of the one-hundred elements in the circle representing a four-sided polygon).

Example B:

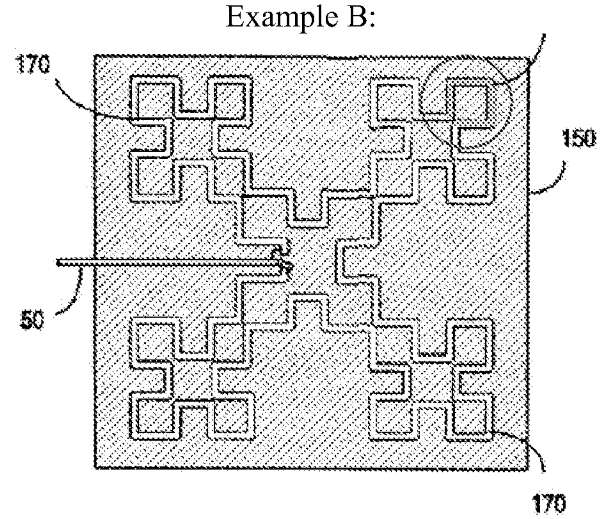
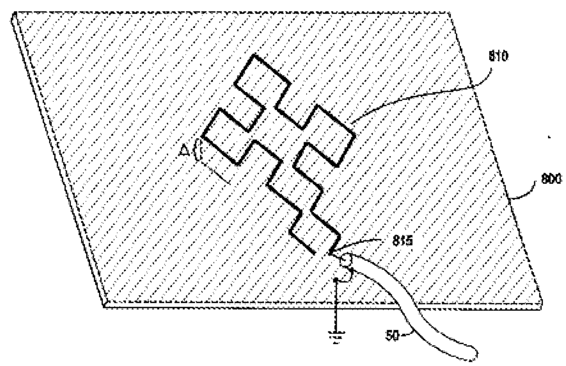


FIG. 7C-1 (annotated by Requester to show one box of the twenty-five boxes in the circle as a four-sided polygon).

12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.

Figure 11A shows a single arm antenna mounted in a monopole configuration. Specifically, Cohen recites that "FIG. 11A is a single arm of an MI-2 fractal antenna[5]. Of course other fractal configurations such as disclosed herein could be used instead of the MI-1 configuration shown, and non-planar configurations may also be used." Cohen at Col. 24, lines 37-40. Thus, the multilevel structure, *i.e.*, the MI-2 antenna shown in FIG. 7C-1, can be used in the monopole configuration of FIG. 11A instead of the MI-1 configuration. *See also* Cohen at Col. 7, lines 26-28.

FIG. 11A



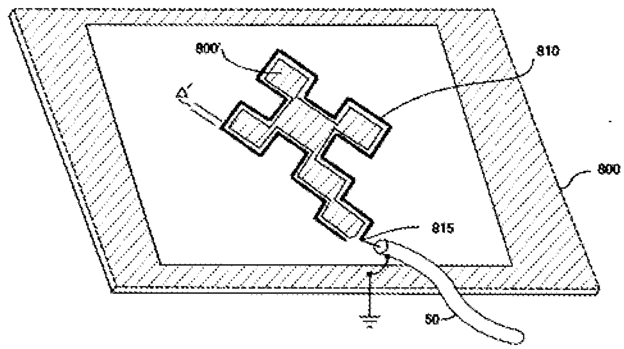
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.

Cohen discloses a single arm MI-1 antenna 810 mounted substantially parallel to a ground plane 800 in a patch antenna configuration. Cohen, FIG. 11B; and Col. 24, line 62 - Col. 25, line 6. Specifically, Cohen recites "FIG. 11B shows an embodiment in which a preferably fractal antenna 810 lies in the same plane as a ground plane 800 but is separated therefrom by an insulating region, and in which a passive or parasitic element 800' is disposed 'within' and spaced-apart a distance Δ' from the antenna, and also being coplanar." Cohen at Col. 24, lines 62-68. Since the antenna 810 is co-planar with the ground plane 800, the MI-1 antenna structure is mounted substantially parallel to a ground plane in a patch antenna configuration. Thus, the

[5] Note that the "fractal" antennae of Cohen are only near-fractal antennae instead of true fractal antennae. *See e.g.,* Cohen at Col. 12, lines 8-13; ("Further it is understood that it suffices if an element according to the present invention is substantially a fractal. By this it is meant that a deviation of less than perhaps 10% from a perfectly drawn and implemented fractal will still provide adequate fractal-like performance, based upon actual measurements conducted by applicant.").

multilevel structure, *i.e.*, the MI-2 antenna shown in FIG. 7C-1, can be used in the patch configuration of FIG. 11B instead of the MI-1 antenna.

FIG. 11B



23. The antenna according to claim 1, wherein said antenna is being shared by several communication services or systems.

Cohen discloses antennae that can be shared by several communication services or systems. For example, Table-1 of Cohen discloses far field radiation patterns for Minkowski island quad antennas for each iteration for four resonating frequencies, e.g., 55, 101, 142 and 198 MHz with each frequency being in a different spectrum, e.g., 101 MHz in the FM radio frequency spectrum and 142 MHz being in the mobile spectrum. Cohen at Col. 19, lines 41-64. *See also* Cohen at Table 5 on page 46 showing additional frequencies for different systems. *See also* Cohen at Col. 22, lines 46-47.

32. The antenna according to any one of claims 1, 5, 13, 15, or 16 wherein said antenna is included in a portable communications device.

Cohen discloses the placement of a multi-band multilevel antenna within a portable communications device (i.e. a cell phone); *see e.g.,* Cohen at Col. 22, lines 9-16, ("As shown by FIGS. 8B and 8C, several such antenna, each oriented differently could be fabricated within the curved or rectilinear case of a **cellular or wireless telephone**…")(emphasis added); *see also* Cohen at Col. 15, lines 32-35 and 51-56; Col. 16, lines 17-23; Col. 17, lines 18-21; Col. 22, lines 18-23; and Figures 8A and 8B, shown below.

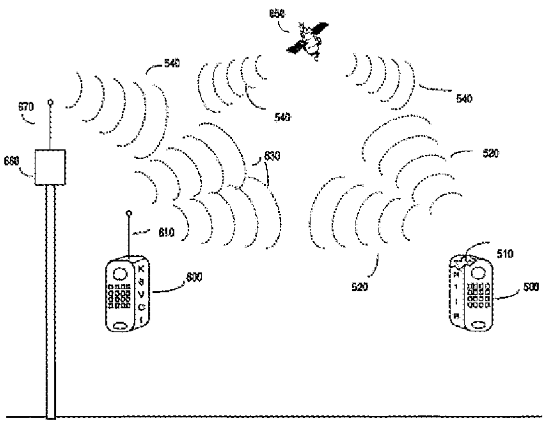


FIG. 8A – Cohen

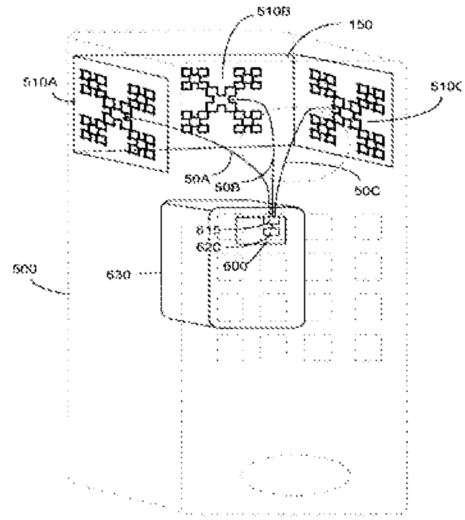


FIG. 8B – Cohen

33. The antenna according to claim 32, wherein said portable communications device is a handset.

Cohen discloses the placement of a multi-band multilevel antenna within a portable communications device (i.e. a handset). *See e.g.,* Cohen at Col. 16, lines 17-19. ("In the embodiment of FIG. 8B, unit 500 is a **handheld** transceiver, and antennas 5l0A, 5l0B, 5l0C, 5l0D preferably are fed for vertical polarization, as shown.")(emphasis added); *see also* Cohen at Col. 22, lines 9-16. ("As shown by FIGS. 8B and 8C, several such antenna, each oriented differently could be fabricated within the curved or rectilinear case of a **cellular or wireless telephone**…")(emphasis added); *see also* Cohen at Col. 15, lines 32-35 and 51-56; Col. 16, lines 17-23; Col. 17, lines 18-21; Col. 22, lines 18-23; and Fig. 8A and Fig. 8B, shown below.

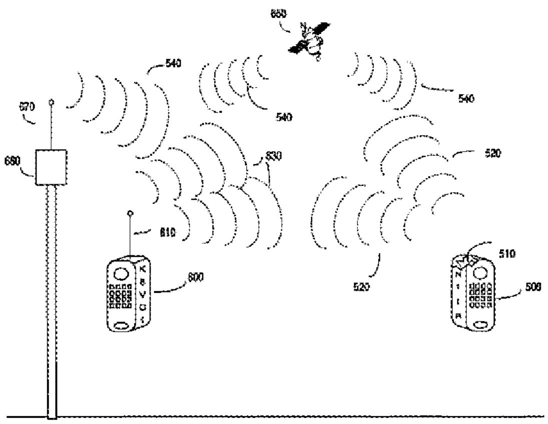


FIG. 8A – Cohen

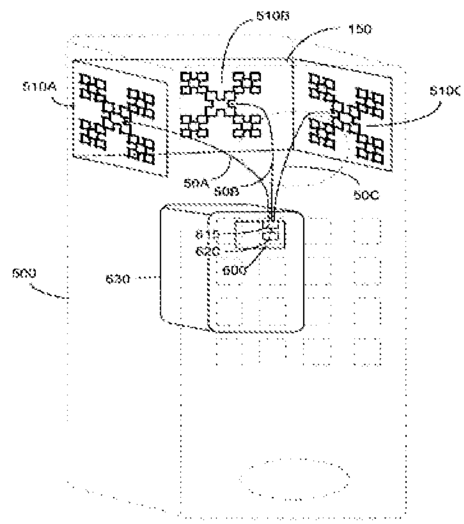


FIG. 8B – Cohen

34. The antenna according to claim 33, 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.

Cohen discloses an antenna operating at multiple frequency bands within the 800 MHz – 3600 MHz frequency range. *See e.g.,* Cohen at Col. 11, lines 13-17; Col. 17, lines 30-34; Col. 22, lines 46-47. Cohen discloses that one of the frequency bands is operating within the 800-3600 MHz frequency range. *See e.g.,* Cohen at Col. 13, lines 1-3, (an MI-2 antenna "for operation in the **850-900 MHz cellular telephone band**."); (emphasis added) *see also* Cohen at Col. 13, lines 19-22, ("**At satellite telephone frequencies of 1650 MHz** or so, the dimensions would be approximately halved again.") (emphasis added); *see also* Cohen at Col. 22, lines 15-22.

35. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 890 MHz-3600 MHz frequency range.

Cohen discloses an antenna operating at multiple frequency bands within the 890 MHz – 3600 MHz frequency range. *See e.g.,* Cohen at Col. 11, lines 13-17; Col. 17, lines 30-34; Col. 22, lines 46-47. Cohen discloses that one of the frequency bands is operating within the 800-3600 MHz frequency range. *See e.g.,* Cohen at Col. 13, lines 1-3, (an MI-2 antenna "for operation in the **850-900 MHz cellular telephone band**."); (emphasis added) *see also* Cohen at Col. 13, lines 19-22, ("**At satellite telephone frequencies of 1650 MHz** or so, the dimensions would be approximately halved again.") (Emphasis added); *see also* Cohen at Col. 22, lines 15-22.

F. Claim 12 Is Rendered Obvious by Cohen, in view of Korisch, Under 35 U.S.C. § 103

Please see attached Claim Chart, Exhibit CC-F, for a comparison of Claim 12 of the '868 patent with Cohen and Kitchener

Requester respectfully submits that Claim 12 of the '868 patent is rendered obvious by Cohen in view of Kitchener under 35 U.S.C. § 103. A claim chart applying Cohen and Kitchener is submitted herewith as Exhibit CC-F.

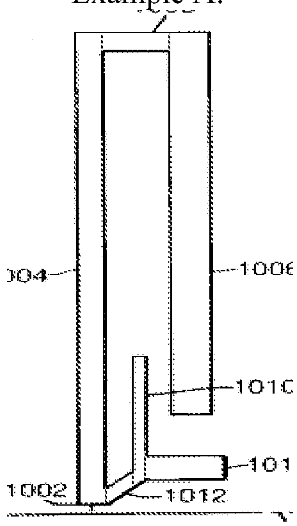
Reasons to combine:

To the extent that Cohen does not disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12, in the alternative Cohen in view of Kitchener an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12. Cohen does disclose that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board …" Cohen at Col. 24, lines 48-56. Cohen discloses that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board, …" Cohen at Col. 24, lines 48-56. Kitchener discloses a multilevel structured antenna on a printed circuit board and at least one multilevel structure is mounted in a monopole configuration. Specifically, Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). Kitchener at p. 7, lines 2-5 and p. 8, lines 4-8. Since Cohen and Kitchener disclose multilevel structure antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Cohen and Kitchener to have a multilevel structure antenna with an interconnection circuit to match antenna impedances.

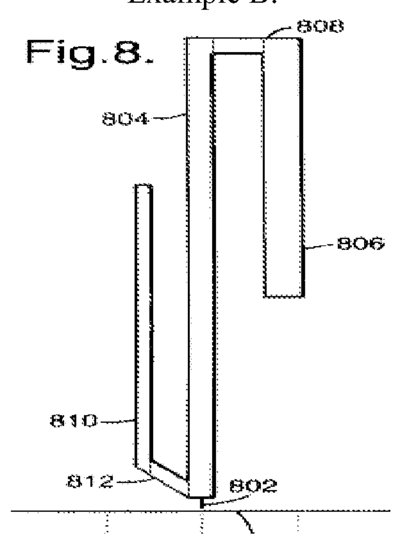
12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.

Kitchener discloses an antenna wherein at least one multilevel structure is mounted in a monopole configuration. Specifically, Kitchener recites "Figure 5 shows a three dimensional dual resonant monopole." Kitchener at p. 5, line 14. Kitchener further recites that "The first embodiment [of Figure 5] is a two dimensional equivalent of the three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 3-5. The antennae illustrated in Figures 8 and 10 are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Kitchener at p. 7, lines 13-28. Specifically, Kitchener recites "Figure 8 is an alternative to this design [Figure 6] that there are no third and fifth arms and that second arm 806 is parallel with the first member 804....Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found improving matching." Kitchener at p. 7, lines 21-28. *See also* Kitchener, Figures 8 and 10, annotated by the Requester and shown below in Examples A and B.

Example A:



Example B:



Since Cohen and Kitchener disclose multilevel structured antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Cohen and Kitchener to have an antenna with at least one multilevel structure mounted in a monopole configuration.

In view of the above, and the detailed application of the prior art against the claim presented below and the attached claim chart, Cohen in view of Kitchener raises an SNQ with respect to claim 12 of the '868 patent since Cohen in view of Kitchener teaches the technical feature of the '868 patent in a new and non-cumulative manner. Accordingly, the Examiner should order reexamination against claim 12 of the '868 patent, cancel this claim, rendering it null, void, and otherwise unenforceable.

G. CLAIMS 14 AND 26 ARE RENDERED OBVIOUS BY COHEN, IN VIEW KORISCH, UNDER 35 U.S.C. § 103

Please see attached Claim Chart, Exhibit CC-G, for a comparison of Claims 14 and 26 of the '868 patent with Cohen and Korisch

Requester respectfully submits that Claims 14 and 26 of the '868 patent are rendered obvious by Cohen in view of Korisch under 35 U.S.C. § 103. A claim chart applying Cohen and Korisch is submitted herewith as Exhibit CC-G.

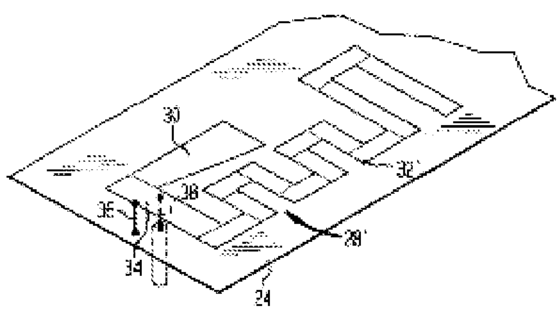
Reasons to combine:

To the extent that Cohen does not disclose an antenna wherein at least one multilevel structure is mounted in a patch configuration as recited in claim 14, in the alternative Cohen in view of Korisch an antenna wherein at least one multilevel structure is mounted in a patch configuration as recited in claim 14. Regarding claim 26, to the extent Cohen does not specifically disclose an interconnection circuit that links the antenna to an input/output connector and which is used to incorporate adaptation networks for impedances, filters, or diplexers, Korisch discloses this feature. Cohen does disclose that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board …" Cohen at Col. 24, lines 48-56. Korisch discloses a multilevel structured antenna on a printed circuit board. Korisch at Figures 3 and 4 (as annotated by the Requester and shown below); Figure 5 (shown below); Col. 2, line 54 – Col. 3, line 9; Col. 3, lines 20-46. In addition, Korisch discloses an antenna mounted in a patch configuration as recited in claim 14 and an antenna having an interconnection circuit that links the antenna to an input/output connector, and matches the impedances of the antenna and the input/output connector as recited in claim 26. Since Cohen and Korisch disclose multilevel structured antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Cohen and Korisch to have an antenna mounted in a patch configuration as recited in claim 14 and an interconnection circuit to match antenna impedances as recited in claim 26.

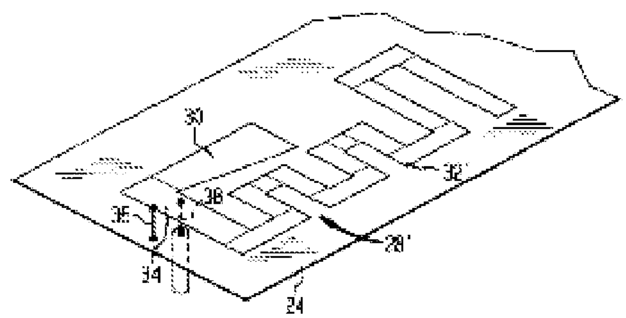
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.

To the extent that Cohen does not disclose an antenna wherein at least one multilevel structure is mounted in a patch configuration as recited in claim 14, Korisch discloses at least one multilevel structure (*i.e.*, the unitary second layer 28 in Figure 3 and 28' in Figure 4, as annotated by the Requester and shown below as Examples A-C) mounted substantially parallel to a ground plane (*i.e.*, the first layer 23 in Figures 3 and 4) in a patch antenna configuration as shown below in Figure 5. Korisch at Figures 3 and 4 (annotated by the Requester and shown below in Examples A-C; Figure 5; Col. 2, line 54 – Col. 3, line 9; and Col. 3, lines 20-46.

Example A:



Example B:



Example C:

FIG. 3

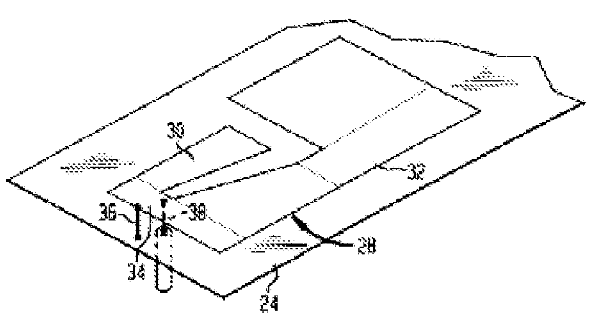
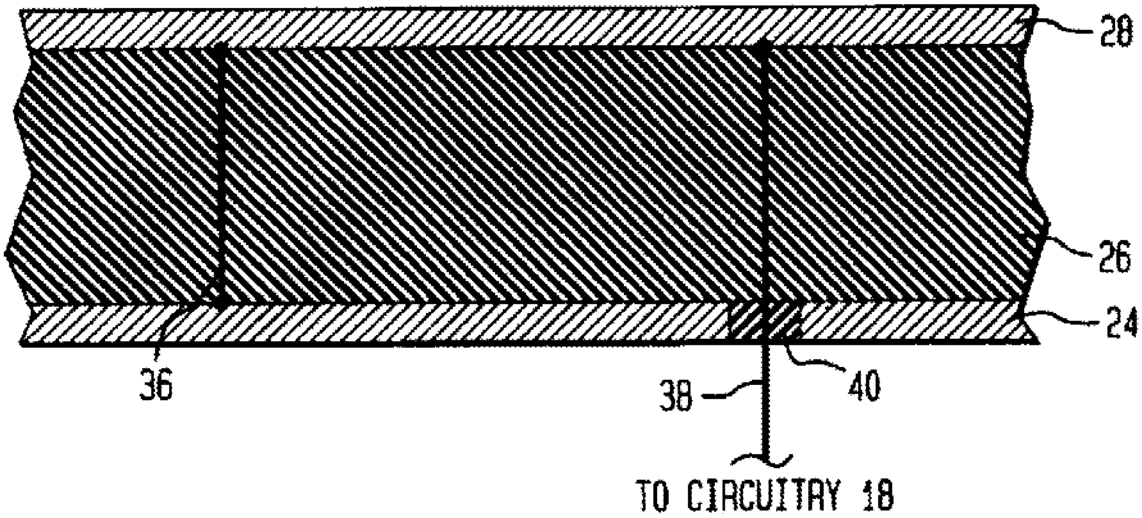


FIG. 5

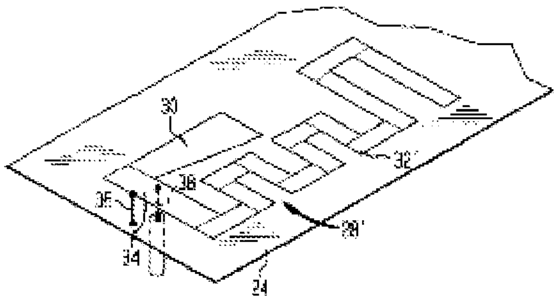


The antenna in Korisch is a multilevel structured printed antenna on a printed circuit board. Korisch at Figures 3 and 4; Col. 2, line 54 – Col. 3, line 9; Col. 3, lines 20-46. Cohen discloses that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board, …" Cohen at Col. 24, lines 48-56. Thus, it would be obvious to one of ordinary skill in art at the time of invention to replace the multilevel structured printed antenna of Cohen with the multilevel structured printed antenna of Korisch since Cohen and Korisch are both directed to multilevel structured printed antennae on printed circuit boards, and thereby have an antenna having the at least one multilevel structure in a patch antenna configuration.

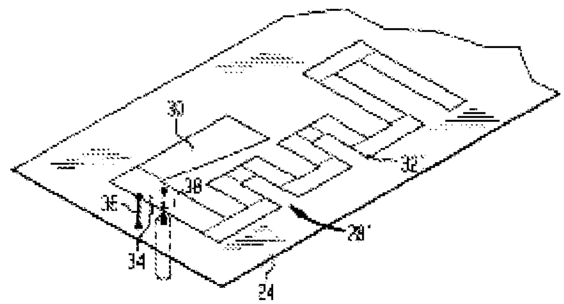
26. The antenna according to claim 1, wherein said antenna includes an interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for impedances, filters or diplexers.

To the extent Cohen does not specifically disclose an interconnection circuit that links the antenna to an input/output connector and which is used to incorporate adaptation networks for impedances, filters, or diplexers, Korisch discloses this feature. Specifically, Korisch discloses a multilevel structured antenna (*i.e.*, antenna 20) having an interconnection circuit (*i.e.*, a grounding pin 36 and a connecting pin 38) that links the antenna to an input/output connector (*i.e.*, to ground and to the transceiver circuitry 18), and which is used to incorporate adaptation networks for impedances, filters or diplexers (*i.e.*, "The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands.”). Korisch at Col. 3, lines 44-46. *See also,* Korisch at Figures 3 and 4 (as annotated by the Requester); Figure 5; and Col. 3, lines 20-46.

Example A:



Example B:



Example C:

FIG. 3

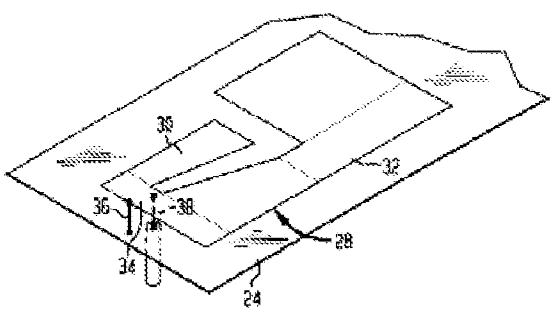
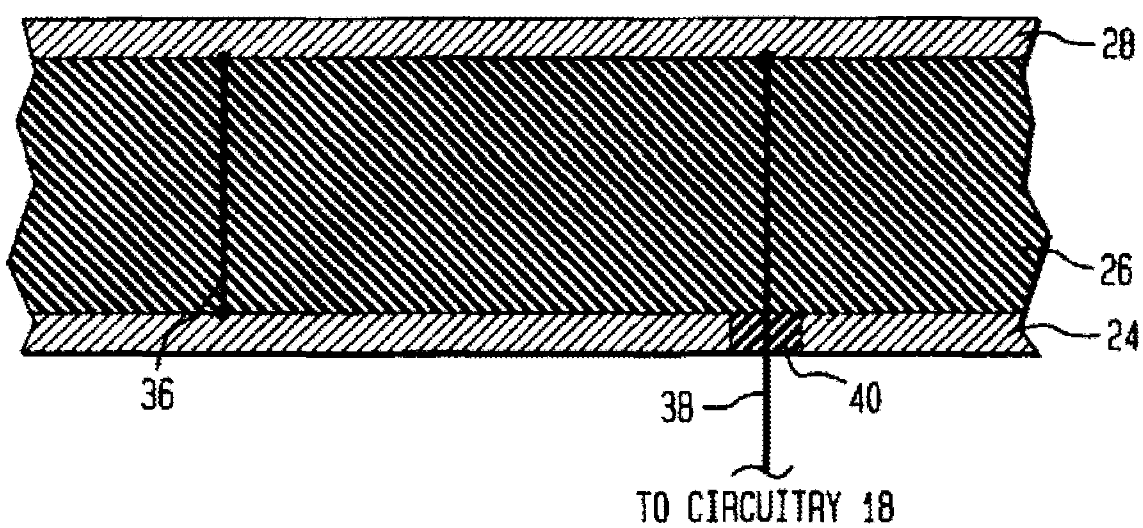


FIG. 5



The antenna in Korisch is a multilevel structured printed antenna on a printed circuit board. Korisch at Figures 3 and 4; Col. 2, line 54 – Col. 3, line 9; Col. 3, lines 20-46. Cohen discloses that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board, …" Cohen at Col. 24, lines 48-56. Thus, it would be obvious to one of ordinary skill in art at the time of invention to replace the printed antenna of Korisch with the printed antenna of Cohen since Korisch and Cohen are both directed to printed antennae on printed circuit boards, and thereby have an interconnection circuit to maintain the antenna impedance at 50 ohms for both frequency bands.

VI. 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 § 2642(II)(A). Claims 1, 3, 6, 12, 14, 23, 26, and 32-35 of the '868 patent are not patentable over the prior art documents cited herein. The prior art documents teach the subject matter of the '868 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, 3, 6, 12, 14, 23, 26, and 32-35 of the '868 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 '868 patent, corresponding claim charts are provided at Exhibit CC-A through CC-G attached hereto.

Enclosed is a credit card authorization to cover the Fee for reexamination. If this authorization is missing or defective, please charge the Fee to the Novak Druce Deposit Account No. 14-1437.

Respectfully submitted,

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Claim Chart comparing claims 1, 3, 6, 12, 14, 23, 26, and 33-35 of US 7,015,868 to Korisch

Prior art cited in this chart:

- U.S. Patent No. 5,926,139 to Korisch ("Korisch")

Claims of the '868 Patent	Disclosure of the Prior Art
Claim 1	
1. A multi-band antenna including	"This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device." Korisch at Col. 1, lines 6-9. "Referring now to the drawings, FIG. 1 shows a handheld portable communications device, designated generally by the reference numeral 10, having a data entry keypad 12 and a display 14 disposed on one surface of the insulative case 16. The device 10 includes a radio transceiver operable in two frequency bands. As will be described in full detail hereinafter, an antenna according to the present invention operable in those bands is also incorporated in the device 10." Korisch at Col. 2, lines 46-53.
at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements having the same number of sides or faces,	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating

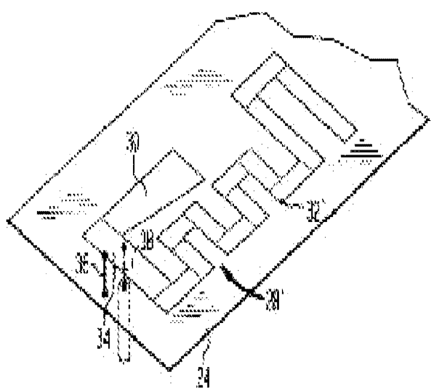
element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24.

As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

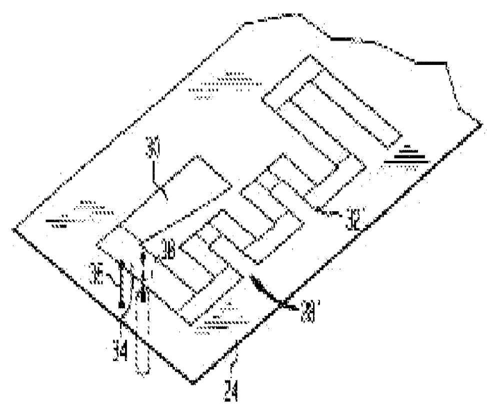
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

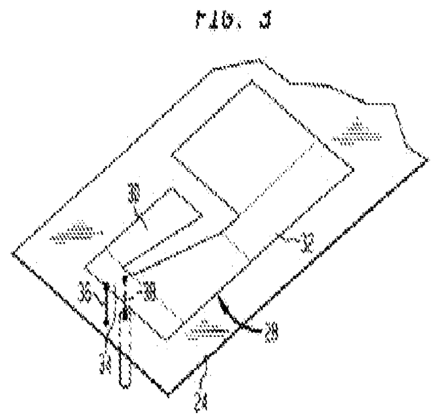
Korisch, Figures 3 and 4 (annotated by Requester)

Example A:



Example B:



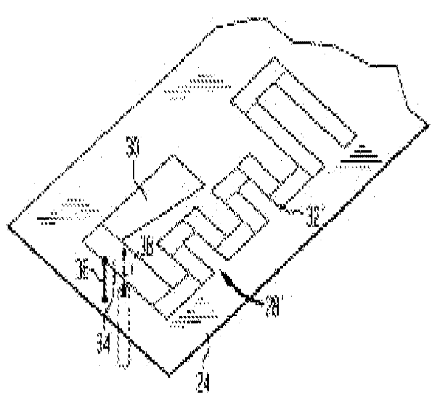
	Example C: 
wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling,	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24.

As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

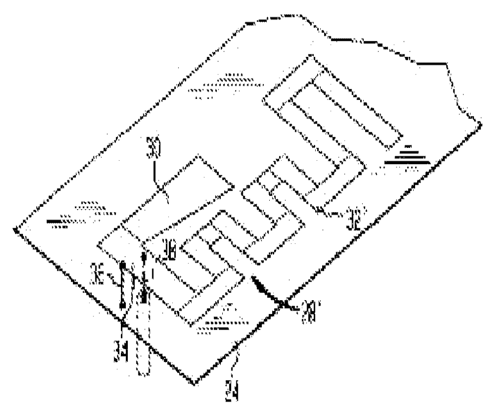
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

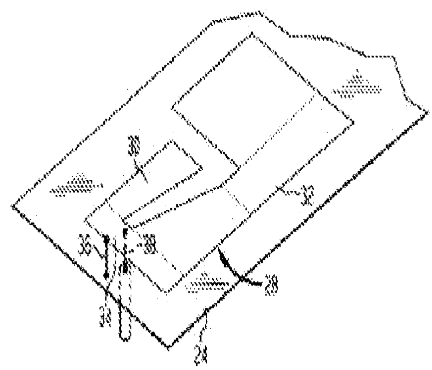
Korisch, Figures 3 and 4 (annotated by Requester)

Example A:



Example B:



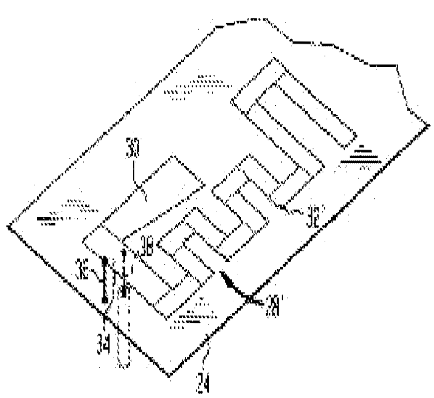
	Example C: FIG. 3 
wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements,	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24. As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30,

32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

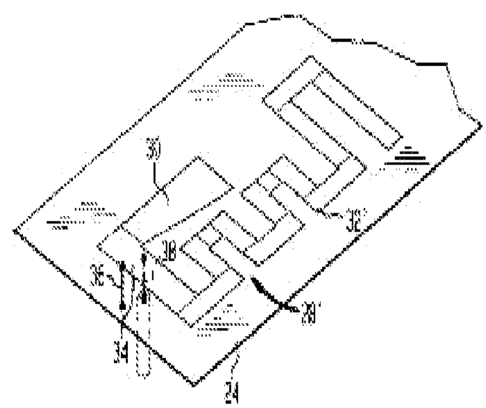
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

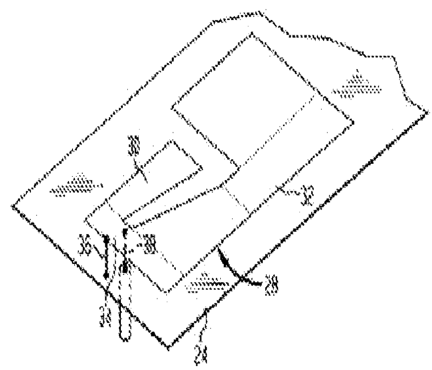
Korisch, Figures 3 and 4 (annotated by Requester)

Example A:



Example B:



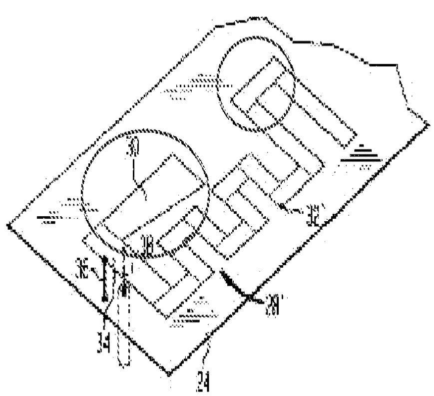
	Example C: FIG. 3 
and wherein not all the polygonal or polyhedral elements have the same size and	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24. As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30,

32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

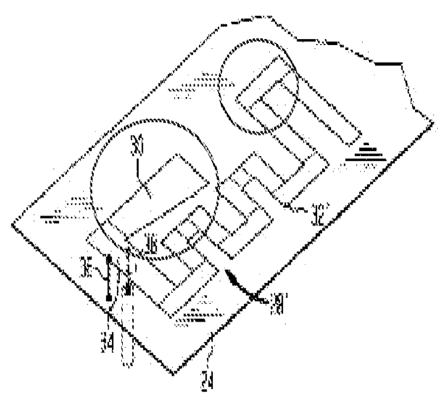
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

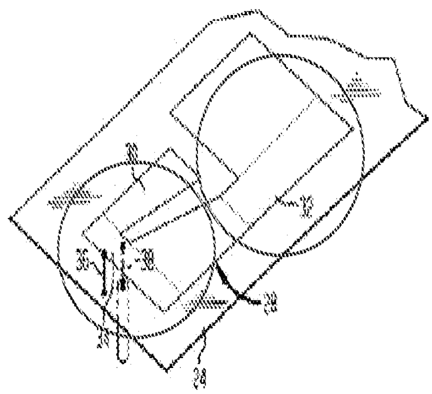
Korisch, Figures 3 and 4 (annotated by Requester to show different sized polygonal elements in the red circles)

Example A:



Example B:



	Example C: FIG. 3 
the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure.	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases

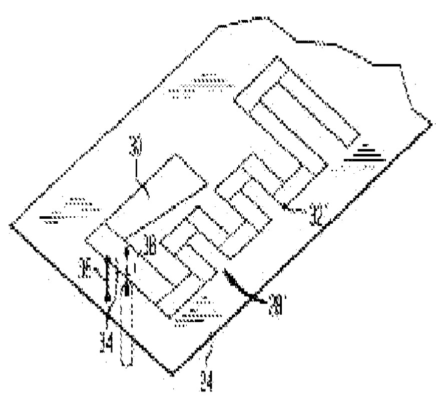
the feed pin 38 must be electrically insulated from the ground plane 24.

As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

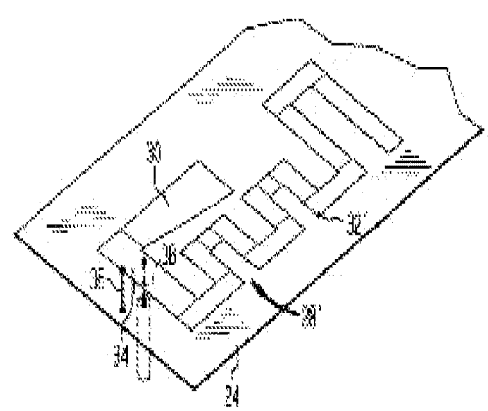
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

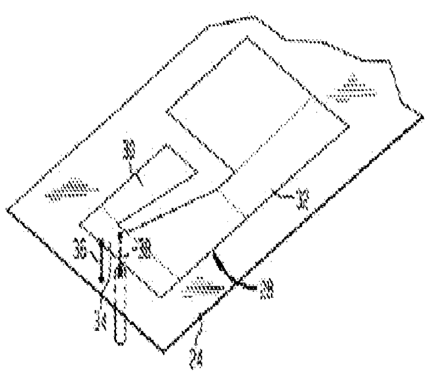
Korisch, Figures 3 and 4 (annotated by Requester)

Example A:



Example B:



	Example C: FIG. 3 
Claim 3	
3. The antenna according to claim 1, wherein not all the regions or areas of contact between said polygonal or polyhedral elements have the same size.	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases

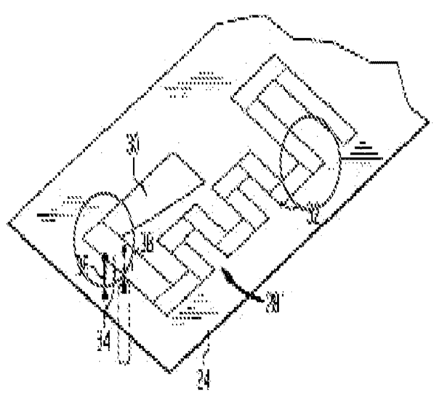
the feed pin 38 must be electrically insulated from the ground plane 24.

As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

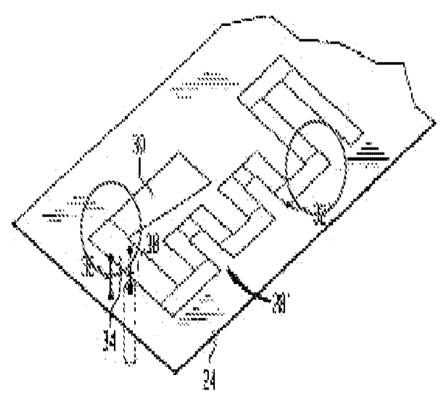
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

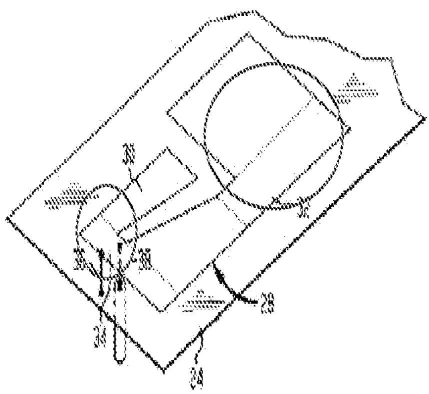
Korisch, Figures 3 and 4 (annotated by Requester to show different sixed contact areas in the red circles)

Example A:



Example B:



	Example C: FIG. 3 
Claim 6	
6. The antenna according to claim 1, wherein said at least one multilevel structure is formed by polygons of a single type, selected from the group consisting of four-sided polygons, pentagons, hexagons, heptagons, octagons, decagons, and dodecagons.	"FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna. The second layer 28 includes a first radiating portion 30 shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands and a second radiating portion 32 shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands. As shown, the first radiating portion 30 is smaller than the second radiating portion 32 and functions as the antenna for the higher of the two frequency bands. The second layer 28 further includes a connecting portion 34 joining the first radiating portion 30 and the second radiating portion 32. A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases

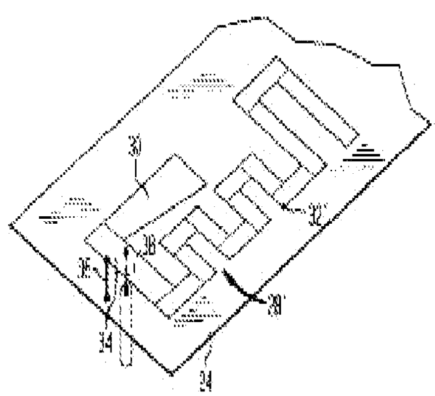
the feed pin 38 must be electrically insulated from the ground plane 24.

As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

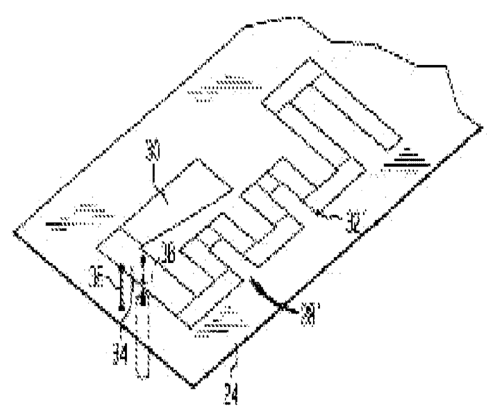
The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands. For the lower frequency band, the shorter radiating portion 30 provides a very high impedance so it doesn't load the longer radiating portion 32. Similarly, for the high frequency band, the longer radiating portion 32 provides a very high impedance so it doesn't load the shorter radiating portion 30."
Korisch at Col. 2, line 66 – Col. 3, line 52.

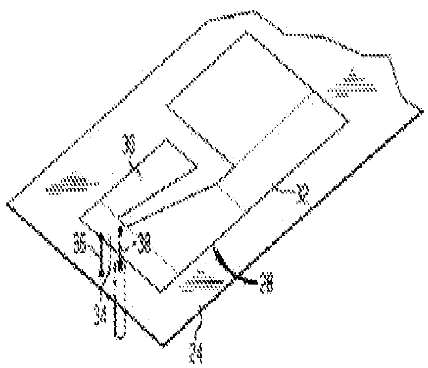
Korisch, Figures 3 and 4 (annotated by Requester)

Example A:



Example B:



	Example C: FIG. 3 
Claim 14	
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.	"FIG. 2 illustrates how the transceiver circuitry 18 within the case 16 is coupled to the antenna 20. As shown, it is conventional that the transceiver circuitry 18 has a single input/output port 22 for both frequency bands. It is known to provide two separate planar antennas on the side of the case 16, one for each frequency band. However, this requires a redesign of the transceiver circuitry 18 to provide separate input/output ports for the two bands. In addition, the use of two separate antennas requires multiple grounding pins, which requires additional space on the printed circuit board holding the transceiver circuitry 18. The present invention overcomes these disadvantages. FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna" Korisch at Col. 2, lines 54 – Col. 3, line 9. "A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground

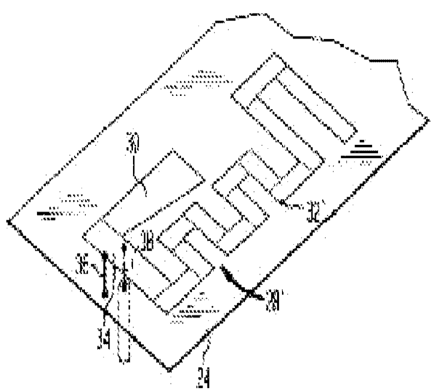
plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24.

As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

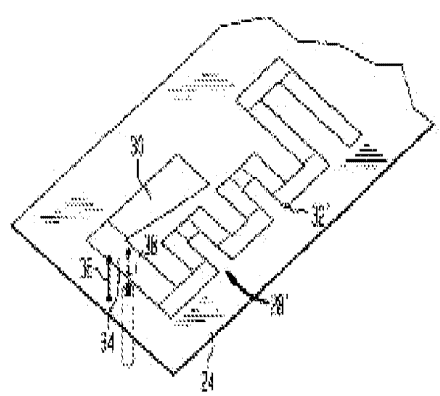
The spacing between the ground pin 36 and the feed pin 36 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands."
Korisch at Col. 3, lines 20-46.

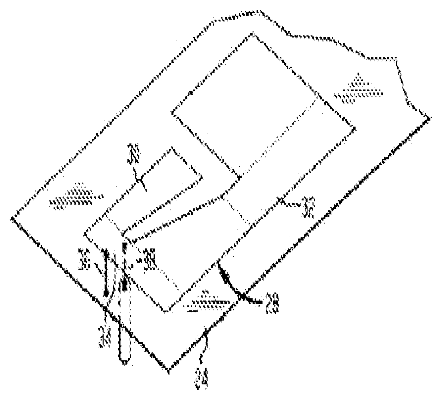
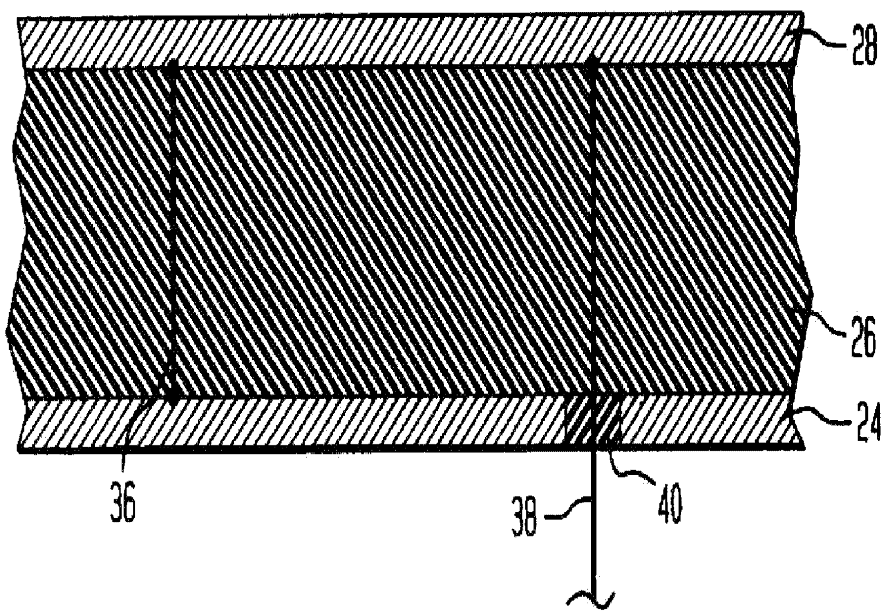
Korisch, Figures 3-5 (Figures 3 and 4 annotated by the Requester)

Example A:

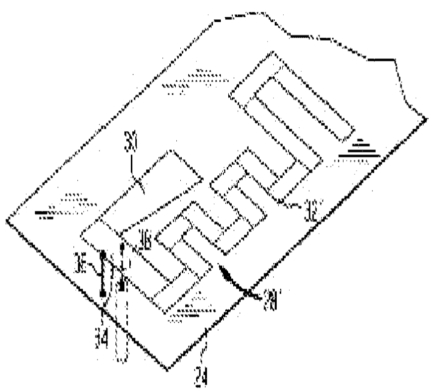
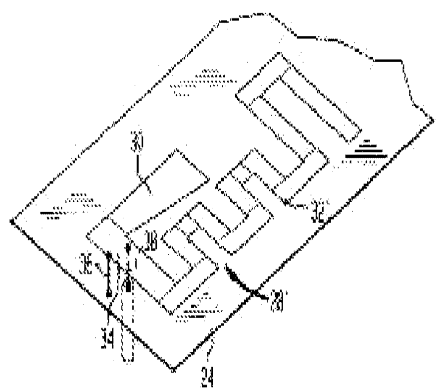


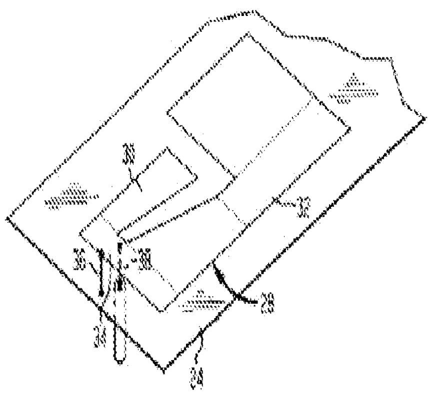
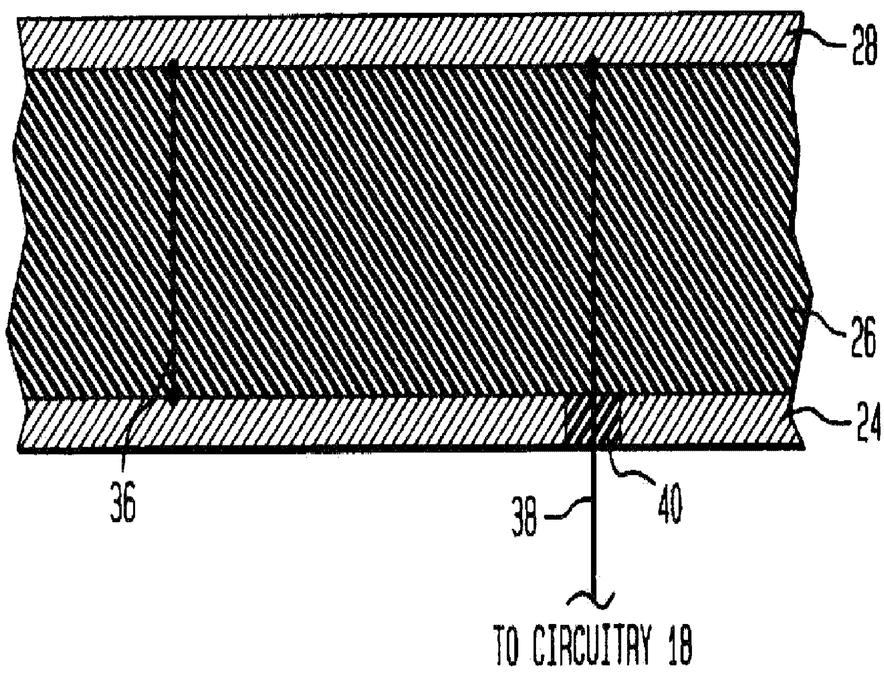
Example B:



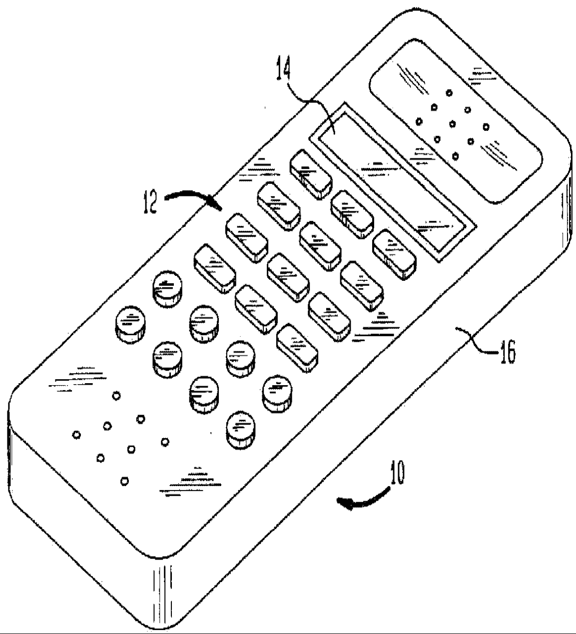
	Example C: FIG. 3  FIG. 5 
Claim 23	
23. The antenna according to claim 1, wherein said antenna is	"This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device.

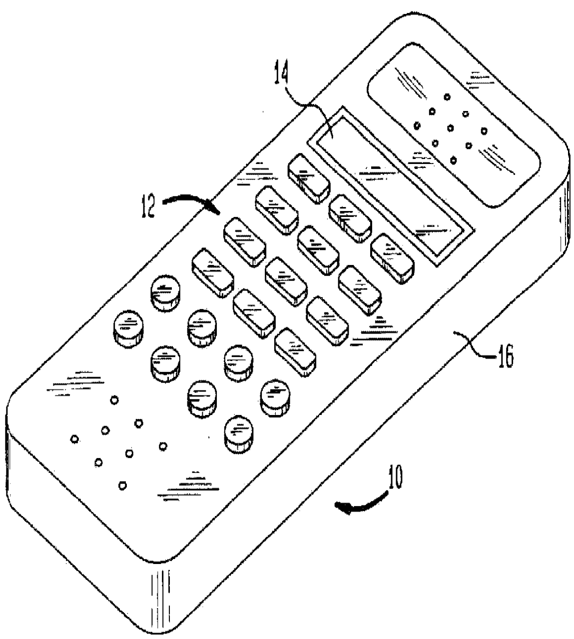
being shared by several communication services or systems.	In recent years, portable handheld wireless communications devices have become increasingly popular. At the present time, cellular telephones operating in the frequency band of 824 MHz through 896 MHz are the most widespread type of such devices. However, the personal communications system (PCS) operating in the frequency band of 1850 MHz through 1990 MHz is gaining in popularity. Accordingly, equipment suppliers are developing portable handheld radio transceivers which operate in both these frequency bands. Thus, there exists a need for an antenna capable of operating in both of the described frequency bands." Korish at Col. 1, lines 6-20. "In accordance with the principles of this invention, there is provided a planar dual frequency band antenna for use in a radio transceiver device. The inventive antenna comprises a planar dielectric substrate having first and second major surfaces and a first layer of conductive material on the first major surface of the substrate to function as a ground plane for the antenna. A unitary second layer of conductive material is disposed on the second major surface of the substrate to function as a radiating element for the antenna. The second layer has a first radiating portion shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands, a second radiating portion shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands, and a connecting portion joining the first and second radiating portions of the second layer. A grounding pin extends through the substrate and interconnects the first layer and the connecting portion of the second layer. A feed pin is connected to the connecting portion of the second layer and is coupled to circuitry of the radio transceiver device." Korisch at Col. 1, line 61 – Col. 2, line 13.
Claim 26	
26. The antenna according to claim 1, wherein said antenna includes an interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for	"A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24. As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30,

impedances, filters or diplexers.	32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'. The spacing between the grounding pin 36 and the feed pin 38 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands." Korisch at Col. 3, lines 20-46. Korisch, Figures 3-5 (Figures 3 and 4 annotated by the Requester) Example A:  Example B: 

	Example C: FIG. 3  FIG. 5 
Claim 32	
32. The antenna according to any one of claims 1, 5, 13, 15, or	"This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device." Korisch at Col. 1, lines 5-9.

16 wherein said antenna is included in a portable communications device.	"Referring now to the drawings, FIG. 1 shows a handheld portable communications device, designated generally by the reference numeral 10, having a data entry keypad 12 and a display 14 disposed on one surface of the insulative case 16. The device 10 includes a radio transceiver operable in two frequency bands. As will be described in full detail hereinafter, an antenna according to the present invention operable in those bands is also incorporated in the device 10." Korisch at Col. 2, lines 46-53. "FIGS. 6 and 7 schematically illustrate two alternative placements for the antenna according to this invention. Both placements are within the case 16. As shown in FIG. 6, the antenna can be mounted below the top surface of the case 16. As shown in FIG. 7, the antenna can be mounted below the rear surface of the case 16 near the upper end thereof. Both of the illustrated placements minimize the power absorbed by the hand of the user of the communications device 10. Accordingly, there has been disclosed an improved planar dual frequency band antenna for use in a handheld communications device. The inventive antenna has a single feed for both frequency bands and results in reduced cabling as compared with separate antennas for each of the frequency bands. While alternative embodiments of this invention have been disclosed herein, it is understood that various adaptations to the disclosed embodiments are possible and will be apparent to one of ordinary skill in the art, and it is intended that this invention be limited only by the scope of the appended claims." Korisch at Col. 3, line 52 – Col. 4, line 15. Korisch, Figure 1.

	FIG. 1 
Claim 33	
33. The antenna according to claim 32, wherein said portable communications device is a handset.	"This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device." Korisch at Col. 1, lines 5-9. "Referring now to the drawings, FIG. 1 shows a handheld portable communications device, designated generally by the reference numeral 10, having a data entry keypad 12 and a display 14 disposed on one surface of the insulative case 16. The device 10 includes a radio transceiver operable in two frequency bands. As will be described in full detail hereinafter, an antenna according to the present invention operable in those bands is also incorporated in the device 10." Korisch at Col. 2, lines 46-53. "FIGS. 6 and 7 schematically illustrate two alternative placements for the antenna according to this invention. Both placements are within the case 16. As shown in FIG. 6, the antenna can be mounted below the top surface of the case 16. As shown in FIG. 7, the antenna can be mounted below the rear surface of the case 16 near the upper end thereof. Both of the illustrated placements minimize the power absorbed by the hand of the user of the communications device 10.

	Accordingly, there has been disclosed an improved planar dual frequency band antenna for use in a handheld communications device. The inventive antenna has a single feed for both frequency bands and results in reduced cabling as compared with separate antennas for each of the frequency bands. While alternative embodiments of this invention have been disclosed herein, it is understood that various adaptations to the disclosed embodiments are possible and will be apparent to one of ordinary skill in the art, and it is intended that this invention be limited only by the scope of the appended claims." Korisch at Col. 3, line 52 – Col. 4, line 15. Korisch, Figure 1. FIG. 1 
Claim 34	
34. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of	"This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device. In recent years, portable handheld wireless communications devices have become increasingly popular. At the present time, cellular telephones operating in the frequency band of 824 MHz through 896 MHz are the most widespread type of such devices. However, the personal communications system (PCS)

said frequency bands is operating within the 800 MHz-3600 MHz frequency range.	operating in the frequency band of 1850 MHz through 1990 MHz is gaining in popularity. Accordingly, equipment suppliers are developing portable handheld radio transceivers which operate in both these frequency bands. Thus, there exists a need for an antenna capable of operating in both of the described frequency bands." Korish at Col. 1, lines 6-20. "In accordance with the principles of this invention, there is provided a planar dual frequency band antenna for use in a radio transceiver device. The inventive antenna comprises a planar dielectric substrate having first and second major surfaces and a first layer of conductive material on the first major surface of the substrate to function as a ground plane for the antenna. A unitary second layer of conductive material is disposed on the second major surface of the substrate to function as a radiating element for the antenna. The second layer has a first radiating portion shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands, a second radiating portion shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands, and a connecting portion joining the first and second radiating portions of the second layer. A grounding pin extends through the substrate and interconnects the first layer and the connecting portion of the second layer. A feed pin is connected to the connecting portion of the second layer and is coupled to circuitry of the radio transceiver device." Korisch at Col. 1, line 61 – Col. 2, line 13.
Claim 35	
35. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 890 MHz-3600 MHz frequency range.	"This invention relates to an antenna operable in two frequency bands and, more particularly, to a planar dual frequency band antenna for use in a handheld communications device. In recent years, portable handheld wireless communications devices have become increasingly popular. At the present time, cellular telephones operating in the frequency band of 824 MHz through 896 MHz are the most widespread type of such devices. However, the personal communications system (PCS) operating in the frequency band of 1850 MHz through 1990 MHz is gaining in popularity. Accordingly, equipment suppliers are developing portable handheld radio transceivers which operate in both these frequency bands. Thus, there exists a need for an antenna capable of operating in both of the described frequency bands." Korish at Col. 1, lines 6-20. "In accordance with the principles of this invention, there is provided a planar dual frequency band

	antenna for use in a radio transceiver device. The inventive antenna comprises a planar dielectric substrate having first and second major surfaces and a first layer of conductive material on the first major surface of the substrate to function as a ground plane for the antenna. A unitary second layer of conductive material is disposed on the second major surface of the substrate to function as a radiating element for the antenna. The second layer has a first radiating portion shaped and sized to function as a first planar inverted F-antenna for a first of the frequency bands, a second radiating portion shaped and sized to function as a second planar inverted F-antenna for the second of the frequency bands, and a connecting portion joining the first and second radiating portions of the second layer. A grounding pin extends through the substrate and interconnects the first layer and the connecting portion of the second layer. A feed pin is connected to the connecting portion of the second layer and is coupled to circuitry of the radio transceiver device." Korisch at Col. 1, line 61 – Col. 2, line 13.

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Claim Chart comparing claim 12 of US 7,015,868 to Korisch in view of Kitchener

Prior art cited in this chart:

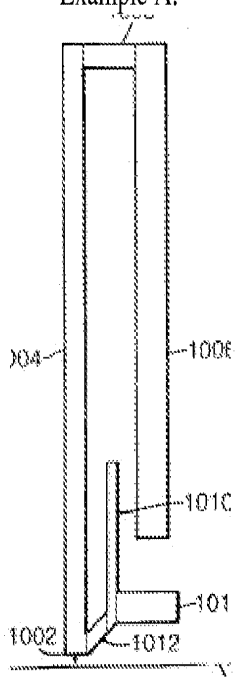
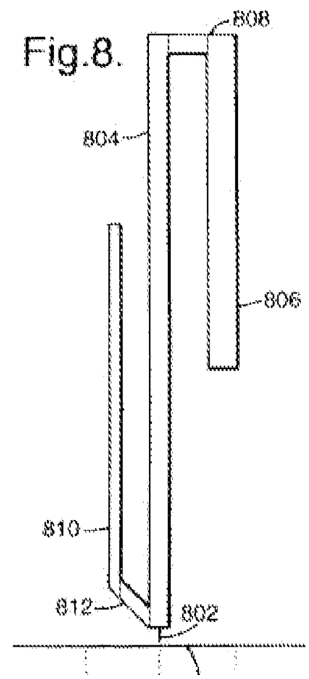
- U.S. Patent No. 5,926,139 to Korisch ("Korisch")
- U.K. Patent No. 2317994 to Kitchener ("Kitchener")

Reason to Combine:

Korisch does not specifically disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration. However, the antenna in Korisch is a multilevel structured printed antenna on a printed circuit board. Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). In addition, Kitchener discloses an antenna wherein at least one multilevel structure is mounted in a monopole configuration. Specifically, the antennae illustrated in Figures 8 and 10 are variations of the monopole antenna configuration of Figure 6 and have different arm configurations. Since Korisch and Kitchener disclose multilevel structure antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Korisch and Kitchener to have a multilevel structure antenna on a printed circuit board in a monopole configuration. Since Kitchener and Korisch disclose multilevel structured antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Kitchener and Korisch to have an antenna with at least one multilevel structure mounted in a monopole configuration.

Claims of the '868 Patent	Disclosure of the Prior Art
Claim 12	
12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.	"FIG. 2 illustrates how the transceiver circuitry 18 within the case 16 is coupled to the antenna 20. As shown, it is conventional that the transceiver circuitry 18 has a single input/output port 22 for both frequency bands. It is known to provide two separate planar antennas on the side of the case 16, one for each frequency band. However, this requires a redesign of the transceiver circuitry 18 to provide separate input/output ports for the two bands. In addition, the use of two separate antennas requires multiple grounding pins, which requires additional space on the printed circuit board holding the transceiver circuitry 18. The present invention overcomes these disadvantages. FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna." Korisch at Col. 2, lines 54 – Col. 3, line 9. "A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24. As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the

	wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'. The spacing between the ground pin 36 and the feed pin 36 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands." Korisch at Col. 3, lines 20-46. "Figure 5 shows a three dimensional dual resonant monopole;" Kitchener at p. 5, line 14. "The first embodiment is a two dimensional equivalent of this three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 2-5. "Figure 7 is a second embodiment of the invention and differs from the first embodiment in that two second and third arms 706 are not parallel but diverge from the distal end, and in that fourth and fifth arms 710 lie parallel with the first member 704, said fourth and fifth arms being attached to the first member by connecting members 712. Such divergence of the arms 706 from the distal end reduces coupling between the second and third arms and the fourth and fifth arms and was found to improve the impedance of the structure at higher frequencies. Figure 8 is an alternative to this design in that there are no third and fifth arms and that the second arm 806 is parallel with the first member 804. The fourth embodiment, as shown in Figure 9, is a still further variant of the design of Figure 7; second 906 and third 910 arms lie on the same side of the first element 904 whereby lateral dimensions are reduced. Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found to improve matching." Kitchener at p. 7, lines 13-28. "Examples can be conveniently manufactured employing printed copper tracks on a dielectric substrate such as FR4. Flexible dielectric substrates can be employed which, in the case of a mobile communications handset, would enable the antenna to be flexible, which in turn could be more

	appealing to the end user." Kitchener at p. 8, lines 4-8. Kitchener, Figures 8 and 10. Example A:  Example B: 

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Claim Chart comparing claims 14 and 26 of US 7,015,868 to Kitchener in view of Korisch

Prior art cited in this chart:

- U.S. Patent No. 5,926,139 to Korisch ("Korisch")
- U.K. Patent No. 2317994 to Kitchener ("Kitchener")

Reason to Combine:

Kitchener does not specifically disclose a multilevel structure antenna in a patch antenna configuration nor does Kitchener specifically disclose an interconnection circuit. Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (i.e., a printed antenna on a printed circuit board). However, Korisch discloses a multilevel structure antenna on a printed circuit board in a patch configuration and having an interconnection circuit that links the antenna to an input/output connector and matches impedances of the antenna and the input/output connector. Since Kichener and Korisch disclose multilevel structure antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Kitchener and Korisch to have a multilevel structure antenna on a printed circuit board in a patch configuration and to match impedances.

Claims of the '868 Patent	Disclosure of the Prior Art
Claim 14	
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.	"The first embodiment is a two dimensional equivalent of this three dimensional antenna, which is shown in Figure 6. The printed antenna comprises a feed part 602 from which a first elongate printed member 604 extends." Kitchener at p. 7, lines 2-5. "Examples can be conveniently manufactured employing printed copper tracks on a dielectric substrate such as FR4. Flexible dielectric substrates can be employed which, in the case of a mobile communications handset, would enable the antenna to be flexible, which in turn could be more appealing to the end user." Kitchener at p. 8, lines 4-8. "FIG. 2 illustrates how the transceiver circuitry 18 within the case 16 is coupled to the antenna 20. As shown, it is conventional that the transceiver circuitry 18 has a single input/output port 22 for both frequency bands. It is known to provide two separate planar antennas on the side of the case 16, one for each frequency band. However, this requires a redesign of the transceiver circuitry 18 to provide separate input/output ports for the two bands. In addition, the use of two separate antennas requires multiple grounding pins, which requires additional space on the printed circuit board holding the transceiver circuitry 18. The present invention overcomes these disadvantages. FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna." Korisch at Col. 2, lines 54 – Col. 3, line 9. "A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane

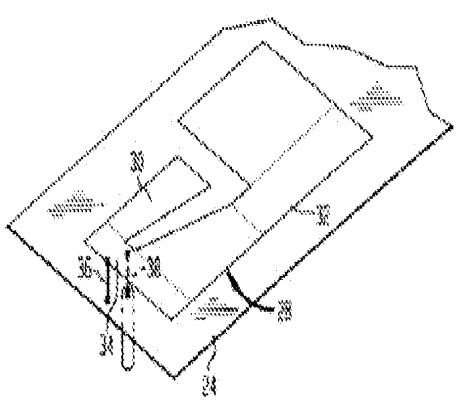
24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24.

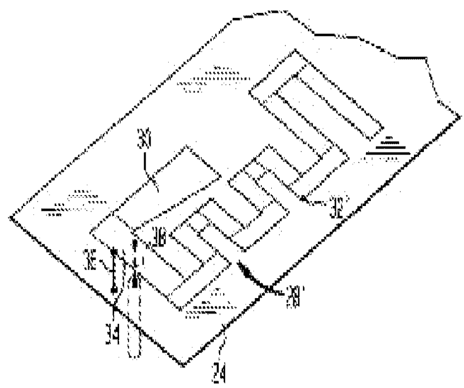
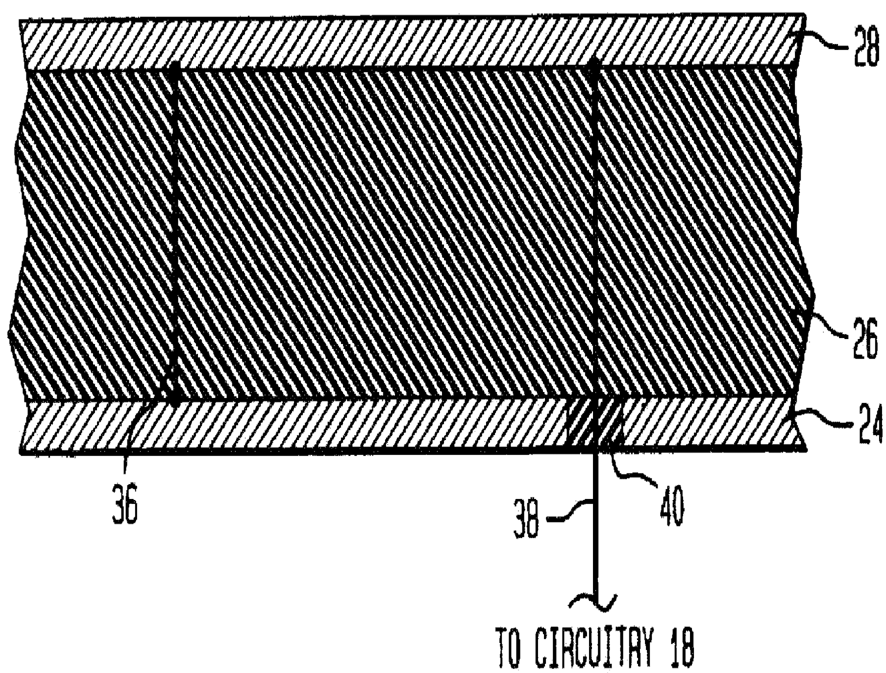
As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

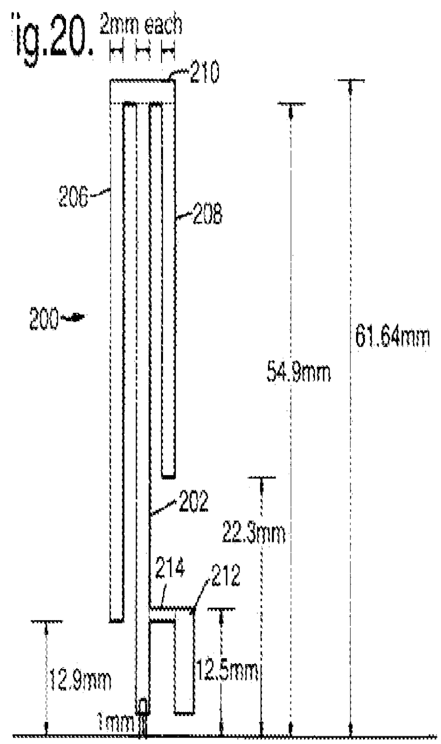
The spacing between the ground pin 36 and the feed pin 36 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands."
Korisch at Col. 3, lines 20-46.

Korisch, Figures 3-5 (Figures 3 and 4 annotated by the Requester).

FIG. 3

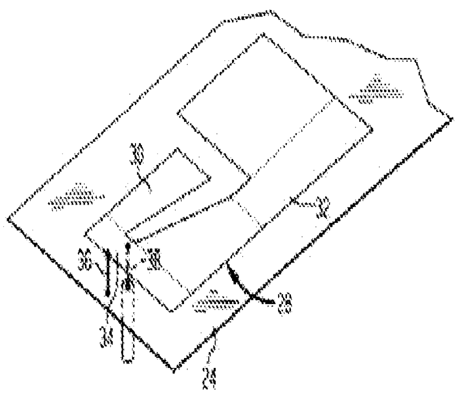


	Korisch, Figure 3.  Korisch ,Figure 4. FIG. 5  Korisch , Figure 5.
Claim 26	
26. The antenna according to claim 1, wherein said antenna	"Figure 20 shows a still further embodiment with dimensions as detailed, the antenna 200 comprising a general W-shape, with the central arm 202 being the longest and being connected to an sma connector feed 204 and the outside arms 206, 208 being of different

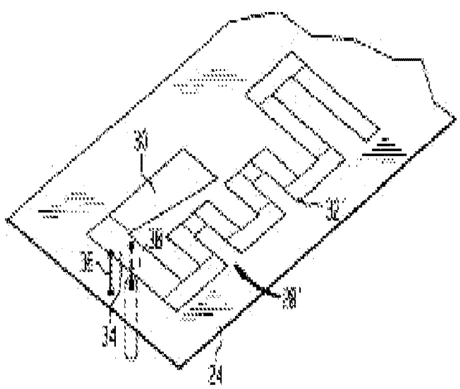
includes an interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for impedances, filters or diplexers.	length, being connected at 210 to the central conductor." Kitchener at p. 11, lines 8-12. Kitchener, Figure 20 (annotated by Requester).  "FIG. 2 illustrates how the transceiver circuitry 18 within the case 16 is coupled to the antenna 20. As shown, it is conventional that the transceiver circuitry 18 has a single input/output port 22 for both frequency bands. It is known to provide two separate planar antennas on the side of the case 16, one for each frequency band. However, this requires a redesign of the transceiver circuitry 18 to provide separate input/output ports for the two bands. In addition, the use of two separate antennas requires multiple grounding pins, which requires additional space on the printed circuit board holding the transceiver circuitry 18. The present invention overcomes these disadvantages. FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the

	lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna." Korisch at Col. 2, lines 54 – Col. 3, line 9. "A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24. As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'. The spacing between the ground pin 36 and the feed pin 36 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands." Korisch at Col. 3, lines 20-46. Korisch - Figures 3 and 4 (annotated by the Requester).

FIG. 3



Korisch, Figure 3.



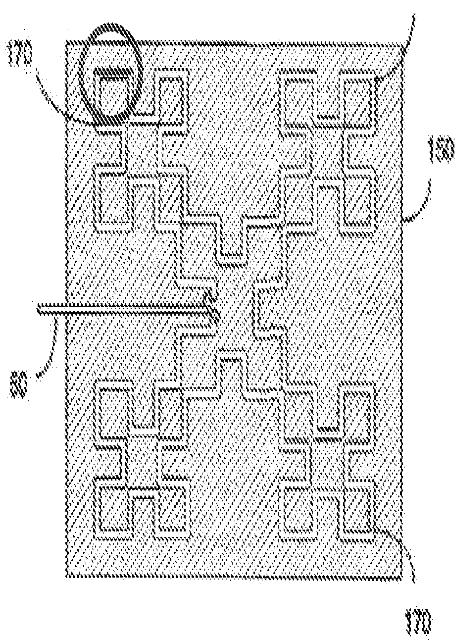
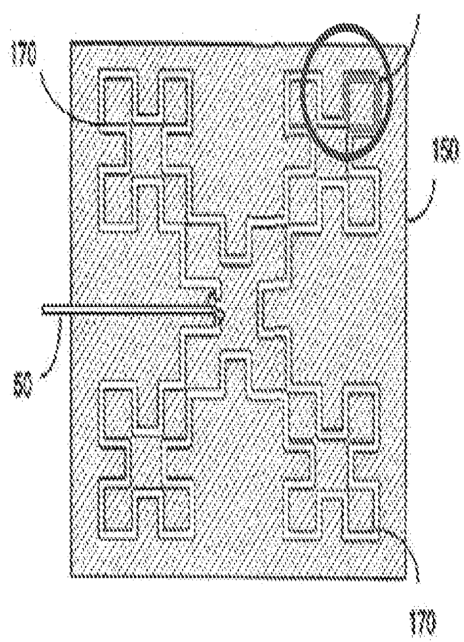
Korisch ,Figure 4.

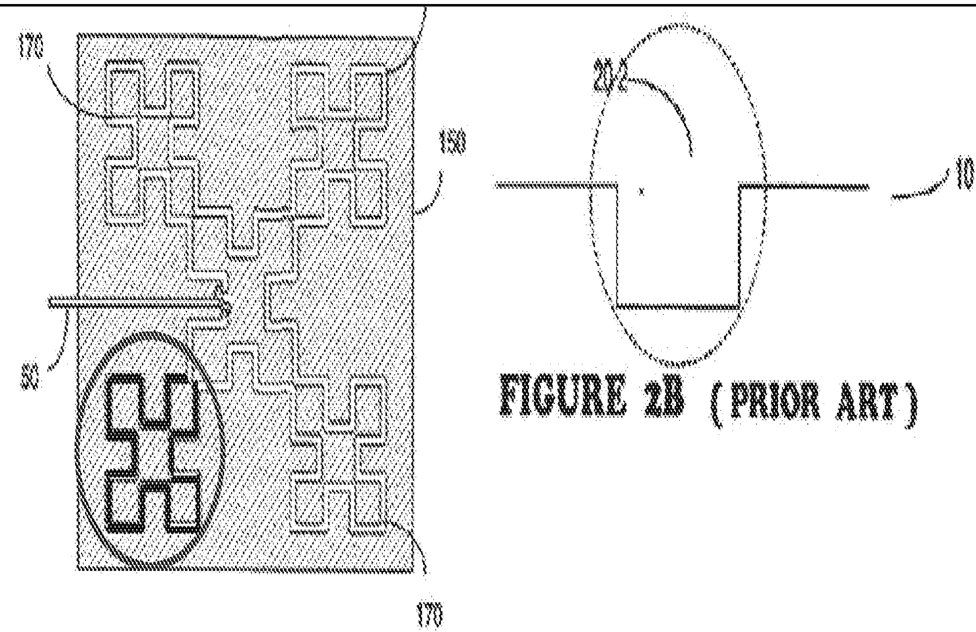
CC-E

Claim Chart comparing claims 1, 3, 6, 12, 14, 23, and 33-35 of US 7,015,868 to Cohen

Prior art cited in this chart:

- U.S. Patent No. 6,140,975 to Cohen ("Cohen")

Claims of the '868 Patent	Disclosure of the Prior Art
Claim 1	
1. A multi-band antenna including	"[T]he fractal antenna of FIG. 5B exhibits more resonance frequencies than the antenna of FIG. 5B, and also some resonant frequencies that are not harmonically related to each other." Cohen, Col.11, lines 12-17. "The Q values in Table 5 reflect that MI-2 and MI-3 fractal antennas are multiband." Cohen, Col.22, lines 46-47.
at least one multilevel structure wherein the multilevel structure comprises a set of polygonal or polyhedral elements having the same number of sides or faces,	"A Minkowski motif is depicted in FIGS. 2B-2D, 5B, 7C, and 7E. The Minkowski motif selected was a three-sided box (e.g., 20-2 in FIG. 2B) placed atop a line segment." Cohen, Col.18, lines 54-59. Cohen, Figures 7C-1 (annotated by Requester) and 2B. Example A: Example B:  Example C: FIG. 2B

	
wherein each of said elements is electromagnetically coupled to at least one other of said elements either directly through at least one point of contact or through a small separation providing coupling,	"[T]he etched-away non-conductive portion of the printed circuit board 150 is shown cross-hatched, and the copper or other conductive traces 170 are shown without cross-hatching." Cohen, Col.12, lines 1-4. "FIG. 7C-2 depicts a slot antenna version of what was shown in FIG. 7C-2, wherein the conductive portion 170 (shown cross-hatched in FIG. 7C-2) surround and defines a fractal-shape of non-conductive substrate 150. Electrical connection to the slot antenna to the slot antenna is made with a coaxial or other cable 50, whose inner and outer conductors make contact as shown." Cohen, Col.12, lines 34-40. Cohen, Figures 7C-1 (annotated by Requester).

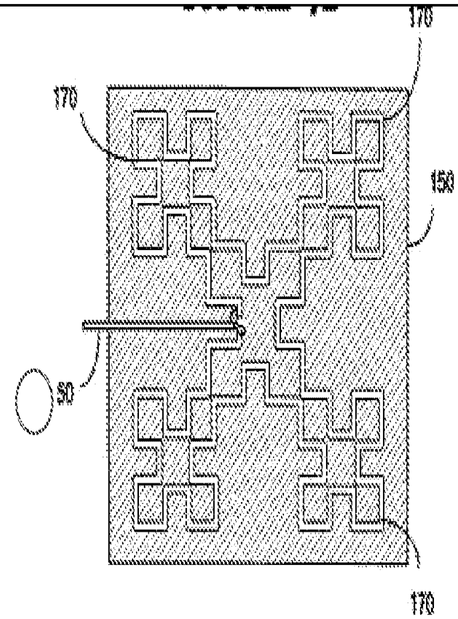
<table>
<tr><td></td><td>

FIGURE 7C-1</td></tr>
<tr><td>wherein for at least 75% of said polygonal or polyhedral elements, the region or area of contact between said polygonal or polyhedral elements is less than 50% of the perimeter or area of said elements,</td><td>Cohen, Figure 7C-1 (annotated by Requester).

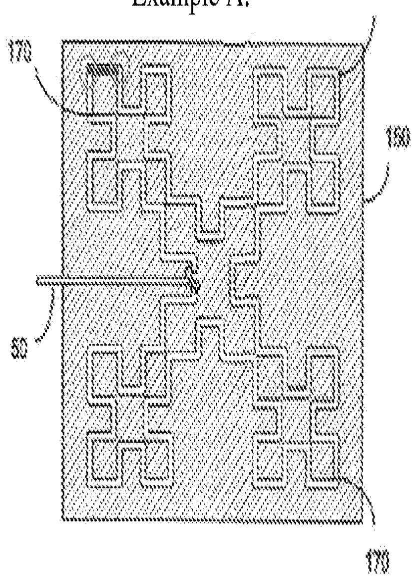
Example A:


FIG. 7C-1 (annotated by Requester to show points of contact for 1 of 100 elements of a four-sided polygon whereby the areas of

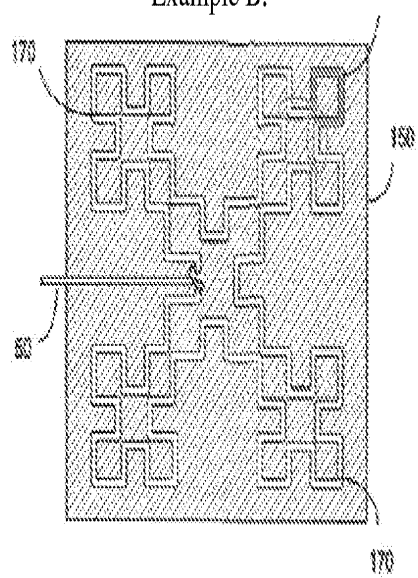
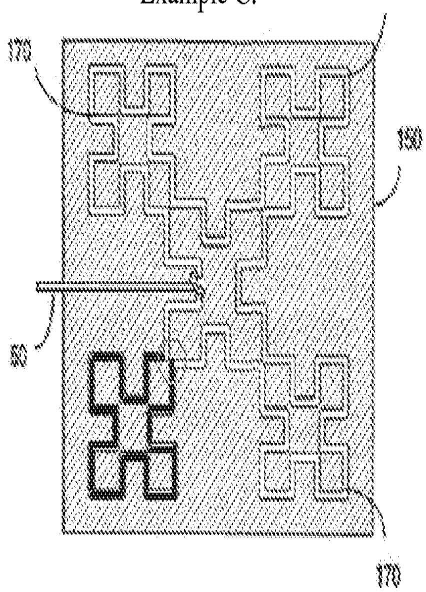
Example B:


FIG. 7C-1 (annotated by Requester to show points of contact for 1 of 25 four-sided polygons whereby the areas of contact</td></tr>
</table>

	contact between the elements are significantly less than 50% of the perimeter or area of a four-sided polygon element) Example C:  FIG. 7C-1 (annotated by Requester to show points of contact for 1 of 5 twenty-sided polygons whereby the areas of contact are significantly less than 50% of the perimeter or area of a twenty-sided polygon)	between the four-sided polygons are significantly less than 50% of the perimeter or area of the four-sided polygons)
and wherein not all the polygonal or polyhedral elements have the same size and	"Using fractal geometry, the antenna ground counterpoise has a self-similar structure resulting from the repetition of a design or motif (or 'generator') that is replicated using rotation, and/or translation, and/or scaling." Cohen, Col.5 lines 4-8. "A Minkowski motif is depicted in FIG.s 2B-2D, 5B, 7C and 7E. The Minkowski motif selected was a three-sided box (e.g., 20-2 in FIG. 2B) placed atop a line segment. The box sides may be any arbitrary length, e.g., perhaps a box height and width of 2 units with the two remaining base sides being of length three units (see FIG. 2B)." Cohen, Col.18, lines 54-59.	

"Note that each separate horizontal line segment will have a different lower value of x and x_{max}. Relevant offsets from zero may be entered as need, and vertical segments may be 'boxed' by 90° rotation and application of the above methodology."
Cohen, Col.19, lines 19-23.

Cohen, Figure 7C-1, (annotated by Requester).

Example A:

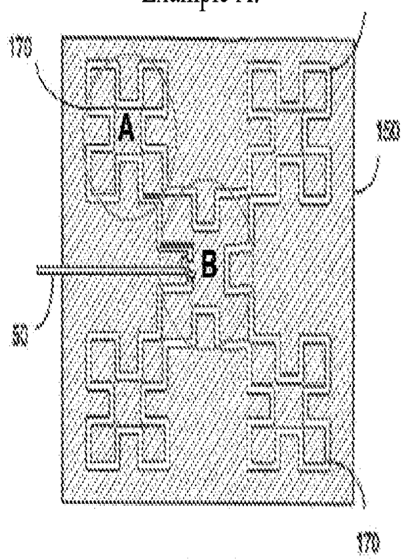


FIG. 7C-1 (annotated by Requester to show single element in region A is not the same size as a single element in region B because of scaling)

Example B:

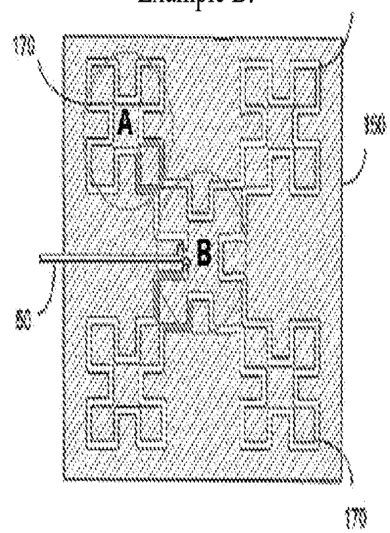
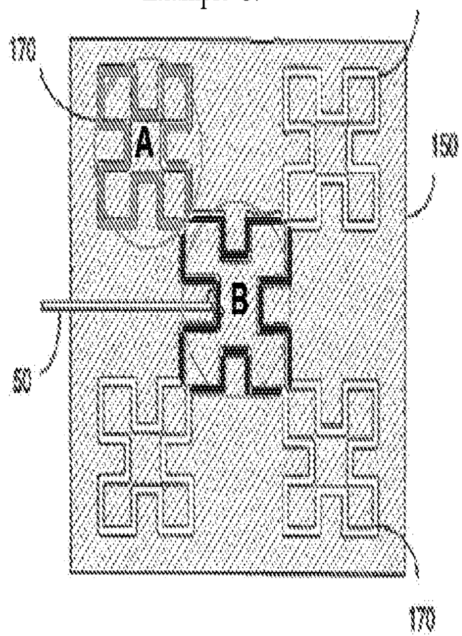
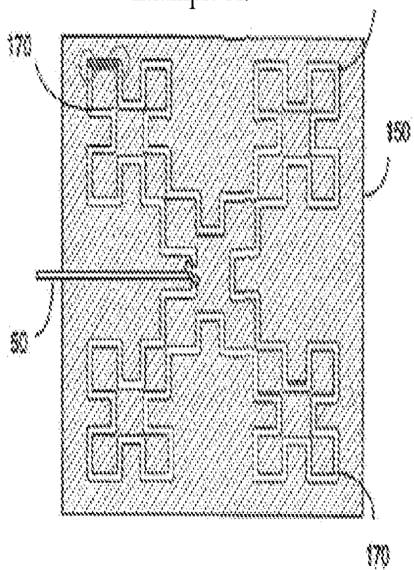
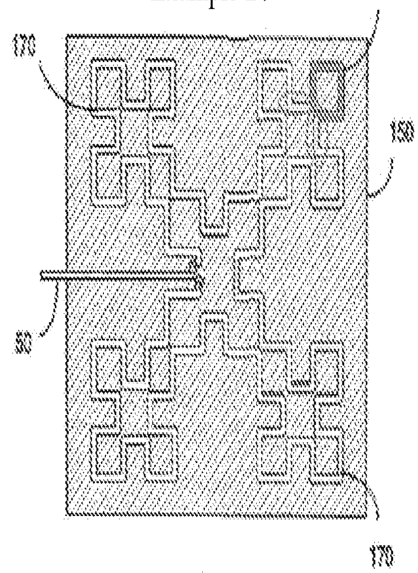
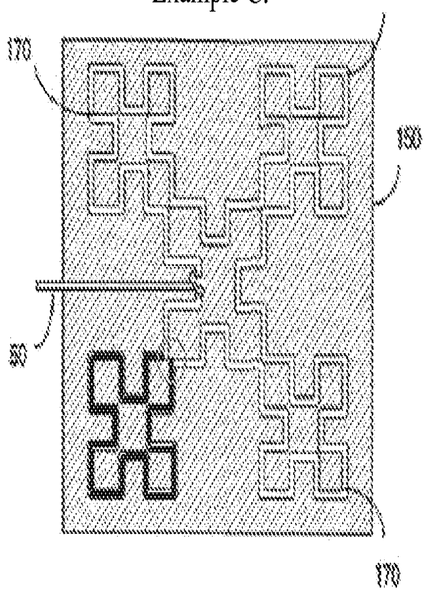
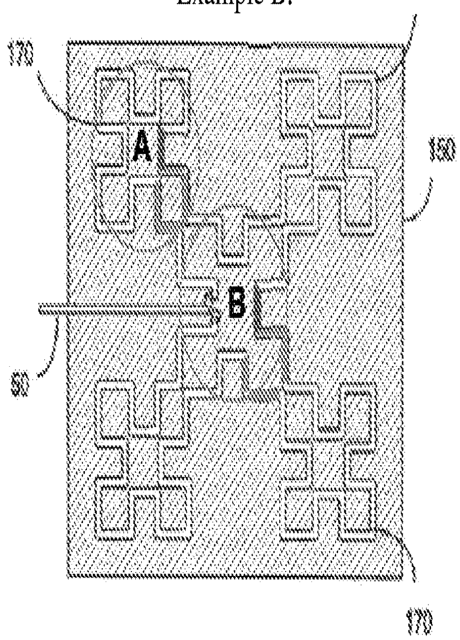
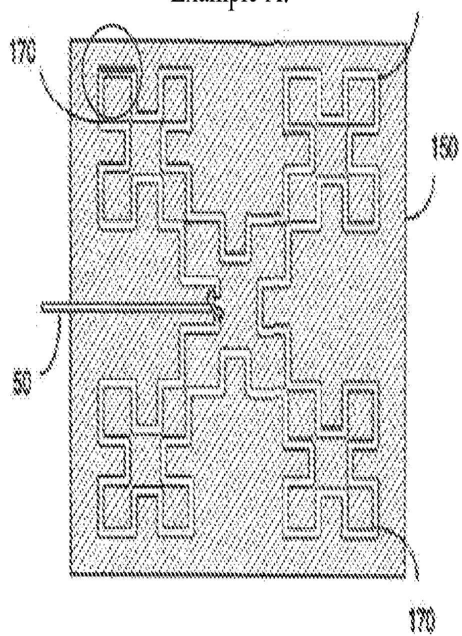
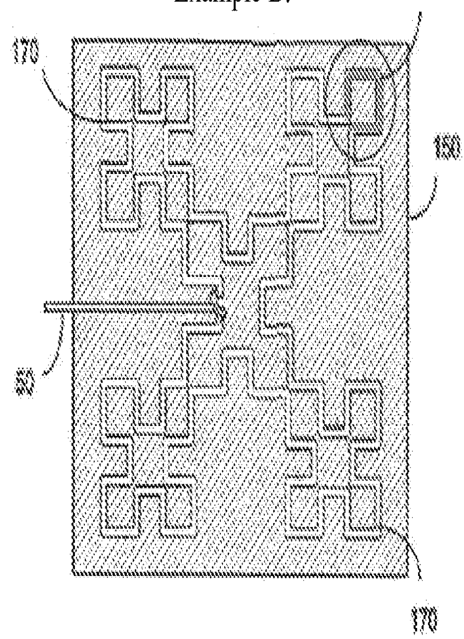


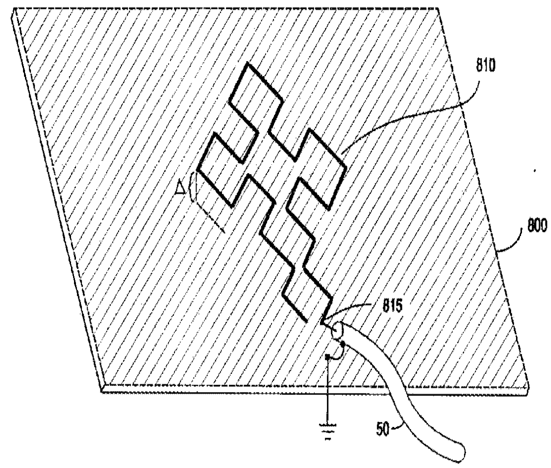
FIG. 7C-1 (annotated by Requester to show single element in region A is not the same size as a single element in region B because of scaling)

	Example C:  FIG. 7C-1 (annotated by Requester to show twenty-sided polygon in region A is not the same size as twenty-sided polygon in region because of scaling).
the perimeter of the multilevel structure has a different number of sides than the polygons that compose the multilevel structure.	Cohen, Figure 7C-1 (annotated by Requester).

	Example A:  FIG. 7C-1 (annotated by Requester) Example B:  FIG. 7C-1 (annotated by Requester) Example C:  FIG. 7C-1 (annotated by Requester)
Claim 3	
3. The antenna according to claim 1, wherein not all the	"Using fractal geometry, the antenna ground counterpoise has a self-similar structure resulting from the repetition of a deign or motif (or 'generator') that is replicated using rotation, and/or translation, and/or scaling."

regions or areas of contact between said polygonal or polyhedral elements have the same size.	Cohen, Col.5 lines 4-8. "[A] deviation of less than perhaps 10% from a perfectly drawn and implemented fractal will still provide adequate fractal-like performance." Cohen, Col.12, line 9-11. "A Minkowski motif is depicted in FIG.s 2B-2D, 5B, 7C and 7E. The Minkowski motif selected was a three-sided box (e.g., 20-2 in FIG. 2B) placed atop a line segment. The box sides may be any arbitrary length, e.g., perhaps a box height and width of 2 units with the two remaining base sides being of length three units (see FIG. 2B)." Cohen, Col.18, lines 54-59. "Note that each separate horizontal line segment will have a different lower value of x and x_{max}. Relevant offsets from zero may be entered as need, and vertical segments may be 'boxed' by 90° rotation and application of the above methodology." Cohen, Col.19, lines 19-23. Cohen, Figure 7C-1 (annotated by Requester). Example B: 

Claim 6	
6. The antenna according to claim 1, wherein said at least one multilevel structure is formed by polygons of a single type, selected from the group consisting of four-sided polygons, pentagons, hexagons, heptagons, octagons, decagons, and dodecagons.	Cohen, Figure 7C-1 (annotated by Requester). Example A:  FIG. 7C-1 (annotated by Requester to show one element of the one-hundred elements in the circle representing a four-sided polygon). Example B:  FIG. 7C-1 (annotated by Requester to show one box of the twenty-five boxes in the circle as a four-sided polygon).
Claim 12	
12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.	"FIG. 7C-1 depicts a second iteration Minkowski (MI-2) printed circuit fractal antenna, according to the present invention;" Cohen, Col.7, lines 26-28. "For example, in FIG. 11A a conductive surface 800 is disposed a distance Δ behind or beneath a fractal antenna 810, which in FIG. 11A is a single arm of an MI-2 fractal antenna. Of course other fractal configurations such as disclosed herein could be used instead of the MI-1 configuration shown, and non-planar configurations may also be used." Cohen at Col. 24, lines 34-40. Cohen, Figure 11A.

	 **FIGURE 11A**
Claim 14	
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.	"FIG. 11B shows an embodiment in which a preferably fractal antenna 810 lies in the same plane as a ground plane 800 but is separated therefrom by an insulating region .... For example, the embodiment of FIG. 11B may be fabricated from a single piece of printed circuit board material in which copper (or other conductive material) remains to define the groundplane 800, the antenna 810, and the parasitic element 800', ..." Cohen, Col.24, line 62 – Col. 25, line 31. "FIG. 11B shows an embodiment in which a preferably fractal antenna 810 lies in the same plane as a ground plane 800 but is separated therefrom by an insulating region, and in which a passive or parasitic element 800' is disposed 'within' and spaced-apart a distance Δ' from the antenna, and also being coplanar." Cohen, Col.24, lines 62-67. Cohen, Figure 11B.

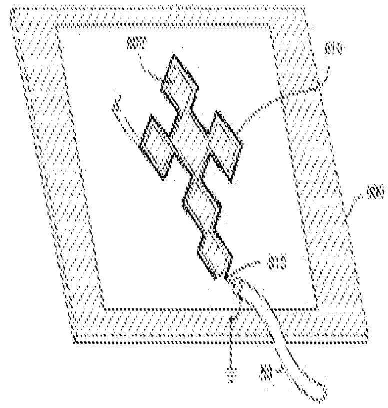
	 FIGURE 11B
Claim 23	
23. The antenna according to claim 1, wherein said antenna is being shared by several communication services or systems.	"Table 1, below summarizes ELNEC-derived far field radiation patterns for Minkowski island quad antennas for each iteration for the first four resonances. In table 1, each iteration is designed an MI-N for Minkowski Island of iteration N. Note that the frequency of lowest resonance decreased with the fractal Minkowski Island antennas, as compared to a prior art quad antenna. Stated differently, for a given frequency, a fractal Minkowski Island antenna will be smaller than a conventional quad antenna."

TABLE 1

Antenna	Res. Freq. (MHz)	Gain (dBi)	SWR	PC (for 1st)	Direction
Ref. Quad	76	3.3	2.5	1	Broadside
	144	2.8	5.3	--	Endfire
	220	3.1	5.2	--	Endfire
	294	5.4	4.5	--	Endfire
MI-1	55	2.6	1.1	1.38	Broadside
	101	3.7	1.4	--	Endfire
	142	3.5	5.5	--	Endfire
	198	2.7	3.3	--	Broadside
MI-2	43.2	2.1	1.5	1.79	Broadfire
	85.5	4.3	1.8	--	Endfire
	102	2.7	4.0	--	Endfire
	116	1.4	5.4	--	Broadside

Cohen, Table 1, Col. 19, lines 50-

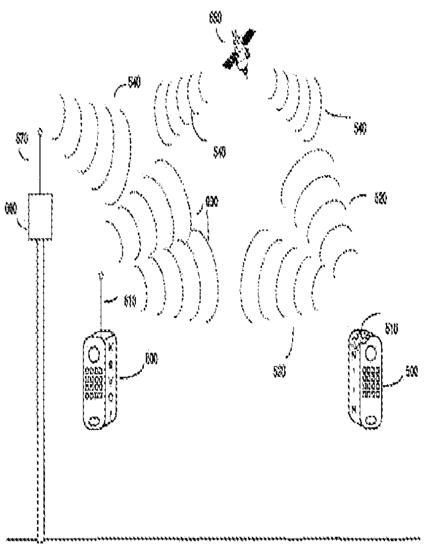
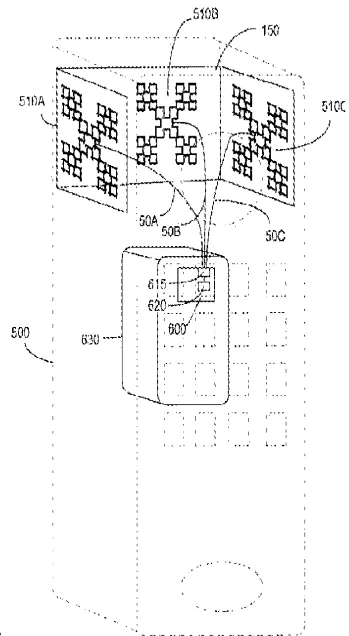
TABLE 5

Antenna	Freq. (MHz)	Freq. Ratio	SWR	3:1 BW	Q
MI-3	53.0	1	1:1	6.4	8.3
	80.1	1.5:1	1.1:1	4.5	17.8
	121.0	2.3:1	2.4:1	6.8	17.7
MI-2	54.0	1	1:1	3.6	15.0
	95.8	1.8:1	1.1:1	7.3	13.1
	126.5	2.3:1	2.4:1	9.4	13.4

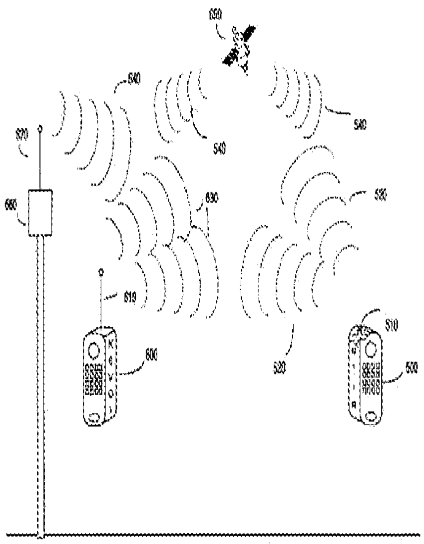
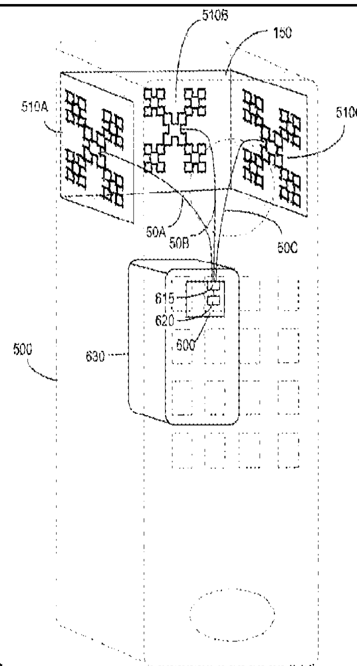
65.

"The Q values in table 5 reflect that MI-2 and MI-3 fractal antennas are multiband." Cohen, Col.22, lines 46-47.

Claim 32	
32. The antenna according to any one of claims 1, 5, 13, 15, or 16 wherein said antenna is included in a portable communications device.	"FIG. 8A depicts a generalized system in which a transceiver 500 is coupled to a fractal antenna system 510 to send electromagnetic radiation 520 and/or receive electromagnetic radiation 540. A second transceiver 600 shown equipped with a conventional whip-like vertical antenna 610 also sends electromagnetic energy 630 and/or receives electromagnetic energy 540." Cohen, Col. 15, lines 32-35. "If transceivers 500, 600 are communication devices such as transmitter-receivers, wireless telephones, pagers, or the like, a communications repeating unit such as a satellite 650 and/or a ground base repeater unit 660 coupled to an antenna 670, or indeed to a fractal antenna according to the present invention, may be present." Cohen, Col. 15, 51-46. "As shown by FIGS. 8B and 8C, several such antenna, each oriented differently could be fabricated within the curved or rectilinear case of a cellular or wireless telephone, with the antenna outputs coupled to a circuit for coupling to the most optimally directed of the antennas for the signal then being received." Cohen, Col.22, lines 10-16. "In the embodiment of FIG. 8B, unit 500 is a handheld transceiver, and antennas 510A, 510B, 510C, 510D preferably are fed for vertical polarization, as shown. Element 510D may, for example, be a fractal ground counterpoise system for a vertical antenna element, shown in phantom as element 193 (which element may itself be a fractal to further reduce dimensions)." Cohen, Col.16, lines 17-23. "Although FIG. 8C depicts a unit 500 that may be handheld, unit 500 could in fact be a communications system for use on a desk or a field mountable unit, perhaps unit 660 as shown in FIG. 8A." Cohen, Col.17, lines 18-21. "Similarly, fractal-designed antennas could be used in handheld military walkie-talkie transceivers, global positioning systems, satellites, transponders, wireless communication and computer networks, remote and/or robotic control systems, among other applications."

	Cohen, Col.22, lines 18-23. Cohen, Figures 8A and 8B.   Cohen, FIG. 8A Cohen, FIG. 8B
Claim 33	
33. The antenna according to claim 32, wherein said portable communications device is a handset.	"FIG. 8A depicts a generalized system in which a transceiver 500 is coupled to a fractal antenna system 510 to send electromagnetic radiation 520 and/or receive electromagnetic radiation 540. A second transceiver 600 shown equipped with a conventional whip-like vertical antenna 610 also sends electromagnetic energy 630 and/or receives electromagnetic energy 540." Cohen, Col. 15, lines 32-35. "If transceivers 500, 600 are communication devices such as transmitter-receivers, wireless telephones, pagers, or the like, a communications repeating unit such as a satellite 650 and/or a ground base repeater unit 660 coupled to an antenna 670, or indeed to a fractal antenna according to the present invention, may be present." Cohen, Col. 15, 51-46. "In the embodiment of FIG. 8B, unit 500 is a **handheld** transceiver, and antennas 510A, 510B, 510C,

	510D preferably are fed for vertical polarization, as shown." Cohen, Col.16, lines 17-23. (Emphasis added). "Although FIG. 8C depicts a unit 500 that may be handheld, unit 500 could in fact be a communications system for use on a desk or a field mountable unit, perhaps unit 660 as shown in FIG. 8A." Cohen, Col.17, lines 18-21. "As shown by FIGS. 8B and 8C, several such antenna, each oriented differently could be fabricated within the curved or rectilinear case of a cellular or wireless telephone, with the antenna outputs coupled to a circuit for coupling to the most optimally directed of the antennas for the signal then being received." Cohen, Col.22, lines 10-16. "Similarly, fractal-designed antennas could be used in handheld military walkie-talkie transceivers, global positioning systems, satellites, transponders, wireless communication and computer networks, remote and/or robotic control systems, among other applications." Cohen, Col.22, lines 18-23. Cohen, Figure 8A and 8B.

	  Cohen, FIG. 8A Cohen, FIG. 8B
Claim 34	
34. The antenna according to claim 33, 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.	"Further, as shown by Table 1, the fractal antenna of FIG. 5B exhibits more resonance frequencies than the antenna of FIG. 5B, and also exhibits some resonant frequencies that are not harmonically related to each other." Cohen, Col. 11, lines 13-17. "Applicant has fabricated an MI-2 Minkowski island fractal antenna for operation in the **850-900 MHz cellular telephone band**. The antenna was fabricated on a printed circuit board and measured about 1.2" (3 cm) on a side KS. The antenna was sufficiently small to fit inside applicant's cellular telephone, and performed as well as if the normal attachable "rubber-ducky" whip antenna were still attached. The antenna was found on the side to obtain desired vertical polarization, but could be fed anywhere on the element with 50 .OMEGA. impedance still being inherently present. Applicant also fabricated on a printed circuit board an MI-3 Minkowski island fractal quad, whose side dimension KS was about 0.8" (2 cm), the antenna again being inserted inside the cellular telephone. The MI-3 antenna appeared to work as well as the normal whip antenna, which was not attached. Again, any slight gain loss in going from MI-2 to MI-3 (e.g., perhaps 1 dB loss relative to an MI-0 reference quad, or 3 dB los relative to an MI-2) is more than offset by the resultant shrinkage in size. **At**

	satellite telephone frequencies of 1650 MHz or so, the dimensions would be approximately halved again. FIGS. 8A, 8B and 8C depict preferred embodiments for such antennas." Cohen, Col. 13, lines 1-22. (Emphasis added). "Further, multi-iteration fractals according to the present invention were found to resonate at multiple frequencies, including frequencies that were non-harmonically related." Cohen, Col. 17, lines 30-34. "The resultant antenna system would be smaller than the "rubber-ducky" type antennas now used by cellular telephones, but would have improved characteristics as well. Similarly, fractal-designed antennas could be used in handheld military walkie-talkie transceivers, global positioning systems, satellites, transponders, wireless communication and computer networks, remote and/or robotic control systems, among other applications." Cohen, Col. 22, lines 15-22. "The Q values in Table 5 reflect that MI-2 and MI-3 fractal antennas are multiband." Cohen, Col.22, lines 46-47.
Claim 35	
35. The antenna according to claim 33, wherein said antenna operates at multiple frequency bands, and wherein at least one of said frequency bands is operating within the 890 MHz 3600 MHz frequency range.	"Further, as shown by Table 1, the fractal antenna of FIG. 5B exhibits more resonance frequencies than the antenna of FIG. 5B, and also exhibits some resonant frequencies that are not harmonically related to each other." Cohen, Col. 11, lines 13-17. "Applicant has fabricated an MI-2 Minkowski island fractal antenna for operation in the **850-900 MHz cellular telephone band**. The antenna was fabricated on a printed circuit board and measured about 1.2" (3 cm) on a side KS. The antenna was sufficiently small to fit inside applicant's cellular telephone, and performed as well as if the normal attachable "rubber-ducky" whip antenna were still attached. The antenna was found on the side to obtain desired vertical polarization, but could be fed anywhere on the element with 50 .OMEGA. impedance still being inherently present. Applicant also fabricated on a printed circuit board an MI-3 Minkowski island fractal quad, whose side dimension KS was about 0.8" (2 cm), the antenna again being inserted inside the cellular telephone. The MI-3 antenna appeared to work as well as the normal whip antenna, which was not attached. Again, any

	slight gain loss in going from MI-2 to MI-3 (e.g., perhaps 1 dB loss relative to an MI-0 reference quad, or 3 dB los relative to an MI-2) is more than offset by the resultant shrinkage in size. **At satellite telephone frequencies of 1650 MHz** or so, the dimensions would be approximately halved again. FIGS. 8A, 8B and 8C depict preferred embodiments for such antennas." Cohen, Col. 13, lines 1-22. (Emphasis added). "Further, multi-iteration fractals according to the present invention were found to resonate at multiple frequencies, including frequencies that were non-harmonically related." Cohen, Col. 17, lines 30-34. "The resultant antenna system would be smaller than the "rubber-ducky" type antennas now used by cellular telephones, but would have improved characteristics as well. Similarly, fractal-designed antennas could be used in handheld military walkie-talkie transceivers, global positioning systems, satellites, transponders, wireless communication and computer networks, remote and/or robotic control systems, among other applications." Cohen, Col. 22, lines 15-22. "The Q values in Table 5 reflect that MI-2 and MI-3 fractal antennas are multiband." Cohen, Col.22, lines 46-47.

CC-F

Claim Chart comparing claim 12 of US 7,015,868 to Cohen in view of Kitchener

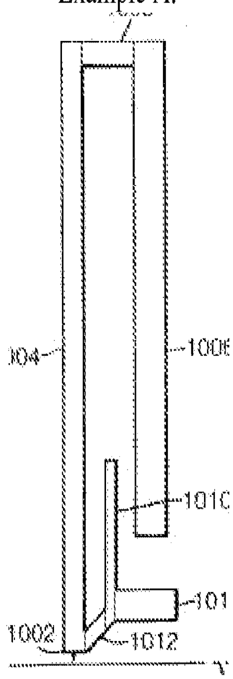
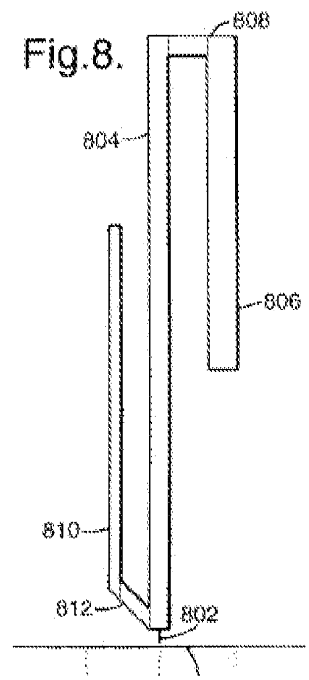
Prior art cited in this chart:

- U.S. Patent No. 6,140,975 to Cohen ("Cohen")
- U.K. Patent No. 2317994 to Kitchener ("Kitchener")

Reason to Combine:

To the extent that Cohen does not disclose an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12, in the alternative Cohen in view of Kitchener an antenna wherein at least one multilevel structure is mounted in a monopole configuration as recited in claim 12. Cohen does disclose that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board ..." Cohen discloses that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board, ..." Kitchener discloses a multilevel structured antenna on a printed circuit board and at least one multilevel structure is mounted in a monopole configuration. Specifically, Kitchener discloses that the multilevel structure antenna can be a "printed antenna" and can be "manufactured employing printed copper tracks on a dielectric substrate such as FR4" (*i.e.*, a printed antenna on a printed circuit board). Since Cohen and Kitchener disclose multilevel structure antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Cohen and Kitchener to have a multilevel structure antenna with an interconnection circuit to match antenna impedances.

Claims of the '868 Patent	Disclosure of the Prior Art
Claim 12	
12. The antenna according to claim 1, wherein said at least one multilevel structure is mounted in a monopole configuration.	"In the configuration shown, the relative close proximity between conductive sheet 800 and fractal antenna 810 lowers the resonant frequencies and widens the bandwidth of antenna 810. The conductive sheet 800 may be a plane of metal, the upper copper surface of a printed circuit board, a region of conductive material perhaps sprayed onto the housing of a device employing the antenna, for example the interior of a transceiver housing 500, such as shown in FIGS. 8A, 8B, 8C, and 15. " Cohen at Col. 24, lines 48-56. "Figure 5 shows a three dimensional dual resonant monopole;" Kitchener at p. 5, line 14. "The first embodiment is a two dimensional equivalent of this three dimensional antenna, which is shown in Figure 6." Kitchener at p. 7, lines 2-5. "Figure 7 is a second embodiment of the invention and differs from the first embodiment in that two second and third arms 706 are not parallel but diverge from the distal end, and in that fourth and fifth arms 710 lie parallel with the first member 704, said fourth and fifth arms being attached to the first member by connecting members 712. Such divergence of the arms 706 from the distal end reduces coupling between the second and third arms and the fourth and fifth arms and was found to improve the impedance of the structure at higher frequencies. Figure 8 is an alternative to this design in that there are no third and fifth arms and that the second arm 806 is parallel with the first member 804. The fourth embodiment, as shown in Figure 9, is a still further variant of the design of Figure 7; second 906 and third 910 arms lie on the same side of the first element 904 whereby lateral dimensions are reduced. Figure 10 shows an antenna similar to the fourth embodiment (Figure 8) but has a stub element 1014 which was found to improve matching." Kitchener at p. 7, lines 13-28. "Examples can be conveniently manufactured employing printed copper tracks on a dielectric substrate such as FR4. Flexible dielectric substrates can be employed which, in the case of a mobile

	communications handset, would enable the antenna to be flexible, which in turn could be more appealing to the end user." Kitchener at p. 8, lines 4-8. Kitchener, Figures 8 and 10. Example A:  Example B: 

C

1/

C-G

8

Claim Chart comparing claims 14 and 26 of US 7,015,868 to Cohen in view of Korisch

Prior art cited in this chart:

- U.S. Patent No. 6,140,975 to Cohen ("Cohen")
- U.K. Patent No. 2317994 to Kitchener ("Kitchener")

Reason to Combine:

Cohen does not specifically disclose a multilevel structure antenna in a patch antenna configuration nor does Cohen specifically disclose an interconnection circuit. Cohen does disclose that "[T]he conductive sheet 800 [the antenna] may be a plane of metal, the upper copper surface of a printed circuit board ..." Korisch discloses a multilevel structured antenna on a printed circuit board. In addition, Korisch discloses an antenna mounted in a patch configuration as recited in claim 14 and an antenna having an interconnection circuit that links the antenna to an input/output connector, and matches the impedances of the antenna and the input/output connector as recited in claim 26. Since Cohen and Korisch disclose multilevel structured antennae on printed circuit boards, it would be obvious to one of ordinary skill in the art to combine Cohen and Korisch to have an antenna mounted in a patch configuration as recited in claim 14 and an interconnection circuit to match antenna impedances as recited in claim 26.

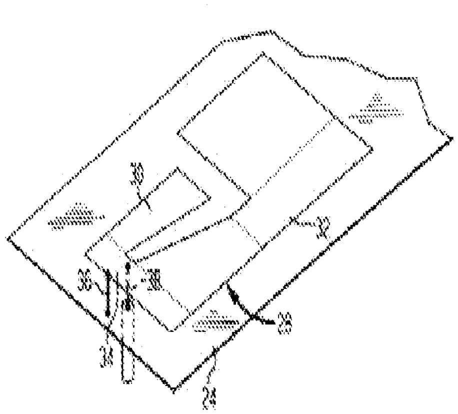
Claims of the '868 Patent	Disclosure of the Prior Art
Claim 14	
14. The antenna according to claim 1, wherein said at least one multilevel structure is mounted substantially parallel to a ground plane in a patch antenna configuration.	"In the configuration shown, the relative close proximity between conductive sheet 800 and fractal antenna 810 lowers the resonant frequencies and widens the bandwidth of antenna 810. The conductive sheet 800 may be a plane of metal, the upper copper surface of a printed circuit board, a region of conductive material perhaps sprayed onto the housing of a device employing the antenna, for example the interior of a transceiver housing 500, such as shown in FIGS. 8A, 8B, 8C, and 15. " Cohen at Col. 24, lines 48-56. "FIG. 2 illustrates how the transceiver circuitry 18 within the case 16 is coupled to the antenna 20. As shown, it is conventional that the transceiver circuitry 18 has a single input/output port 22 for both frequency bands. It is known to provide two separate planar antennas on the side of the case 16, one for each frequency band. However, this requires a redesign of the transceiver circuitry 18 to provide separate input/output ports for the two bands. In addition, the use of two separate antennas requires multiple grounding pins, which requires additional space on the printed circuit board holding the transceiver circuitry 18. The present invention overcomes these disadvantages. FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna." Korisch at Col. 2, lines 54 – Col. 3, line 9. "A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the

conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24.

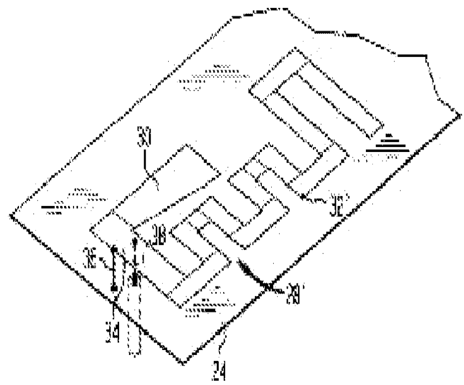
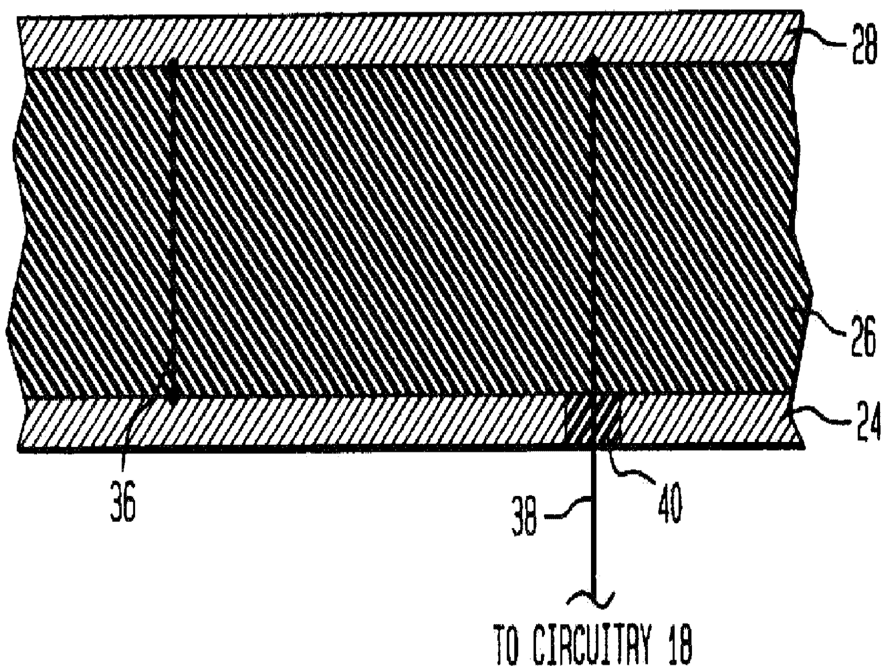
As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length, width and height of the respective radiating portion. In the embodiment shown in FIG. 4, the radiating portion 32' of the radiating element 28' meanders, as contrasted with the substantially "straight" radiating portion 32 shown in FIG. 3. This provides increased length for the radiating portion 32'.

The spacing between the ground pin 36 and the feed pin 36 is selected to maintain the antenna impedance at approximately 50 ohms for both frequency bands."
Korisch at Col. 3, lines 20-46.

Korisch, Figures 3-5 (Figures 3 and 4 annotated by the Requester).



Korisch, Figure 3.

	 Korisch ,Figure 4. FIG. 5  Korisch , Figure 5.
Claim 26	
26. The antenna according to claim 1, wherein said antenna includes an	"In the configuration shown, the relative close proximity between conductive sheet 800 and fractal antenna 810 lowers the resonant frequencies and widens the bandwidth of antenna 810. The conductive sheet 800 may be a plane of metal, the upper copper surface of a printed circuit board, a region of conductive material perhaps sprayed onto the housing of a device employing the antenna,

interconnection circuit that links the antenna to an input/output connector, and which is used to incorporate adaptation networks for impedances, filters or diplexers.	for example the interior of a transceiver housing 500, such as shown in FIGS. 8A, 8B, 8C, and 15. " Cohen at Col. 24, lines 48-56. "FIG. 2 illustrates how the transceiver circuitry 18 within the case 16 is coupled to the antenna 20. As shown, it is conventional that the transceiver circuitry 18 has a single input/output port 22 for both frequency bands. It is known to provide two separate planar antennas on the side of the case 16, one for each frequency band. However, this requires a redesign of the transceiver circuitry 18 to provide separate input/output ports for the two bands. In addition, the use of two separate antennas requires multiple grounding pins, which requires additional space on the printed circuit board holding the transceiver circuitry 18. The present invention overcomes these disadvantages. FIG. 3 shows the two conductive layers of the antenna according to this invention without the intermediate planar dielectric substrate (which is shown in FIG. 5). These layers are each deposited on a respective major surface of the substrate. Thus, the inventive antenna includes a first layer of conductive material 24 which functions as a ground plane for the antenna. This layer 24 is on the lower surface of the planar dielectric substrate 26 (FIG. 5). On the upper surface of the dielectric substrate 26 is a unitary second layer 28 of conductive material which functions as a radiating element for the antenna." Korisch at Col. 2, lines 54 – Col. 3, line 9. "A grounding pin 36 extends through the dielectric substrate 26 and interconnects the ground plane 24 and the connecting portion 34 of the radiating element 28. A feed pin 38 extends through the ground plane 24 and the substrate 26 to couple the radiating element 28 to the transceiver circuitry 18. Where the feed pin 38 extends through the conductive layer 24, it is insulated from the conductive layer 24 by an insulating via 40. Although the feed pin 38 is shown as extending through the ground plane 24, it is understood that there may be a situation where the circuitry 18 is on the same side of the ground plane 24 as the radiating element 28. In such a situation, the feed pin 38 will not pass through the ground plane 24, but in all cases the feed pin 38 must be electrically insulated from the ground plane 24. As shown, the radiating element 28 is shaped generally like the letter J. Each of the radiating portions 30, 32 extends from its connection to the feed pin 38 approximately one quarter of the wavelength at the center frequency of its respective frequency band. This extent includes the length,