

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RESMED CORP.,
Petitioner,

v.

FRACTUS, S.A.,
Patent Owner.

Case No. IPR2026-00341
Patent No. 8,362,960

PATENT OWNER PRELIMINARY RESPONSE

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EXHIBIT LIST

Exhibit No.	Title
EX2001	U.S. Patent No. 8,810,458
EX2002	Letter of June 21, 2021 from Ruben Bonet to David Pendarvis
EX2003	Attachment to email of November 9, 2022 (EX2004 at 6-7)
EX2004	Email correspondence between Fractus and ResMed sent from July 26, 2021 through March 24, 2023
EX2005	Joint Motion to Dismiss with Prejudice in <i>Fractus, S.A. v. ADT LLC</i> , Case No. 2:22-cv-00412-JRG
EX2006	“Fractus expands IoT patent licensing program signing ADT agreement and ending litigation,” https://www.prnewswire.com/news-releases/fractus-expands-iot-patent-licensing-program-signing-adt-agreement-and-ending-litigation-302264328.html (last accessed June 21, 2026)
EX2007	“Fractus expands U.S. connected safety licensing via RPX agreement,” https://www.fractus.com/company/news/fractus-expands-u-s-connected-safety-licensing-via-rpx-agreement/ (last accessed June 21, 2026)
EX2008	“Fractus welcomes new licensee, expanding presence in the U.S. smart home market,” https://www.fractus.com/company/news/fractus-welcomes-new-licensee-expanding-presence-in-the-u-s-smart-home-market/ (last accessed June 21, 2026)
EX2009	Photos of Resmed’s AirSense 10 4G product
EX2010	“Our Global Offices,” https://www.taoglas.com/about-taoglas/taoglas-office-locations/ (last accessed August 21, 2026)

EX2011	Expert Declaration of Hossein Hashemi, Ph.D.
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I. Introduction

The Petition sets forth three invalidity grounds challenging claims of U.S. Patent No. 8,362,960 (the “’960 Patent), none of which establish a reasonable likelihood that any challenged claim is unpatentable.

Claim 1 is directed to a handheld device that includes at least two antennas with specific operating characteristics that are provided with a particular arrangement on a ground plane. This arrangement, specifically the location and orientation of the antennas, provides isolation between antennas with the specified operating characteristics. The first of the two antennas is configured to transmit and receive electromagnetic radiation in at least three frequency bands, while the second antenna is configured to operate in at least one frequency band.

Ground 1 purportedly invalidates independent claim 1 and dependent claims 2, 3, 4, 19 and 20 over Kangasvieri (EX1005) and Chiba (EX1006). Kangasvieri is relied upon for an antenna system that includes two antennas and their orientations relative to the ground plane, and apparently¹, Chiba replaces one of Kangasvieri’s two antennas

¹ Patent Owner notes that characterizing Ground 1 is difficult as the Petition fails to explain the proposed combination of Kangasvieri and Chiba with the particularity required by 35 U.S.C. § 312. *See* Section V.E, *infra*.

with a multiband antenna.² This substitution, however, which results in a structure that includes a completely superfluous second antenna, is contrary to the primary objectives of both references, and results in an arrangement that Chiba explicitly teaches away from. Specifically, the first and second antennas in Kangasvieri are separate transmit and receive antennas for the same frequency band. Ground 1 proposes replacing Kangasvieri's single-band first antenna with a multiband antenna from Chiba that is configured to transmit and receive in all of the frequency bands at which it operates. This substitution renders the second antenna in Kangasvieri superfluous – the functionality that the second antenna provided prior to the substitution is subsumed by the Chiba antenna. Specifically, per the Petition, Chiba's antenna transmits and receives in all the frequency bands at which it operates, and therefore, provides the same functionality as Kangasvieri's transmit-only or receive-only second antenna. Given the references teach that antenna structures should be made smaller, and Chiba explicitly teaches that multiple antenna systems are a “problem,” the person of ordinary skill in the art (“POSITA”) would not have kept Kangasvieri's second antenna once the Chiba antenna was incorporated in the device. Accordingly, the proposed combination that includes the superfluous second antenna from Kangasvieri would not have been obvious.

² A multiband antenna is an antenna that operates in multiple frequency bands.

Further, the Petition does not provide the required rational underpinning for why a skilled artisan would retain Kangasvieri's second antenna, the above-referenced superfluous antenna, after making the substitution. The Petition states that Kangasvieri's second antenna "remains present" and continues to operate, but this second antenna is rendered completely unnecessary by the presence of Chiba's multiband antenna in the combination. An obviousness theory must explain why a skilled artisan would select the particular proposed configuration, including why the artisan would preserve a redundant feature. The Petition fails to provide a rationale for retaining the superfluous second antenna, and therefore, does not provide the required articulated rational underpinning necessary to establish obviousness.

Third, the unexplained retention of Kangasvieri's second antenna indicates that the challenged claim, rather than the teachings of the prior art, supplied the roadmap for the Petition's combination. Using the challenged claim to select and arrange isolated features from the references is impermissible *ex post* hindsight reasoning.

Fourth, the Petition does not provide a sufficient technical basis for concluding that Chiba's three-band antenna could replace Kangasvieri's first antenna with a reasonable expectation of success. The Petition asserts that the substitution would require "little to no structural redesign" relying on the fact that Kangasvieri's first antenna and Chiba's multiband antenna are both described as planar inverted-F antennas ("PIFAs"). Kangasvieri, however, expressly teaches that a PIFA's radiating

characteristics depend on the ground plane as well as the antenna element and explains that ground-plane currents affect coupling and isolation between antennas. The Petition fails to provide analysis of these considerations from Kangasvieri, and therefore, fails to establish the required reasonable expectation of success.

Finally, the Petition fails to set forth Ground 1 with the particularity required by 35 U.S.C. § 312. Specifically, the Petition asserts that “A POSITA would have been motivated to replace the first antenna with Chiba’s antenna in Kangasvieri’s mobile terminal.” Kangasvieri, however, discloses multiple examples of its first antenna, and the Petition appears to rely on *at least* two of these examples. At least one of the relied upon examples is inconsistent with the Petition’s rationale for making the substitution in the first place. Further, the Petition fails to illustrate how the antennas would be oriented once the substitution has taken place. It is simply not clear how the combination proposed in Ground 1 is implemented; therefore, it is unclear how the combination purportedly reads on claim 1. Accordingly Ground 1 fails to meet the particularity requirement of 35 U.S.C. § 312.

Grounds 2 and 3 do nothing to resolve the above-described issues with the proposed combination of Kangasvieri and Chiba. Grounds 2 and 3 are, therefore, deficient for the same reasons.

Accordingly, there is no reasonable likelihood that Petitioner will prevail with respect to at least one of the claims challenged in the Petition, and *inter partes* review should not be instituted based upon the proposed invalidity grounds.

II. Background

A. The ‘960 Patent

U.S. Patent No. 8,362,960 (the “’960 Patent”, EX1001) addresses the difficulty of integrating multiple antennas into compact handheld devices while maintaining adequate isolation between them. The patent explains that handheld devices increasingly required separate antennas for cellular and other wireless services, but that simply separating the antennas was often impractical because of the limited printed circuit board (“PCB”) area available. The ‘960 Patent identifies antenna placement and orientation relative to the PCB ground plane as techniques for reducing electromagnetic coupling between the antennas. EX1001 at 1:39-50; 2:54-65. In particular, the patent teaches that good isolation can be achieved by deliberately selecting the antennas’ orientations and antenna types based on the currents they excite in the common ground plane, rather than relying principally on physical separation. EX1001 at 1:39-50; 9:54-10:30; *see also* EX2011 at ¶ 30.

Claim 1 captures this concept through a handheld device that includes a particular geometric arrangement of two antennas relative to a substantially rectangular ground plane. The first antenna is configured to transmit and receive in at least three

mobile-communication frequency bands and extends substantially parallel to a first side of the ground plane, while the second antenna operates in at least one frequency band and extends substantially parallel to a second side. Critically, the first antenna is positioned near a short side of the ground plane, and the first and second sides of the ground plane are substantially orthogonal. EX1001 at 24:19-37 (claim 1). Thus, claim 1 does not merely recite two antennas incorporated into the same handheld device; it specifies their respective orientations with reference to the geometry of the common ground plane, producing an orthogonal antenna arrangement tied to the physical structure of the device. EX2011 at ¶ 31.

The specification of the '960 Patent explains the technical significance of this arrangement in terms of antenna isolation. The patent teaches selecting antenna orientation relative to the PCB so as to minimize coupling, including orienting antennas according to the directions of currents induced in the ground plane. EX1001 at 9:37-10:30. The inventive focus of claim 1 can therefore be understood as the deliberate spatial and directional coordination of the two antennas with the rectangular ground plane – one antenna near a short side, with the antennas extending parallel to substantially orthogonal sides – rather than merely trying to physically separate as much as possible multiple antennas in the same handheld device. EX2011 at ¶ 32.

B. Chiba

U.S. Patent No. 6,195,048 (“Chiba,” EX1006), entitled “Multifrequency Inverted F-Type antenna,” is directed to a multifrequency inverted F-type antenna intended principally for use as an internal antenna in small, thin radio communication terminals, particularly portable telephones. The patent expressly identifies its objective as providing an antenna capable of sending and receiving radio waves in multiple frequency bands without increasing the antenna’s size by incorporating all antenna functionality into in a single, compact antenna structure. EX1006 at 1:1-5, 30-35, 45-52, 2:34-36; *see also* EX2011 at ¶ 34.

Chiba identifies a problem with prior approaches for achieving this multiband operation. Specifically, a conventional inverted F-type antenna has an emission conductor whose length determines its resonant frequency. To accommodate two different frequency bands, one prior arrangement placed two single-frequency inverted F-type antennas adjacent to one another, with each antenna having its own ground connection, feeding point, and coaxial feed. Chiba explains that this arrangement increases the required installation area because two separate antennas must be accommodated, and therefore, is a “problem.” EX1006 at 1:45-65; 2:1-25; *see also* EX2011 at ¶ 35. An example of such a “problem” arrangement is illustrated in FIG. 2 of Chiba, reproduced below.

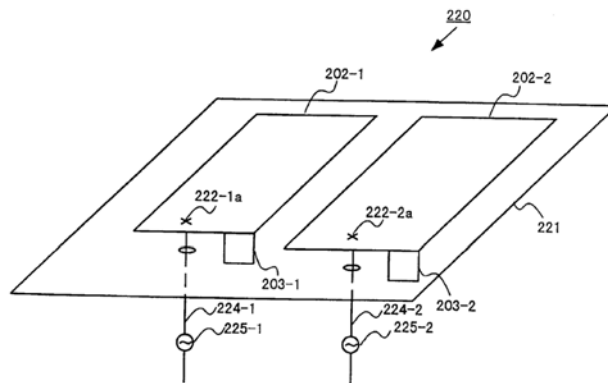


FIG. 22

Chiba addresses this problem by incorporating multiple resonant antenna structures into a single emission-conductor arrangement. In the principal embodiment, a cut-out is formed in an emission conductor that has one end connected to a ground conductor through a short-circuit plate. The cut-out creates a first emission conductor 12-1 and a second emission conductor 12-2, each having a different resonant length, and therefore, resonating at a different frequency bands, as illustrated in FIG. 1, reproduced below. EX2011 at ¶¶ 36.

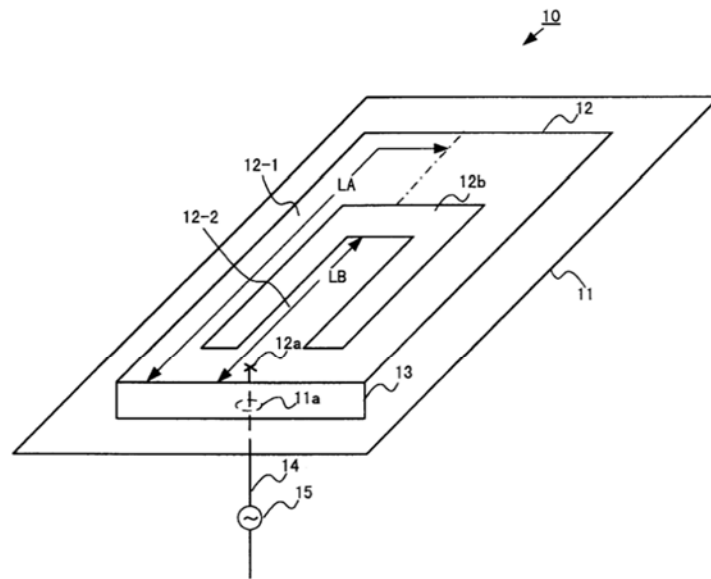


FIG. 1

Importantly, both emission conductors associated with the same overall antenna structure are supplied through a single feeding point 12a. Chiba explains that the first frequency band is determined by the shape and resonance length of the first emission conductor, while the second frequency band is determined by the shape and resonance length of the second emission conductor. The two resonances therefore permit the single antenna structure to receive and transmit radio waves in two different frequency bands. EX1006 at 5:1-25; 6:1-20; *see also* EX2011 at ¶ 37.

Chiba specifically identifies a portable telephone antenna implementing two systems – GSM and PHS – as an example, with the antenna configured to operate in the 800 MHz GSM band and the 1.9 GHz PHS band, as illustrated in FIG. 3. Thus, the disclosure demonstrates that the invention is intended to allow one physical antenna

structure to perform the function that otherwise might require two separate single-frequency band antennas. EX1006 at 6:20-55; *see also* EX2011 at ¶ 38.

Chiba further emphasizes that the multiband capability is achieved without the increase in installation area or installation volume that the prior art solution of using a second antenna would require. Chiba reports that its first embodiment can have substantially the same installation area and height as a conventional single-frequency inverted F-type antenna, while providing the additional resonance needed for the second frequency band. The disclosed embodiments extend this concept beyond two bands: Chiba describes configurations having three resonant conductors for three frequency bands and states that four or more frequency bands can be accommodated by forming additional emission conductors. Chiba's industrial-applicability discussion therefore characterizes the invention as a small, thin, low-cost multifrequency antenna capable of transmitting and receiving in multiple frequency bands without making the antenna large. In that respect, the central purpose and design principle of Chiba is providing operation in multiple frequency bands by using a single compact antenna structure, rather than the use of multiple physically separate antennas. EX1006 at 6:20-40; 10:1-35; 14:35-55; *see also* EX2011 at ¶¶39-40.

C. Kangasvieri

U.S. Patent Publication No. 2003/0193437 (“Kangasvieri,” EX1005), entitled “Method and System for Improving Isolation in Radio-Frequency Antennas,” is

directed to improving isolation between separate transmit and receive antennas that operate in the same frequency band. For example, as illustrated in FIG. 2 from the reference, reproduced below, antenna 22 (annotated in green) is a transmit-only or receive-only antenna in a particular frequency band and antenna 24 (annotated in yellow) is the corresponding antenna in that same frequency band that provides the other function. EX2011 at ¶ 41. If antenna 22 is a transmit antenna, then antenna 24 is a receive antenna, and vice versa.

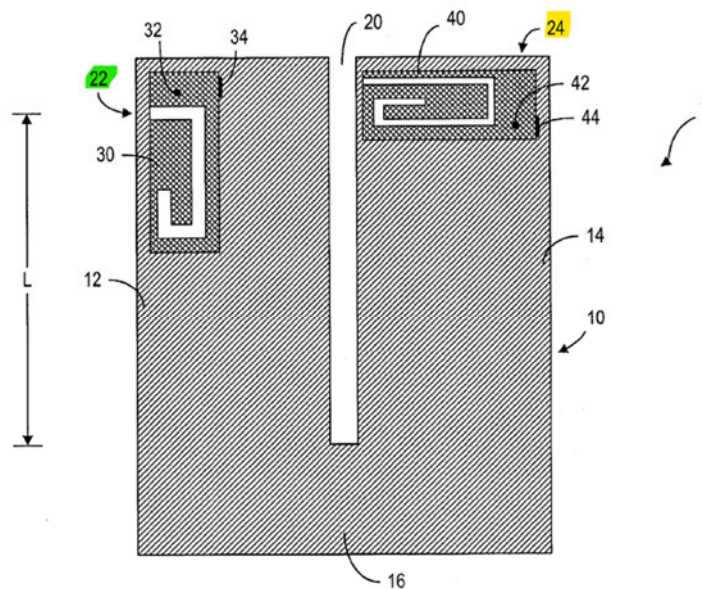


FIG. 2

Kangasvieri is particularly concerned with mobile terminals in which separate antennas are used for transmission and reception, including in PCS-band systems. It explains that, in a full-duplex system, the transmit and receive frequency bands can be sufficiently close that conventional duplex filters must be relatively large, which increases signal-path losses and makes it difficult to reduce the thickness of a mobile

phone. The stated objective is, therefore, to provide an antenna structure that does not require a large volume while improving isolation between the transmit and receive antennas. EX1005 at ¶¶ [0001]-[0004]; *see also* EX2011 at ¶ 42.

Kangasvieri identifies the common ground plane used by the separate transmit and receive antennas as the principal source of the isolation problem. Specifically, Kangasvieri explains that, for a PIFA, signal power supplied to a radiating element also produces current in the ground plane through the grounding structure. When the transmit and receive antennas share that ground plane, power supplied to the transmit antenna can consequently appear at the receive antenna through the ground plane, thereby reducing isolation between the two antennas. This problem is particularly relevant to systems such as CDMA IS-95, GSM-1900, and WCDMA-1900, where the transmit and receive operating ranges are relatively close within the overall PCS frequency band. EX1005 at ¶¶ [0063]-[0065]; *see also* EX2011 at ¶ 43.

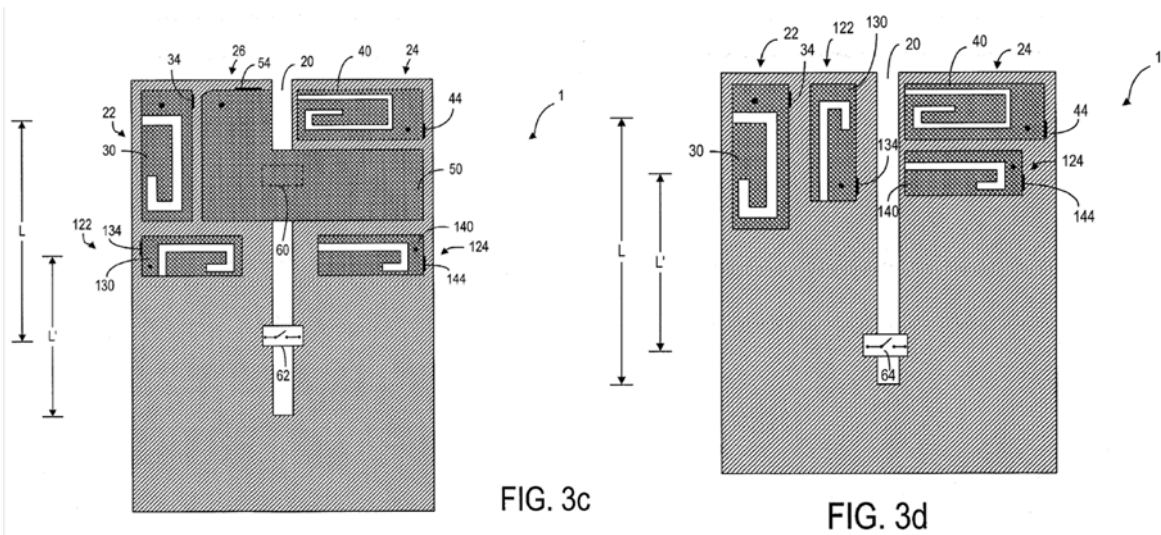
The principal solution proposed by Kangasvieri is to place a slot or cut in the common ground plane between the transmit and receive antennas. The two antennas are positioned over respective sections of the ground plane, with the slot separating those sections while a connecting portion can maintain their physical connection. The effective length of the slot is selected to be approximately one-quarter wavelength of the operating frequency band. An example of such an arrangement is illustrated in FIG. 2 from the publication (provided above). EX2011 at ¶ 44.

Kangasvieri also addresses mobile terminals operating in multiple frequency bands, while preserving the fundamental transmit/receive isolation technique. For example, a third antenna 26 may operate in a lower frequency band while the first and second antennas form the transmit/receive pair in a higher band, as illustrated in FIG. 3a.

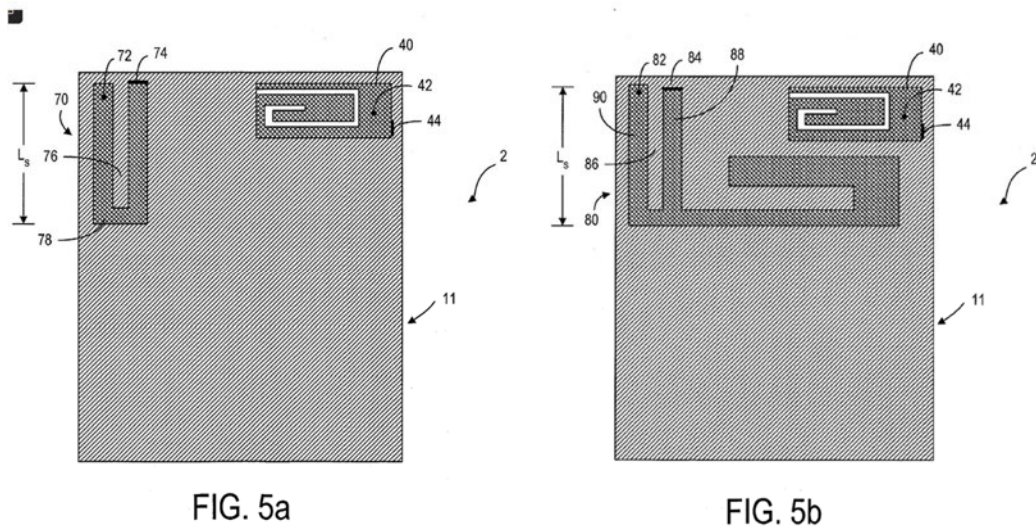


In this embodiment, a switch 60 positioned across the ground-plane slot can electrically connect or separate the two ground-plane sections depending on the operating band: the switch is closed for the lower-frequency transceiver antenna and opened when the higher-frequency transmit/receive pair is being used. EX2011 at ¶ 47. It is important to note that when an antenna is provided that is capable of transmission and reception in a particular frequency band, like antenna 26, only a single antenna for that frequency band is provided.

Kangasvieri further discloses multiple transmit/receive antenna pairs sharing the same ground plane. In the embodiments of FIGs. 3c and 3d, antennas 22 and 24 provide a first transmit/receive pair and antennas 122 and 124 provide a second transmit/receive pair in a different frequency band. In these arrangements, the effective length of the slot can be changed with switches 62/64 so that the slot can present a length of approximately one-quarter wavelength at the operating frequency for all of the transmit/receive pairs. EX1005 at ¶¶ [0066]-[0069]; *see also* EX2011 at ¶ 48.



Finally, Kangasvieri discloses an alternative way of achieving the same basic isolation objective without relying on a slot in the common ground plane. In this embodiment, illustrated in FIGs. 5a and 5b, one antenna is a slot antenna 70/80 and the other is a PIFA 40.



A slot is formed in the radiating element of the slot antenna so that the feed line and grounding strip are effectively separated by approximately one-half wavelength.

This configuration causes the signal supplied to the slot antenna to experience approximately a 180-degree phase shift before being coupled to the ground plane, thereby producing the phase relationship used to improve isolation. Kangasvieri expressly contemplates that either antenna can serve as the transmitter while the other serves as the receiver and further describes a dual-band slot antenna that can cover the PCS transmit band while also covering transmission and reception in another band such as GSM 850, as illustrated in FIG. 5b. EX2011 at ¶ 50. It should be noted that in this embodiment, when antenna 80 provides transmission and reception in the GSM 850 band, no additional GSM 850 antennas are provided in the arrangement.

As the discussion above illustrates, every embodiment in Kangasvieri includes separate transmit and receive antennas. Thus, although the publication contains embodiments for multiband terminals, its central purpose is not simply to provide multiple frequency bands; rather, it is to permit separate transmit and receive antennas operating in the same frequency band to coexist while achieving improved isolation in a compact antenna structure. EX1005 at ¶¶ [0071]-[0073]; claims 13-21; *see also* EX2011 at ¶ 51.

D. Inoue and Vance

The present preliminary response is focused on the validity of independent claim 1 of the '960 Patent under Ground 1. Therefore, Patent Owner declines at this time to

characterize Inoue (EX1009) and Vance (EX1007), which are relied upon only in Grounds 2 and 3.

III. Claim Construction

Patent Owner respectfully submits that for the purpose of this Preliminary Response the Board can resolve all issues without an explicit construction of any claim term – the plain and ordinary meaning of all terms amply illustrates that the invalidity grounds presented in the Petition fail to show a likelihood of invalidating any claim of the '960 Patent.

IV. The Person of Ordinary Skill in the Art

For purposes of this Preliminary Response only, Patent Owner assumes the POSITA definition asserted in the Petition. Petition at 15. Patent Owner, however, reserves the right to present its own definition in the event an IPR is instituted.

V. Argument

An obviousness theory must explain why a POSITA would have made the proposed modification. It is not enough to identify familiar components and state that they can be placed together. “Rejections on obviousness cannot be sustained by mere conclusory statements;” there must be articulated reasoning with a rational underpinning. *In re Kahn*, 441 F.3d 977, 988 (C.A. Fed. 2006); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418, 127 S. Ct. 1727, 1741, 167 L. Ed. 2d 705 (2007). Further, where a proposed combination introduces or preserves a redundant feature, there must be a rationale for why the redundant feature is maintained in the combination. *See In*

re Schweickert, 676 F. App'x 988, 995 (Fed. Cir. 2017) (Finding that the Board needs to provide an explanation for the inclusion of a redundant and unnecessary feature); *see also Ex parte Synaptics Inc.*, Appeal 2020-005916, 2020 WL 8186446, at *3, 5 (P.T.A.B. Nov. 25, 2020). The Petition must also establish that the POSITA would have a reasonable expectation of success in obtaining the invention with the proposed combination. *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009). The Petition fails to meet this standard. Rather, it uses hindsight to pick and choose portions of the two references it relies upon without adequately explaining why this combination would be considered by a POSITA given the purposes articulated in the references for those inventions and why the resulting combination makes sense given it maintains an unnecessary and redundant feature.

Ground 1 rests on a proposed combination in which Chiba's multifrequency antenna replaces Kangasvieri's first antenna, while Kangasvieri's second antenna remains in the device. Petition at 26-30. Specifically, the Petition relies on Chiba to supply a first antenna that transmits and receives in at least three mobile-communication bands. *Id.* at 22-28. It relies on Kangasvieri to supply the second antenna and the claimed relative arrangement of the two antennas on a substantially rectangular ground plane. *Id.* at 29-37. To support this combination, however, it is not enough for Petitioner to merely show that multiband PIFAs and two-antenna terminals were separately known. Rather, the Petition must explain why it would have been

obvious to the POSITA to make that particular two-antenna configuration. This it fails to do.

There are at least five reasons why the proposed combination would not have been obvious to the POSITA. First, the combination is inconsistent with the design principles taught in Kangasvieri and Chiba. Second, the Petition provides no rational reason to preserve a second antenna after assigning its relevant function to Chiba's replacement antenna. Third, this unexplained retention of the second antenna is an improper product of hindsight. Fourth, the Petition's purported expectation of success fails to account for both Kangasvieri's express teaching that PIFA performance depends on the ground plane and for Chiba's multiple resonant branches. Fifth, the Petition does not identify with sufficient particularity which Kangasvieri embodiment is being modified or how the substituted antenna would occupy the location and orientation required to meet claim 1.

Because the Petition fails to provide technically coherent, record-supported reasons for the combination it advances, Ground 1 does not establish that independent claim 1 would have been obvious.

A. The Proposed Combination Is Contrary to the Teachings of Both References

i. The Proposed Combination Is Contrary to Kangasvieri

A proposed combination does not support obviousness where the modification would defeat the primary reference's basic objective and the petitioner provides no

persuasive reason why a skilled artisan would nevertheless make that modification. *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (finding no motivation where the modification “would destroy the basic objective” of the reference); *Chemours Co. FC, LLC v. Daikin Industries, Ltd.*, 4 F.4th 1370, 1376–77 (Fed. Cir. 2021) (reversing where the proposed modification would alter the reference’s inventive concept). The “primary object” of Kangasvieri is “to provide an antenna structure having a transmit antenna and a receive antenna, wherein the isolation between the transmit and receive antennas is improved.” EX1005 at ¶ [0004]; *see also* EX2011 at ¶ 53. The proposed combination of Ground 1 destroys this “primary object” by eliminating the separation transmit and receive antennas, and replacing them with a single copy of Chiba’s multiband antenna which sends and receives at all its operating frequencies. Petition at 24-26. As such, the proposed combination would not have been obvious to the POSITA at the time of invention. EX2011 at ¶ 53.

Kangasvieri’s “primary object” of “provid[ing] an antenna structure having a transmit antenna and a receive antenna, wherein the isolation between the transmit and receive antennas is improved” is reflected throughout the embodiments relevant to the Petition. *See* Section II.C, *supra*; *see also* EX2011 at ¶ 54. In the FIG. 2 embodiment, antenna 24 (annotated in yellow below) is used for transmission-only or reception-only and antenna 22 (annotated in green) is used for the other function, both in the PCS band. EX1005 at ¶ [0065]; *see also* EX2011 at ¶ 54. In the FIG. 5b embodiment, dual-

band slot antenna 80 (annotated in green) covers PCS transmission and transmission and reception in another lower band, such as GSM 850, while PIFA 40 (annotated in yellow) covers only PCS reception. EX1005 at ¶ [0072]; *see also* EX2011 at ¶ 54. In each instance, the second antenna has a defined role in a transmit-and-receive pair for the same general operating band. *Id.*

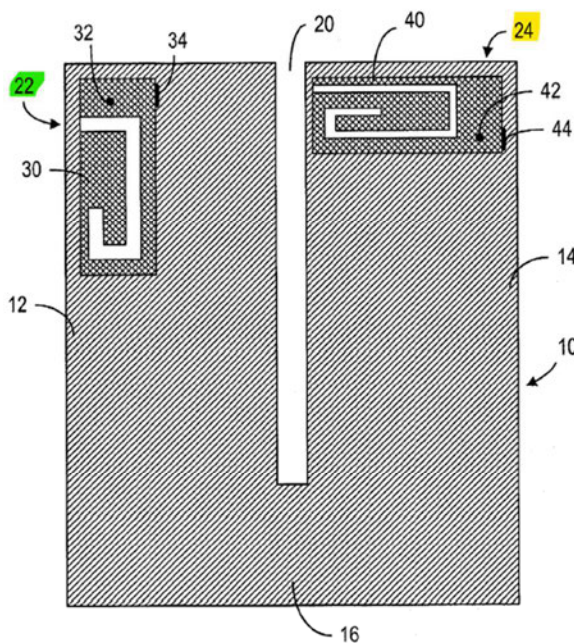


FIG. 2

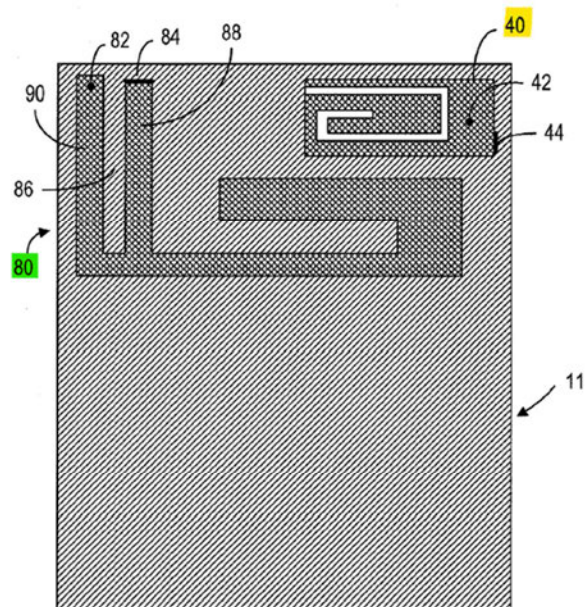


FIG. 5b

Kangasvieri's isolation solution follows from that division of transmit and receive functions onto two separate antennas. Kangasvieri explains that power supplied to a PIFA produces current not only in the radiating element but also in the shared ground plane. EX1005 at ¶ [0063]. When separate transmit and receive antennas share that ground plane, conducted power from the transmit antenna can appear at the receive antenna and reduce isolation. EX1005 at ¶¶ [0063]-[0065]; *see also* EX2011 at ¶ 55.

Kangasvieri therefore introduces a slot or a corresponding phase-shifting arrangement to reduce coupling between the separate antennas. EX1005 at ¶¶ [0010]-[0011], [0064]-[0065]; *see also* EX2011 at ¶ 55. The second antenna is not an arbitrary additional radiator. It exists only because the disclosed terminal assigns transmission and reception in the relevant band to different antennas and then addresses the isolation problem that arrangement creates. EX2011 at ¶ 55.

The Petition's proposed substitution improperly ignores the "primary object" of Kangasvieri. Specifically, the Petition replaces Kangasvieri's first antenna, which only transmits at its intended frequency band, with a multiband Chiba antenna that transmits and receives at each band. Petition at 26 ("Thus, as discussed below, A POSITA would have been motivated to replace the first antenna with Chiba's antenna in Kangasvieri's mobile terminal.").³ The Petition itself repeatedly asserts that Chiba's multifrequency

³ The Petition is actually silent regarding the frequency bands at which the Chiba antenna operates. *See* Petition at 20-29. This failure should, on its own, result in denial of institution as the Petition fails to meet the "particularity" requirement of 35 U.S.C. § 312, which Patent Owner separately addresses in Section V.E, *infra*. For purposes of the following discussion, Patent Owner assumes that Petitioner is proposing to utilize a Chiba antenna in which one of the frequency bands at which it operates is the same as the frequency band of the transmit antenna that it replaces. Otherwise, the proposed

antenna transmits and receives in each of three frequency bands at which it operates. Petition at 24-26 (“A POSITA, furthermore, would have understood that Chiba’s multifrequency inverted F-type antenna 120 is capable of both transmitting and receiving radiofrequency signals in three frequency bands. ... These disclosures confirm that antenna 120 in Figure 14 is designed for both send and receive operations for mobile communication services rather than receive-only functionality. ... [A] POSITA would therefore have understood that antenna 120 is capable of both sending and receiving radio waves in at least three frequency bands.”). Accordingly, the Petition specifically relies on Chiba’s antenna’s capability of “sending and receiving” in the frequency bands in which it operates. *Id.*; EX1006 at 6:51-62, 9:41-58; *see also* EX2011 at ¶ 56. Thus, under the Petition’s theory, the Chiba antenna that replaces Kangasvieri’s first antenna is not limited to the transmit function performed by Kangasvieri’s original first antenna. Rather it performs both transmit and receive functions in its operating bands. *Id.*

substitution would render Kangasvieri inoperable for that frequency band (at which no transmit capability remains), which would be a non-obvious combination. A POSITA would not render Kangasvieri unable to transmit at its intended frequency band by replacing the transmit antenna with a different antenna that cannot operate at the intended band.

Once the replacement is made on the Petition's stated terms, however, the resulting device no longer addresses Kangasvieri's "primary object" of "provid[ing] an antenna structure having a transmit antenna and a receive antenna, wherein the isolation between the transmit and receive antennas is improved." *Id.*

Kangasvieri's treatment of the GSM 850 band in its FIG. 5b embodiment reinforces this point. *Id.* at ¶ 57. In FIG. 5b, antenna 80 can operate in the PCS transmit band and transmit and receive in a lower band such as GSM 850. Antenna 40 covers PCS reception. EX1005 at ¶ [0072]; *see also* EX2011 at ¶ 57. Kangasvieri does not add another GSM 850 antenna where the multiband antenna already supplies send and receive operation in that lower band. *Id.* Rather, Kangasvieri adds a separate antenna only where a separate PCS receive path is needed. *Id.* Thus, when one antenna already supplies the relevant send and receive operation in a band, Kangasvieri does not teach retaining an additional antenna for that same operation. *Id.* Applied to the Petition's premise that Chiba transmits and receives in all its operating bands, Kangasvieri's own design approach would thus lead the POSITA away from keeping a separate second receive antenna. *Id.* The POSITA would, thus, eliminate the superfluous second antenna in the combination.

While the Petition asserts that the second antenna remains "consistent with Kangasvieri's disclosure" (Petition at 30), mere physical retention does not make the proposed configuration consistent with Kangasvieri's primary object, which is to

separate transmit and receive functions and improve isolation between them. The Petition instead proposes eliminating this separation. Therefore, the proposed combination would not have been obvious to the POSITA at the time of invention. *Trivascular*, 812 F.3d at 1068; *Chemours*, 4 F.4th at 1376–77; *see also* EX2011 at ¶ 58.

Further, retaining the second antenna is **not** consistent with the disclosures in Kangasvieri. As illustrated in the embodiments of FIGs. 3c, 3c and 5b, when the antenna structure includes an antenna that provides transmission and reception in a particular band, Kangasvieri does not include an additional transmit-only or receive-only antenna at that band. Accordingly, retaining the second antenna in the combined structure is, in fact, **inconsistent** with Kangasvieri’s disclosures.

ii. The Proposed Combination Is Contrary to Chiba

The primary object of Chiba is to address the space and volume required by multiple single-frequency antennas by utilizing a single multiband antenna that provides transmission and reception at all its operating frequencies. EX1006 at 2:33-45; *see also* EX2011 at ¶ 59. For example, Chiba describes a prior art arrangement in which two inverted-F antennas are placed next to one another on a common ground conductor. Each antenna has its own radiating conductor, ground connection, feeding point, and coaxial feeding line. EX1006 at 1:45-2:25, Fig. 22 (reproduced below); *see also* EX2011 at ¶ 59. Chiba identifies the resulting installation area as a “problem”

because the device must accommodate two physically separate antenna structures, which increases size of the antenna structure. EX1006 at 1:59-2:25; *see also* EX2011 at ¶ 59. The primary object of the Chiba device is to address such “problems.” EX1006 at 2:33-36; *see also* EX2011 at ¶ 59.

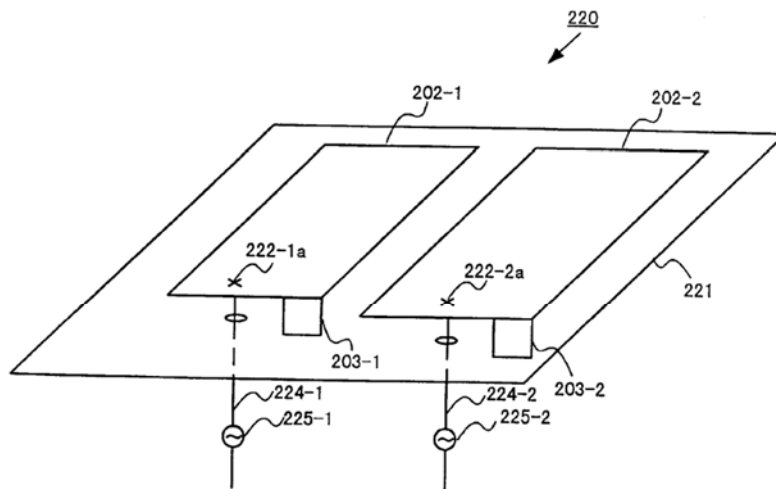


FIG. 22

Chiba solves this problem by integrating multiple resonant paths operating over different frequency bands into a single antenna structure. In its principal dual-band embodiment, a cut-out forms first and second emission conductors with different resonant lengths, both associated with the same antenna and supplied through a single feeding point. EX1006 at 5:1-6:20; *see also* EX2011 at ¶ 60. Chiba explains that this structure can provide the two resonances without materially increasing the installation area or height relative to a conventional single-frequency inverted-F antenna. EX1006 at 6:20-40; *see also* EX2011 at ¶ 60. Its specific example applies that integrated antenna

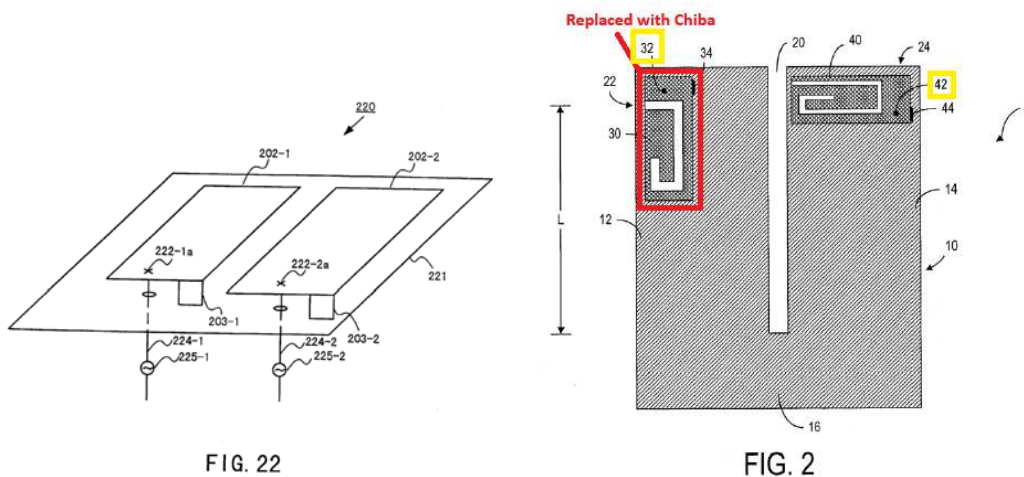
to GSM and PHS operation in a portable telephone. EX1006 at 6:40-62; *see also* EX2011 at ¶ 60.

Chiba extends the same design principle to three or more bands. FIG. 14 includes first, second, and third emission conductors that resonate in respective frequency bands, with power supplied through a single feeding point. EX1006 at 9:41-58; *see also* EX2011 at ¶ 61. Chiba states that this arrangement operates in three frequency bands “without increasing either the installation area or installation volume.” EX1006 at 10:1-6; *see also* EX2011 at ¶ 61. Chiba further contemplates additional conductors for four or more bands. EX1006 at 10:7-35. Across these embodiments, Chiba’s central teaching is to consolidate multiple frequency capabilities into a single compact, commonly fed antenna rather than using separate antennas for functions that the integrated antenna can perform. EX2011 at ¶ 61.

The Petition relies on Chiba’s consolidated capability as a purported motivation to modify Kangasvieri, but in so doing it creates a combination that runs contrary to Chiba’s primary object. Specifically, the proposed combination replaces Kangasvieri’s first antenna with Chiba’s three-band antenna and then inexplicably and unnecessarily retains Kangasvieri’s separately fed second antenna. Petition at 26-30. The resulting arrangement again places multiple antennas with separate feed points on a common ground plane. That is precisely the type of arrangement Chiba identifies as a “problem” to be addressed by its multiband antenna. EX1006 at 1:45-2:25, Fig. 22; *see also*

EX2011 at ¶ 62. In essence, the Petition “thumbs its nose” at the teachings of Chiba, proposing a combination that creates the very problem Chiba sought to solve. *Id.* Put differently, the combination proposed in the Petition recreates the “problem” of Chiba’s FIG. 22, implementing an antenna structure with separate radiators and separate feed points on a shared ground. *Id.* A combination that destroys the primary object of a reference is nonobvious. *See Trivascular*, 812 F.3d at 1068; *Chemours*, 4 F.4th at 1376–77.

The combination is not merely nonobvious; Chiba explicitly teaches away from the combination proposed in Ground 1. EX2011 at ¶ 63 Prior art teaches away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360 (Fed. Cir. 2017). Chiba teaches that an arrangement as proposed in Ground 1, in which two separate antenna structures are arranged on a shared ground plane, is a “problem,” and therefore directly teaches away from the proposed combination. EX2011 at ¶ 63



The Petition, however, goes further because, unlike in Kangasvieri's arrangements, the second antenna in the combination becomes a mere vestige that provides no additional functionality. EX2011 at ¶ 64. The Petition never explains what additional capability the second antenna contributes after the substitution. If the Chiba antenna supplies transmission and reception in all its operating bands, retaining a separate receive antenna adds a second radiating structure and feed without adding an additional service or band. *Id.* The remaining antenna therefore adds the very space, material, and structural complexity that Chiba's integrated approach is designed to avoid for no reason or benefit whatsoever. *Id.*

For these reasons, the references do not provide a coherent path to the Petition's configuration. Kangasvieri teaches a second antenna as part of a separate transmit-and-receive pair, while the Petition's use of Chiba removes that division of functions. Chiba teaches consolidation into a single compact antenna, while the Petition's combination preserves a separate antenna whose relevant function has already been consolidated in

the Chiba antenna. The combination borrows individual features from the references but combines them in a way that is contrary to the primary objects of both references. Such a combination would have been nonobvious to the POSITA at the time of invention. *Trivascular*, 812 F.3d at 1068; *Chemours*, 4 F.4th at 1376–77; *Arctic Cat*, 876 F.3d at 1360.

B. The Petition Does Not Provide a Rational Underpinning for the Proposed Combination

As discussed above, Petitioner bears the burden of explaining the reason a POSITA would have combined these references. This includes providing a rationale for why the combination would retain a redundant and unnecessary feature. *See In re Schweickert*, 676 F. App'x at 995. The Petition fails this test as the only stated motivation it articulates concerns replacement of Kangasvieri's first antenna. The Petition reasons that Chiba's multifrequency PIFA would increase the number of supported communication bands without enlarging the first antenna's volume or the device's ground-plane footprint. Petition at 27-28. It also points to an industry demand for smaller handsets capable of supporting multiple standards. *Id.*; EX1003 ¶¶ 27, 79. While those statements may describe a reason to consider a compact multiband antenna, they do not explain why the modified device would retain Kangasvieri's second antenna after Chiba is said to perform both transmission and reception in the operating bands.

The Petition's treatment of the second antenna is a contrived result without a rationale. The Petition merely states that the Chiba substitution "does not eliminate or materially alter" the second antenna, which "remains present in the combined system and continues to operate in at least one frequency band." Petition at 29-30. It further states that replacing the first antenna would not affect the structure or operation of the second antenna. *Id.* The issue is not whether the second antenna can physically remain. Instead, the issue is why a skilled artisan seeking the benefits identified by the Petition **would have chosen to keep it**. See *Schweickert*, 676 F. App'x at 995 (Finding that the Board needs to provide an explanation for the inclusion of a redundant and unnecessary feature). Because the Petition fails to provide any answer to this question, Ground 1 is deficient.

The need for such an answer is apparent. In *Kangasvieri*, the second antenna is paired with a first antenna that performs transmission but not reception. EX1005 at ¶¶ [0065], [0072]; see also EX2011 at ¶¶ 65-66. In the proposed combination, the first antenna performs both transmission and reception. Petition at 24-30. With Chiba's antenna replacing *Kangasvieri*'s first antenna, *Kangasvieri*'s second antenna no longer has a function. EX2011 at ¶ 65. Making the conclusory statement that "The second antenna disclosed in *Kangasvieri* remains present in the combined system" (Petition at 30) is not a rationale for why the POSITA would have kept *Kangasvieri*'s second antenna once it no longer has a function. *Id.*

The redundancy also conflicts with the Petition's compactness rationale. A person seeking additional bands within a limited volume would have reason to avoid an unnecessary radiator, antenna, feed, matching structure, and associated placement constraints. Chiba's disclosure explains that separately installed antennas increase required area and that integrating multiple resonances into one structure avoids that problem. EX1006 at 1:45-2:25, 9:41-10:6; *see also* EX2011 at ¶ 65. The Petition does not reconcile its stated interest in compactness with its decision to retain an antenna for which it identifies no remaining need. The obvious solution is to remove the redundant second antenna, not retain it creating the "problem" Chiba sought to solve. Removing the redundant antenna would be consistent with Kangasvieri, Chiba, and the understanding of the POSITA. *See* EX2011 at ¶¶ 65-66

Accordingly, the Petition's reasoning stops before it reaches the claimed configuration. It supplies a reason to use Chiba's multiband antenna, but claim 1 requires both that first antenna and a separately arranged second antenna. The unexplained assertion that the second antenna remains cannot bridge that gap. Because the proposed combination contains a redundant element whose presence is contrary to the teachings of the cited references, and the Petition does not provide a reason to preserve it, Ground 1 lacks the rational underpinning required for an obviousness conclusion. *See Schweickert*, 676 F. App'x at 995.

C. The Retention of Kangasvieri's Second Antenna Reflects Impermissible Hindsight

The absence of a functional reason to retain the second antenna reveals that hindsight, not obviousness, dictated the Petition's combination of Kangasvieri and Chiba. Claim 1 requires a first antenna that transmits and receives in at least three mobile-communication bands and a second antenna that operates in at least one band, with the two antennas extending in specified directions relative to orthogonal sides of the ground plane. The Petition uses Chiba to obtain the first antenna's three-band transmit-and-receive capability and uses Kangasvieri to preserve the second antenna and the claimed geometry. Petition at 20-37.

Once Chiba is substituted as the Petition proposes, however, the second Kangasvieri antenna is superfluous. Chiba is said to *transmit and receive in all its operating bands*. Petition at 24-26. Kangasvieri's remaining antenna supplies *only reception or only transmission in one of the operating bands, a function already provided by the Chiba antenna*. EX1005 at ¶¶ [0065], [0072]. The Petition identifies no added function or benefit produced by maintaining both. The second antenna instead brings burdens of an additional antenna structure: it occupies space on or near the ground plane, requires a separate feed, introduces matching and coupling considerations, and constrains the physical arrangement of the terminal. Chiba's discussion of multiple separately fed antennas confirms the installation-area

consequence and considers this a “problem” to be solved. EX1006 at 1:45-2:25; *see also* EX2011 at ¶ 68.

A designer following the references’ stated goals would instead have reason to remove that redundancy. *See* Section V.A, *supra*; *see also* EX2011 at ¶ 69. Further, the Petition’s own compactness rationale emphasizes adding frequency capability while preserving a small form factor. Petition at 27-28; *see also* EX2011 at ¶ 69. Each of those considerations points toward using the multiband antenna’s available functions, not toward keeping a second antenna that duplicates them. *Id.*

Petitioner’s expert describes the relevant industry demands in the same terms. The declaration states that the drive toward smaller, more feature-rich handsets created demand for compact internal antennas capable of covering multiple frequency bands simultaneously. EX1003 ¶ 27; *see also id.* ¶¶ 79, 166. That observation supports the use of an integrated multiband antenna. It does not supply a reason to add or retain a superfluous antenna. To the contrary, an extra antenna with no identified additional function consumes the limited space that the asserted industry trend sought to conserve. *Id.* at ¶ 70.

The Petition does not confront this tension. It does not weigh any benefit of the second antenna against the costs of keeping it, because it does not identify a benefit. *Id.* at ¶ 71. It does not explain why the Chiba antenna’s full transmit and receive capability would go unused, why a separate receive or transmit path would nevertheless

be selected, or why the compactness advantages it attributes to Chiba would be pursued in a configuration that incorporate superfluous hardware. *Id.* It simply states that the second antenna remains. Petition at 30.

That sequence suggests that the second antenna remains for one reason only: claim 1 requires it. EX2011 at ¶ 72. On the present record, the proposed retention runs against Kangasvieri's allocation of functions, Chiba's consolidation principle, and Petitioner's stated compactness objective. The only explanation for the configuration is Petitioner's need to reproduce claim 1. *Id.* That is "impermissible ex post reasoning and hindsight bias that *KSR* warned against." *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1361 (Fed. Cir. 2019).

D. The Petition Does Not Establish a Reasonable Expectation of Success

"[A] conclusion of obviousness requires a reasonable expectation of success." *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1365 (Fed. Cir. 2016). A showing of a reasonable expectation of success cannot be supported through conclusory expert statements. *See Qiagen N. Am. Holdings, Inc. v. HandyLab, Inc.*, No. 2020-2249, 2021 WL 5024387, at *5 (Fed. Cir. Oct. 29, 2021) (conclusory statements that references could be combined "virtually unaltered" are insufficient for showing a reasonable expectation of success). Contrary to the conclusory assertions in the Petition (*see* Petition at 28), the POSITA would not have had a reasonable expectation of successfully replacing Kangasvieri's first antenna with Chiba's multiband antenna.

EX2011 at ¶ 73. The references themselves, and Kangasvieri in particular, illustrate the challenges with Ground 1's proposed combinations, challenges that the Petition does not even attempt to address.

The Petition makes the conclusory statement that substituting Chiba's multiband antenna for Kangasvieri's first antenna would have required "little to no structural redesign" because both antennas share a planar inverted-F structure. Petition at 27-28. It then characterizes the result as predictable and concludes that a person of ordinary skill would have had a reasonable expectation of success. Petition at 27-28. That analysis treats the common "PIFA" label as sufficient to establish electrical and physical interchangeability. Kangasvieri's own disclosure shows why more analysis is required. EX2011 at ¶ 74.

Kangasvieri expressly states that "[t]he radiating characteristics of a planar inverted-F antenna (PIFA) depend on the ground plane as well as on the antenna element itself." EX1005 at ¶ [0063] (emphasis added). Kangasvieri also explains that power supplied to the antenna produces current in the ground plane through the grounding structure. *Id.* That current can travel through the shared ground plane and appear in the other antenna, reducing isolation. *Id.* ¶¶ [0063]-[0065]. Kangasvieri's slot, connecting section, and antenna placement are therefore not incidental supports for a generic PIFA. They are part of the electrical structure that governs current paths, coupling, and isolation. EX2011 at ¶ 75.

Further, Chiba's three-band antenna is also more than a generic PIFA. Its FIG. 14 embodiment uses three emission conductors with different shapes and resonant lengths to establish three frequency bands. EX1006 at 9:41-58; *see also* EX2011 at ¶ 76. The conductors share a single feeding point, and their relationship to the disclosed ground conductor forms part of the multiband antenna. EX1006 at 9:41-10:6. Each resonant path must operate at its intended frequency and with suitable matching for the antenna to provide the three-band capability on which the Petition relies. EX2011 at ¶ 76.

The proposed substitution places those multiple resonant paths into a different ground-plane environment. In Kangasvieri's FIG. 2 embodiment, slot 20 divides the ground plane into sections joined by connecting section 16. EX1005 at ¶¶ [0064]-[0065]. The slot length and current path are chosen to produce the phase relationship used to reduce coupling at the relevant band. *Id.* A multiband antenna operating at different frequencies will interact with the ground plane at those different frequencies. EX2011 at ¶ 77. Kangasvieri's express statement that the ground plane affects radiating characteristics makes it necessary to address that interaction before concluding that Chiba's resonances, matching, and performance would remain as intended. *Id.*

The POSITA would have readily understood that attempting to replace one of Kangasvieri's antennas with Chiba's multiband antenna presents a number of difficult technical considerations. EX2011 at ¶ 78. Chiba's resonant branches would produce

frequency-dependent ground currents. Those currents would encounter Kangasvieri's slot and connecting section, whose impedance and electrical effect vary with frequency. *Id.* Changes in the return path could shift resonance or matching. *Id.* These points follow from the references' disclosed dependence on the ground plane and their use of frequency-specific resonant lengths and current paths. EX1005 at ¶¶ [0063]-[0065]; EX1006 at 9:41-10:6; *see also* EX2011 at ¶ 78. They are not answered by simply observing that both structures may be categorized as PIFAs. *Id.*

The Petition provides no analysis of these interactions. It does not identify which Chiba dimensions would be retained, how the three resonant paths would be tuned on Kangasvieri's ground plane, whether slot 20 would remain configured for the relevant operating band, or how the remaining second antenna would affect the combined system. It also does not explain whether modifications needed to preserve Chiba's three resonances would alter the location, footprint, or orientation that the Petition relies on for claim 1. Instead, it assumes that the first antenna can be replaced with little or no redesign and that the rest of the device will remain materially unchanged. Petition at 27-36.

This deficiency is distinct from demanding certainty of success. The issue is whether the Petition provides a reasoned basis to expect the proposed device to work in the manner required by the claim. Where the primary reference expressly teaches that antenna performance depends on the interaction between the antenna and the

ground plane, a shared “PIFA” label does not establish predictable operation. Some account of the ground-plane interaction, tuning, or necessary redesign is required to support the Petition’s conclusion.

The Petition’s expectation-of-success analysis is also incomplete because it assumes that the second antenna will continue to operate unaffected. Petition at 29-30. Kangasvieri explains that antennas sharing a ground plane interact through ground currents. EX1005 at ¶¶ [0063]-[0065]. Replacing one antenna with a three-band structure changes the excitation presented to that shared ground plane. EX2011 at ¶ 80. The Petition does not explain why those changes would leave the second antenna’s operation and the intended isolation behavior materially unchanged. Its conclusion therefore conflicts with the very coupling mechanism that Kangasvieri describes. *Id.*

Accordingly, the Petition does not substantiate its assertion that the substitution would require little or no redesign or would predictably preserve the necessary operation. The references establish that the ground plane, slots, current paths, resonant lengths, and antenna interaction matter for how the antennas operates. The Petition does not even raise, much less analyze, how these considerations would affect the proposed combination. The Petition instead makes the conclusory assertion that “Because both antennas share the same planar inverted-F structure, little to no structural redesign of the device would have been required.” The Petition therefore does not establish a reasonable expectation that Chiba’s antenna could be placed into

Kangasvieri's device as assumed while retaining three-band transmit-and-receive operation, the second antenna's operation, and the relative geometry required by claim 1. *See Qiagen*, 2021 WL 5024387 at *5.

E. The Petition Does Not Set Forth Ground 1 With the Required Particularity

Section 312(a)(3) requires a petition to identify in writing and with particularity each challenged claim, the grounds on which the challenge is based, and the evidence supporting those grounds. As the Federal Circuit has explained, “[i]n an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3)); *see also Intelligent Bio-Sys.*, 821 F.3d at 1369 (“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” (quoting 35 U.S.C. § 312(a)(3)); *see also Adaptics Ltd. v. Perfect Co.*, Case IPR2018-01596, Paper 20 (March 6, 2019)(informative). The requirement is particularly important here because Ground 1 depends on a physical substitution. The Petition must identify the Kangasvieri structure being modified and explain how Chiba's antenna would be incorporated into that structure in a manner that satisfies claim 1's antenna location and orientation limitations. The Petition fails in this requirement. EX2011 at ¶ 82.

First, as alluded to in note 3, *supra*, the Petition fails to indicate at which three frequency bands the Chiba antenna operates in the proposed combination. *See* Petition at 20-29. Specifically, Chiba discloses embodiments that operate in the GSM and PHS. EX1006 at 6:51-62. Kangasvieri discloses antennas that operate in the PCS band. EX1005 at ¶¶ [0065], [0072]. There is, in fact, overlap between the PCS band and the PHS band, around 1.9 GHz (*see* EX1006 at 6:60-61, FIG. 5; EX1005 at ¶ [0065]), but the Petition never explains if it is utilizing, for example, a Chiba antenna that operates over the PCS band. Patent Owner and the Board are left to guess whether or not the Chiba antenna operates in the same band as the Kangasvieri antenna that it replaces. While a combination of Kangasvieri and Chiba would be non-obvious regardless, rendering the Kangasvieri system inoperable at its intended band on one hand and providing a completely superfluous antenna on the other, patent owners should not be required to guess the grounds on which a petition's invalidity theories are based. *See Hunting Titan, Inc. v. DynaEnergetics Europe GmbH*, Case IPR2018-00600, Paper 67 at 15 (PTAB July 6, 2020); *see also* EX2011 at ¶ 83.

The Petition also does not consistently identify a single Kangasvieri embodiment that is being relied upon in the combination. It relies extensively on FIG. 2 to identify the substantially rectangular ground plane and the directions in which the first and second antennas extend. Petition at 18-21, 29-37. FIG. 2 includes ground plane 10, slot 20, and separate antennas 22 and 24. EX1005 at ¶¶ [0064]-[0065]. The Petition's

annotated FIG. 2 identifies particular sides of the ground plane and uses the depicted antenna locations to satisfy the parallel, short-side, and orthogonal-side limitations. Petition at 30-37.

At the same time, the Petition invokes Kangasvieri's multiband disclosure associated with FIG. 5b. Petition at 21, 29. In that embodiment, dual-band slot antenna 80 covers PCS transmission and another lower band such as GSM 850, while PIFA 40 covers PCS reception. EX1005 at ¶ [0072]. FIG. 5b is not simply another view of the FIG. 2 device. It uses a different antenna configuration and arrangement, and it does not include the same slot 20 and ground-plane configuration on which the Petition relies elsewhere. EX2011 at ¶ 85. The Petition does not say whether Chiba replaces antenna 22 in FIG. 2, antenna 80 in FIG. 5b, or a construct assembled from features of both embodiments.

That ambiguity affects more than nomenclature. The reason for the second antenna, the identity of the transmit and receive functions, the type of the first antenna, and the ground-plane structure differ across the cited embodiments. EX2011 at ¶ 86. A substitution into FIG. 2 must account for slot 20 and the current paths that Kangasvieri describes. A substitution into FIG. 5b must account for replacing a dual-band slot antenna rather than the FIG. 2 PIFA shown in the Petition's placement analysis. If the Petition proposes a hybrid, it must identify which features are combined and why a

person of ordinary skill would have assembled them. The Petition does none of those things.

The Petition's allusions to the embodiment of Kangasvieri's FIG. 5b, and antenna 80 in particular, is especially problematic. Antenna 80 in FIG. 5b is a slot antenna, not a PIFA. EX1005 at ¶ [0072] ("a dual-band slot antenna 80 is used to carry out the dual-band function."). The Petition, however, argues that "A POSITA would have had reason to substitute Kangasvieri's PIFA with Chiba's similarly sized multifrequency PIFA as the first antenna." Petition at 28. In other words, the Petition's obviousness rationale is dependent on both antennas being PIFAs. The Petition nevertheless relies on slot antenna 80 in explaining how Kangasvieri discloses the "first antenna" of claim 1:

Kangasvieri further teaches a multiple frequency band antenna system that is configured to transmit and receive electromagnetic wave signals. Ex. 1003 ¶ 67. For example, Kangasvieri teaches that "[a]dvantageously, **the first antenna (80)** is a *multiple-band antenna operating in at least a first frequency band and a second frequency band* different from the first frequency band."

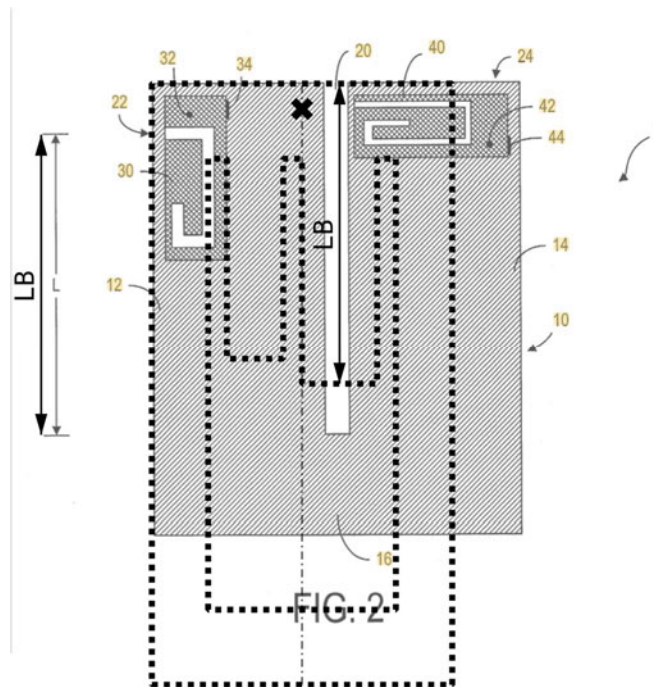
Petition at 21 (bold added, italics original).

Because the Petition never explains with particularity which of Kangasvieri's first antennas is being replaced by the Chiba antenna, it is unclear whether or not the

Petition's purported obviousness rationale is even applicable. This is precisely the type of ambiguity the particularity requirement of 35 U.S.C. § 312 is intended to prevent. *See Hirsch Glass Corp. v. Cambria Co. LLC*, No. IPR2022-00583, 2022 WL 3162213, at *8 (P.T.A.B. Aug. 8, 2022) (“[T]his approach improperly shifts the burden of deciphering Petitioner's arguments onto Patent Owner and the Board, which is contrary to the statutory and regulatory provisions governing *inter partes* review proceedings discussed above.”).

The Petition also fails to define the physical placement of Chiba's antenna. It repeatedly asserts that Chiba's multifrequency PIFA has essentially the same footprint as Kangasvieri's first antenna and would be placed in nearly the same location and orientation. Petition at 27-28, 31-36. Those assertions are necessary to the claim mapping. Claim 1 requires the first antenna to extend substantially parallel to a first side of the ground plane and to be arranged near a short side, while the second antenna extends substantially parallel to a substantially orthogonal second side. The Petition uses the depicted orientation of Kangasvieri's original antennas to satisfy those limitations and then assumes that the replacement preserves that geometry. This is, however, a poor assumption. EX2011 at ¶ 89. The POSITA would actually understand that the Chiba footprint is substantially different from that of Kangasvieri's antenna. *Id.*

Specifically, Chiba explains that its length “LB” is about one quarter of the wavelength of its emission conductor’s operating wavelength at the second frequency band. Kangasvieri explains that its length “L” is also one quarter of the wavelength of its operating frequency. EX2011 at ¶ 90. Both Kangasvieri and Chiba operate at approximately 1900 MHz, and therefore, “L” will be approximately equal to “LB.” *Id.* As illustrated below, matching “LB” from Chiba to “L” from Kangasvieri shows that the POSITA would not expect that Chiba’s multifrequency PIFA has essentially the same footprint as Kangasvieri’s first antenna. *Id.*



The missing placement analysis is particularly important because antenna size and orientation cannot be separated from frequency and ground-plane interaction. *Id.* at ¶ 91. Lower operating frequencies generally require longer resonant paths, and Chiba

obtains those paths through the geometry of its emission conductors. EX1006 at 5:1-6:20. Kangasvieri states that PIFA characteristics depend on the ground plane. EX1005 at ¶ [0063]. Thus, the Petition cannot establish the claim's relative-direction limitations merely by placing a label for Chiba's antenna over Kangasvieri's original antenna and assuming the same footprint and orientation. EX2011 at ¶ 91.

The Petition also fails to explain how the three-band antenna would be oriented while preserving each relevant structure. These omissions prevent a meaningful evaluation of whether the proposed combination actually satisfies claim 1. *Id.* at ¶ 92.

Particularity requires the Petition to present its own case rather than leave Patent Owner or the Board to choose among possible combinations. Ground 1 leaves unresolved which Kangasvieri embodiment supplies the operative structure, which antenna Chiba replaces, whether the FIG. 2 slot is present, and how Chiba's three-band antenna is placed and oriented. Because those choices bear directly on the antenna's function, the expectation of success, and the spatial limitations of claim 1, the ambiguity is substantive. The Petition has not identified a single, technically defined combination that can be compared to independent claim 1. Accordingly, ground 1 is deficient as it fails to comply with the particularity requirement of 35 U.S.C. § 312.

F. Conclusion

All the deficiencies in the Petition arise from the same unresolved feature of Ground 1: the Petition substitutes Chiba's transmit-and-receive multiband antenna for

Kangasvieri's first antenna but retains Kangasvieri's now redundant second antenna. That configuration departs from Kangasvieri's use of separate antennas to divide transmit and receive functions, returns to the multiple-antenna arrangement that Chiba seeks to avoid, and leaves an unexplained redundancy at the center of the claim mapping.

The Petition's compactness rationale does not justify that redundancy. Its shared-PIFA rationale does not address the references' express teachings about ground-plane-dependent behavior and multiple resonant paths. Its claim mapping does not identify a single Kangasvieri embodiment or a concrete placement of Chiba's antenna that preserves the claimed geometry. The proposed combination therefore lacks an articulated rational underpinning, reflects reliance on claim 1 as a roadmap, does not establish a reasonable expectation of success, and is not presented with the required particularity. Ground 1 accordingly does not establish that independent claim 1 would have been obvious. Consequently, there is no "reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged" in Ground 1, and *inter partes* review should not be instituted based upon Ground 1.

G. Ground 2 and 3

Grounds 2 and 3 add Inoue and Vance to the combination of Kangasvieri and Chiba from Ground 1. Grounds 2 and 3 rely on the same combination and rationales for combining Kangasvieri and Chiba. Petition at 58, 61. Inoue and Vance, however,

do nothing to resolve the above described problems with combination of Kangasvieri and Chiba from Ground 1. EX2011 at ¶ 93. Accordingly, the combinations in Grounds 2 and 3 would not have been obvious for all of the same reasons set forth above for Ground 1. Accordingly, there is no “reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged” in Ground 2 or 3, and *inter partes* review should not be instituted based upon these grounds.

VI. Conclusion

In light of the foregoing, there is no “reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition,” and IPR should not be instituted based upon the proposed invalidity grounds. Accordingly, pursuant to 35 U.S.C. § 314, Patent Owner respectfully requests that the Board decline to institute IPR for the reasons stated herein.

For completeness, Patent Owner notes that the arguments presented herein are those deemed appropriate for this stage of the present proceeding. Patent Owner reserves the right to make additional arguments and take additional positions in this or other proceedings.

Dated: September 23, 2026

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that this brief complies with the type-volume limitation of 37 C.F.R. § 42.24 because this brief contains 10,692 total words.

Dated: September 23, 2026

By: /Mark J. DeBoy/

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CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a copy of the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE** and accompanying **EXHIBIT** were served via email (as previously consented to by counsel) on September 23, 2026 to lead and backup counsel of record for Petitioners as follows:

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