

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GEOTAB INC. AND GEOTAB USA, INC.
Petitioners,

v.

FRACTUS, S.A.,
Patent Owner.

Case No. PGR2025-00056
Patent 12,095,149

PATENT OWNER'S PRELIMINARY RESPONSE

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EXHIBIT LIST

Exhibit No.	Title
Ex. 2001	PACER Docket Reports from July 28, 2025 in <i>Fractus, S.A. v. Verizon Connect Inc. et al</i> , 2:24-cv-01009-JRG-RSP (E.D.Tex.) and <i>Fractus, S.A. v. Geotab Inc.</i> 2:24-cv-01008-JRG-RSP (E.D.Tex.)
Ex. 2002	Defendants' Preliminary Invalidity Contentions dated June 18, 2025 in 2:24-cv-01009-JRG-RSP (E.D.Tex.)
Ex. 2003	Invalidity Contentions for U.S. Patent No. 11,031,677 in 2:24-cv-01009-JRG-RSP (E.D.Tex.)
Ex. 2004	Amended Docket Control Order dated April 10, 2025 in 2:24-cv-01009-JRG-RSP (E.D.Tex.)
Ex. 2005	Complaint dated December 6, 2024 in 2:24-cv-01008-JRG-RSP (E.D.Tex.)
Ex. 2006	Docket Navigator Time to Trial Statistics for Judge Rodney Gilstrap (last accessed July 23, 2025)
Ex. 2007	Declaration of Mark J. DeBoy
Ex. 2008	DECLARATION IN SUPPORT OF PATENT OWNER'S MOTION FOR <i>PRO HAC VICE</i> ADMISSION OF LARRY L. SHATZER
Ex. 2009	RESERVED
Ex. 2010	Declaration of Hossein Hashemi, Ph.D.
Ex. 2011	Jack H. Winters, "Smart Antennas for Wireless Systems," IEEE Personal Communications, February 1998

TABLE OF AUTHORITIES

Cases

Ex Parte Bjarne Harbo & Lucas Willemoes Hesselhof, No. APPEAL 2024-

002314, 2025 WL 2159181 (P.T.A.B. July 25, 2025)..... 26, 33, 41

In re Gordon, 733 F.2d 900 (Fed. Cir. 1984) 26, 33, 40

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007)..... 26, 33, 41

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I. INTRODUCTION

Fractus, S.A. ("Patent Owner") requests that the Board decline to institute post-grant review ("PGR") because the Petition's invalidity grounds fail to render obvious claims 1-20 of U.S. Patent No. 12,095,149 ("the '149 Patent"). Grounds 1A and 1B of the Petition are predicated on the alleged obviousness of replacing the two antennas of the primary reference Dou with two copies of a single antenna described in the secondary reference, Ciais-Multiband. This proposed substitution, however, violates the express teachings of Dou and renders Dou's antenna system inoperable for its intended purpose. An objective of Dou's antenna architecture is to achieve "spatial diversity" between two antennas at opposite ends of a printed circuit board within a wireless device. EX1013 at 1 (Title, Abstract), [0017], [0022], [0023]; EX2010 (Expert Declaration of Dr. Hossein Hashemi) at ¶¶ 34-36. Antenna spatial diversity improves communication of wireless signals by increasing the likelihood that at least one antenna is located where signal interference is relatively low. EX2010 at ¶ 33. Because closely spaced antennas operating at the same frequency tend to experience similar interference levels, spatial diversity involves separating antennas by a sufficient distance to make their interference levels different. EX2010 at ¶ 33. Consistent with well-known spatial diversity principles, Dou specifies a spacing between its two antennas of at least a quarter-wavelength at the lowest frequency of the antennas. EX1013 at ¶ [0024]; EX2010 at ¶ 35.

But Dou cannot be combined with Ciais-Multiband as Petitioners assert. By the very dimensions of the proposed Dou+Ciais-Multiband antenna set forth in Ground 1A of the Petition, the spacing left between the two antennas is only about half that necessitated by Dou's explicit at-least-a-quarter-wavelength specification. EX2010 at ¶¶ 50-56. A person of ordinary skill in the art (POSITA) would immediately recognize that this proposed modification would destroy the very spatial diversity that Dou's antenna design sought to achieve. *Id.* Because Ground 1A is based on a proposed modification that renders Dou's antenna system inoperable for its intended purpose and leaves no reasonable expectation of anticipated success, Ground 1A fails to render obvious claims 7-9, 11-14, 16-17, and 19-20 of the '149 Patent.

The foundation of Ground 1B, alleging the invalidity of dependent claims 10 and 18, is the same as Ground 1A, and merely introduces an additional antenna disclosed by Hilgers to address certain frequency bands missing from the proposed Dou+Ciais-Multiband antenna system. Ground 1B, consequently, fails for the same reasons as Ground 1A. *See id.* at ¶¶ 57-59.

Ground 2 of the Petition, alleging the invalidity of claims 1-20, again proposes replacing Dou's two antennas with duplicate copies of the secondary reference's single antenna. In this case, the Ground relies on "Ciais-Quadband" instead of Ciais-Multiband for the replacement antennas. But the dimensions of the Ciais-Quadband

antenna are identical to those of the Ciais-Multiband antenna. EX2010 at ¶ 43. Ground 2, consequently, fails for substantially the same reason as Grounds 1A and 1B: the spatial diversity sought by Dou's design is eliminated by the inadequate spacing between the replacement antennas in the asserted combination. EX2010 at ¶¶ 60-68. Ground 2 supplements the proposed Dou+Ciais-Quadband antenna system with two copies of a single antenna disclosed by Nakano. EX2010 at ¶ 62. The addition of Nakano's antenna, however, does not cure the deficiencies of Dou+Ciais-Quadband – the modified antenna system is still incapable of achieving Dou's objective of providing spatial diversity.

Grounds 3A and 3B of the Petition are based on the purported obviousness of replacing Dou's two antennas with two copies of a single antenna described in Jing. As with the proposed substitutions in Grounds 1A, 1B, and 2, replacing Dou's antennas with two copies of Jing's antenna violates the express teachings of Dou and renders Dou's antenna system inoperable for its intended purpose. The dimensions of the proposed Dou+Jing antenna indicated in Ground 3A of the Petition leave a spacing between the two antennas that is only a fraction of that specified by Dou's explicit at-least-a-quarter-wavelength distance. EX2010 at ¶¶ 73-76. A POSITA would once again recognize that this proposed modification would eliminate the spatial diversity that Dou's antenna design sought to achieve. EX2010 at ¶¶ 73-76. Because Ground 3A is based on a proposed modification that renders Dou's antenna

system inoperable for its intended purpose and leaves no reasonable expectation of anticipated success, Ground 3A fails to render obvious claims 1, 3-5, 13, 15, 17, and 19-20 of the '149 Patent. EX2010 at ¶¶ 75-76.

The foundation of Ground 3B, alleging the invalidity of dependent claims 6 and 18, is the same as Ground 3A, and merely introduces an additional antenna disclosed by Ying to address certain frequency bands missing from the proposed Dou+Jing antenna system. Ground 3B, consequently, fails for the same reasons as Ground 3A. *See* EX2010 at ¶¶ 78-79.

II. BACKGROUND

A. The '149 Patent

The '149 Patent is entitled "Multiple-Body-Configuration Multimedia and Smartphone Multifunction Wireless Devices," and issued on September 17, 2024. EX1005 at 1. The '149 Patent issued from U.S. Patent Application No. 18/339,523, filed on June 22, 2023, which is a continuation of U.S. Patent Application No. 17/704,942, filed on March 25, 2022 (now U.S. Patent No. 11,735,810), which is a continuation of U.S. Patent Application No. 17/246,192, filed on April 30, 2021 (now U.S. Patent No. 11,349,200), which is a continuation of U.S. Patent Application No. 16/832,820 filed on March 27, 2020 (now U.S. Patent No. 11,031,677), which is a continuation of U.S. Patent Application No. 15/856,626, filed on December 28, 2017 (now U.S. Patent No. 10,644,380), which is a

continuation of U.S. Patent Application No. 14/738,090, filed on June 12, 2015 (now U.S. Patent No. 9,899,727), which is a continuation of U.S. Patent Application No. 14/246,491, filed on April 7, 2014 (now U.S. Patent No. 9,099,773), which is a continuation of U.S. Patent Application No. 11/614,429, filed on December 21, 2006 (now U.S. Patent No. 8,738,103), claiming benefit of U.S. Provisional Patent Application No. 60/831,544, filed on July 18, 2006 and U.S. Provisional Patent Application No. 60/856,410, filed on November 3, 2006.

The '149 Patent describes a wireless device having a multiband antenna system with two or more antennas, at least one of which has a complex shape that can be characterized by a set of complexity factors that relate to different structural and functional features of the antenna. EX2010 at ¶ 30. By overlaying different-sized grids on a contour of an antenna and evaluating the number of cells within the grid spanned by the contour, attributes of the antenna's complexity can be determined. *Id.* For example, a complexity factor F_{21} , determined from the cell counts from grids with large-sized and medium-sized cells, characterizes the complexity and degree of convolution of features of the antenna contour that appear when the contour is viewed at relatively coarser levels of scale. EX1005 at 19:27-30, EX2010 at ¶ 30. Consequently, complexity factor F_{21} tends to increase with the number of antenna portions within the structure of the antenna system, typically associated with more frequency bands or radiation modes. EX1005 at 19:49-62; EX2010 at ¶ 30. A

complexity factor F_{32} , determined from the cell counts from grids with medium-sized and small-sized cells, characterizes the complexity and degree of convolution of features of the antenna contour that appear when the contour is viewed at relatively finer levels of scale. EX1005 at 20:19-22; EX2010 at ¶ 30. Consequently, complexity factor F_{32} tends to increase when the antenna contour includes a highly convoluted curve and reveals the degree of miniaturization achieved by the antenna system. EX1005 at 20:31-40; EX2010 at ¶ 30. Evaluating an antenna using such complexity factors reveals its suitability for specific applications. *See, e.g.*, EX1005 at 21:36-26:67; EX2010 at ¶ 30.

The claims of the '149 Patent recite wireless devices including antenna systems with at least two antennas and which include antenna structures that meet specific complexity factor requirements in distinctive combinations with particular frequency bands that are supported by the antenna systems. EX2010 at ¶ 31. As will be evident from the arguments herein, the patentability of the subject matter of these claims is reinforced by Petitioners' failure to identify prior art that establishes anticipation or obviousness.

B. Technical Background – Antenna Spatial Diversity

Spatial diversity is a technique in wireless communications that uses multiple antennas to improve signal reliability and performance by mitigating the effects of multipath fading and other interference. EX2010 at ¶ 33. Multipath fading occurs

when a wireless signal propagates along multiple different paths of differing lengths because of interactions with obstacles, resulting in portions of the signal energy arriving at a receiver with different phases slightly offset in time. *Id.* The phase-shifted versions of the signal may result in constructive or destructive interference with each other. *Id.* Such interference is spatially dependent – it varies from one spot to another based on the relative phases of the phase-shifted versions of the signal at different locations. *Id.* Two locations separated by a small fraction of the wavelength of the wireless signal tend to experience similar fading and interference characteristics. *Id.* Consequently, two closely spaced antennas cannot provide effective spatial diversity. *Id.* Conversely, by providing sufficient spacing between two antennas, the likelihood increases that at least one of the antennas will be positioned at a location where the multipath or other interference is relatively low, thereby improving overall signal quality and reliability. *Id.* A commonly accepted rule of thumb is that at least a quarter-wavelength spacing between antennas is necessary to provide effective spatial diversity and, in some contexts, a larger distance such as a half-wavelength spacing or more may be preferable. *Id.*; EX2011 at 23.

C. Petitioners' Art

i. Dou

U.S. Patent Application No. 11/361,860 to Dou *et al.*, entitled "Internal Diversity Antenna Architecture" ("Dou" or EX1013), was filed on February 24, 2006, and was published as U.S. Patent Publication No. 2007/0200773 on August 30, 2007. Dou is generally directed to an antenna architecture that includes first and second antennas located near opposite ends of a printed circuit board (PCB) such that the spacing between two antennas provides spatial diversity. EX2010 at ¶ 34. Fig. 2A of Dou shows an internal diversity antenna structure comprising first and second internal antennas 206, 208 on a PCB 204 within a wireless device 200. *Id.* The first internal antenna 206 is positioned near the top edge of the PCB 204, and the second internal antenna 208 is positioned near the bottom edge of the PCB 204. EX1013 at ¶ [0017]; EX2010 at ¶ 34. As shown in Fig. 2B, a ground plane 210 spans the entire length of the PCB 204, such that the antennas 206 and 208 are positioned over the ground plane 210 on an opposite side of the PCB. Dou explains that:

first internal antenna 206 and the second internal antenna 208 may be used **to implement various spatial diversity techniques** to improve communication of wireless signals across one or more frequency bands of wireless shared media.

EX1013 at ¶ [0022] (emphasis added). *See also* EX1013 at ¶¶ [0032], [0036] (describing other internal diversity embodiments); EX2010 at ¶ 34.

Consistent with generally accepted spacing requirements to achieve spatial diversity, Dou specifies the following spacing dimensions:

In the embodiment shown in FIG. 2A, for example, the length (L) of the wireless device 200 may be greater than 0.3 wavelength ($>0.3\lambda$) of the lowest frequency, **and the first internal antenna 206 and the second internal antenna 208 may be separated by a distance (D) that is no less than the quarter wavelength ($\geq \lambda/4$) of the lowest frequency.**

EX1013 at ¶ [0024] (emphasis added). *See also* EX2010 at ¶ 35.

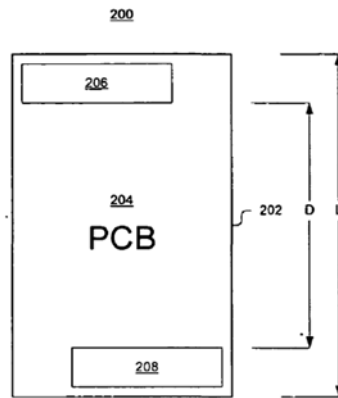


FIG. 2A

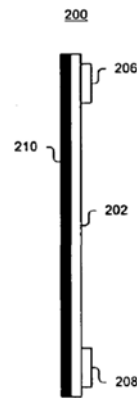


FIG. 2B

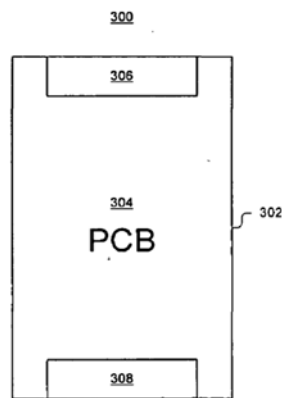


FIG. 3A

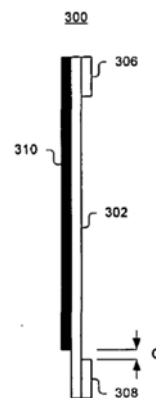


FIG. 3B

In fact, Dou emphasizes the importance of the quarter-wavelength spacing between the two antennas by reciting this limitation in the claims themselves:

8. The wireless device of claim 2, **said first diversity antenna and said second diversity antenna separated by a distance greater than or equal to a quarter wavelength of a lowest operating frequency of said wireless device.**

EX1013 at Claim 8 (emphasis added). *See also* EX2010 at ¶ 36.

In Figs. 3A and 3B, Dou shows a wireless device 300 with a similar diversity antenna comprising first and second spaced-apart antennas 306 and 308 for achieving spatial diversity. EX1013 at ¶ [0032]. The primary difference between the embodiments shown in Figs. 2A-2B and those shown in Figs. 3A-3B is that the ground plane in the latter embodiment does not extend underneath the second antenna 308. *Id.* at ¶ [0034]; EX2010 at ¶ 37.

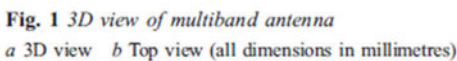
Applying Dou's antenna spacing specification to a frequency of, for example, 870 MHz results in a minimum spacing between the antennas of 86.2 mm. EX2010 at ¶ 38. Specifically, the wavelength λ corresponding to a frequency of 870 MHz is 344.8 mm. At this wavelength, the spacing D between Dou's first and second antennas 206, 208, which is specified to be $\geq \lambda/4$, must be at least 86.2 mm. *Id.*

Similarly, applying Dou's antenna spacing specification to a frequency of 900 MHz results in at least 83.3 mm of spacing between the antennas. *Id.* Specifically, the wavelength λ corresponding to a frequency of 900 MHz is 333.3 mm. *Id.* At this wavelength, the spacing D between Dou's first and second antennas, which Dou indicates should be $\geq \lambda/4$, must be at least 83.3 mm. *Id.*

ii. Ciais-Multiband

Pascal Ciais et al., "Compact Planar Monopole Antenna for Multi-band Mobile Phones," *Electronic Letters*, vol. 40, no. 15, pp. 920-921, July 2004 ("Ciais-Multiband" or EX1010) discloses a planar inverted-F antenna (PIFA) suitable for

¶¶ 39-41.



As shown in Fig. 1, the overall dimensions of Ciais-Multiband's antenna are 38.5 mm x 28.5 mm with a height (spacing from the PCB) of 8.5 mm. The antenna has clearances of 0.5 mm from the end (short) edge of the PCB and 1.0 mm from each of the side (long) edges of the PCB. The PCB dimensions are 40.5 mm x 105.0 mm. EX1010 at 920. Ciais-Multiband identifies the lowest band of the antenna as 870-960 MHz, *i.e.*, 870 MHz is the lowest frequency of the Ciais-Multiband antenna. *Id.*

Because Ciais-Multiband does not attempt to provide antenna diversity, Ciais-Multiband includes only a single multi-band antenna located at one of the short ends of the PCB. Ciais-Multiband, consequently, does not contend with the issue of a suitable spacing between two such antennas to provide spatial diversity or whether the size and shape of such an antenna is practical to enable spatial diversity in a wireless device. EX2010 at ¶ 41.

iii. Hilgers

U.S. Patent Application No. 10/208,680 to Hilgers *et al.*, entitled "GPS Receiver Module" ("Hilgers" or EX1040), was filed on July 30, 2002, and was published as U.S. Patent Publication No. 2003/0025635 on February 6, 2003. Hilgers discloses a GPS receiver module having a dual band antenna for transmission and reception of Bluetooth signals at 2,442.8 MHz and for reception and reception of GPS signals at 1,568.8 MHz. EX1040 at ¶¶ [0025], [0053]; EX2010 at ¶ 42. Hilgers'

antenna is a three-dimensional "printed wire antenna" consisting of conductor paths formed on five of the six "faces" of a ceramic "rectangular block" substrate with "no metallic surface forming a reference potential on the back of the substrate" (*i.e.*, no ground plane). EX1040 at ¶¶ [0037]-[0050]; EX2010 at ¶ 41. The ground-plane-less, block-shaped ceramic substrate, shown in FIG. 3 of Hilgers, has dimensions of $6 \times 6 \times 2.0 \text{ mm}^3$. EX1040 at ¶ [0052]; EX2010 at ¶ 41.

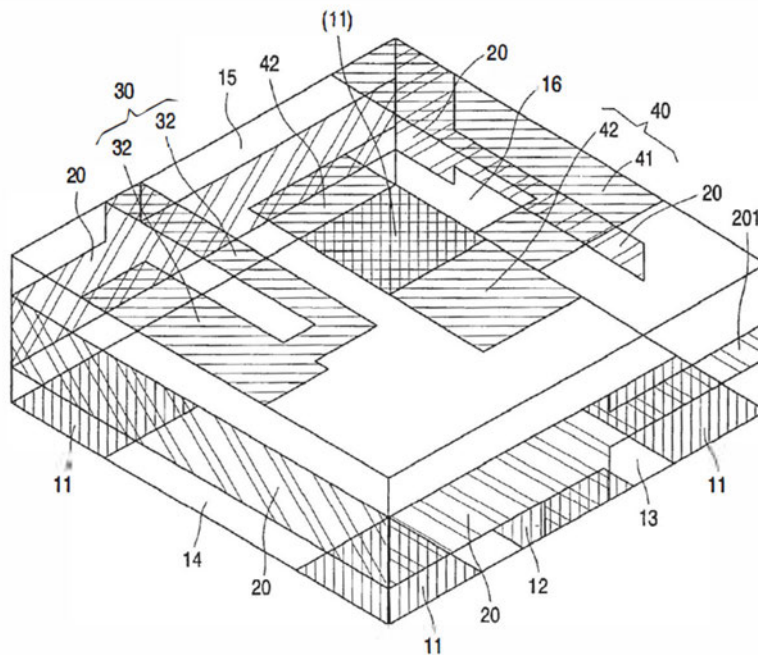
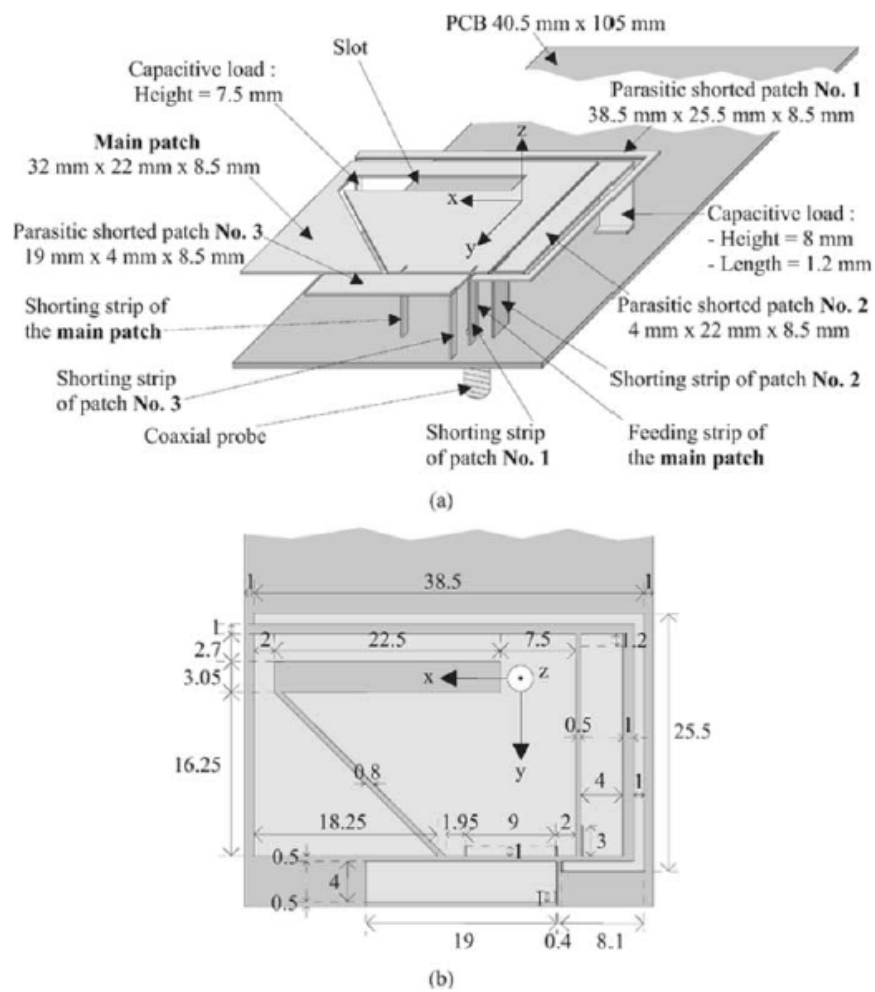


FIG. 3

iv. Ciais-Quadband

Pascal Ciais et al., "Design of an Internal Quad-Band Antenna for Mobile Phones," *IEEE Microwave and Wireless Components Letters*, vol. 14, no. 4, pp. 148-150, April 2004 ("Ciais-Quadband" or EX1009) discloses a planar inverted-F

antenna (PIFA) suitable for cellular telephone applications. In the sole embodiment described by Ciais-Quadband and shown in Figs. 1A and 1B, a single antenna is located at a short end of a PCB ground plane and consists of a main patch with a slot, three quarter-wavelength parasitic elements, and capacitive loads that create additional resonances at four different frequencies. EX1009 at 148; EX2010 at ¶¶ 43-45.



As shown in Figs. 1A and 1B, the overall dimensions of Ciais-Quadband's antenna are 38.5 mm x 28.5 mm with a height (spacing from the PCB) of 8.5 mm (*i.e.*, identical dimensions to the antenna of Ciais-Multiband). EX2010 at ¶ 44. The antenna has clearances of 0.5 mm from the end (short) edge of the PCB and 1.0 mm from each of the side (long) edges of the PCB. The PCB dimensions are 40.5 mm x 105.0 mm. *Id.* at 148-149. *Id.* Like Ciais-Multiband, Ciais-Quadband identifies the lowest band of the antenna as 870-960 MHz, *i.e.*, 870 MHz is the lowest frequency of the Ciais-Quadband antenna. EX1009 at 149 EX2010 at ¶ 44.

Because Ciais-Quadband does not attempt to provide antenna diversity, Ciais-Quadband includes only a single quad-band antenna located at one of the short ends of the PCB. Ciais-Quadband, consequently, does not contend with the issue of a suitable spacing between two such antennas to provide spatial diversity or whether the size and shape of such an antenna is practical to enable spatial diversity in a wireless device. EX2010 at ¶ 45.

v. Nakano

H. Nakano et al. "An Inverted FL Antenna for Dual-Frequency Operation," *IEEE Transactions on Antennas and Propagation*, vol. 53, no. 8, pp. 2417-2421, Aug. 2005 ("Nakano" or EX1012), describes an inverted FL antenna (InvFLA) designed to obtain dual-frequency operation for the wireless LAN frequencies of 2.45 GHz and 5.2 GHz. EX1012 at 2417; EX2010 at ¶ 46. Nakano's antenna is made

of a thin, flat conducting film implemented in a card-type structure in which the antenna is co-planar with a ground plane whose dimensions are 30 mm (L_x) x 25.5 mm (L_y). The antenna extends from a **long side** of the ground plane having a length L_x of 30 mm. EX1012 at 2417-2418; EX2010 at ¶ 46. Consistent with the length of the **long side** of the ground plane, the antenna dimensions are 30 mm x 5.5 mm. EX1012 at 2418-2420; EX2010 at ¶ 46. **That is, the length of Nakano's antenna is the same as the length of a long side of Nakano's ground plane.** As shown in Fig. 1(b) of Nakano, which explicitly lists the ground plane dimensions, the antenna includes three sub-elements: an inverted L element, an inverted F element, and a parasitic inverted L element. EX1012 at 2418; EX2010 at ¶ 46.

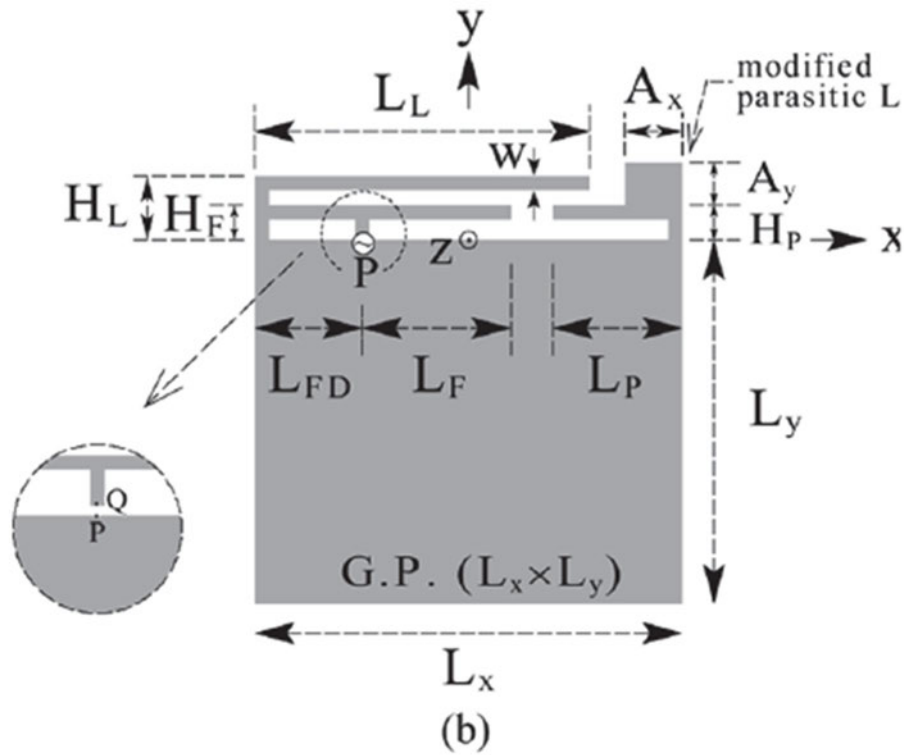
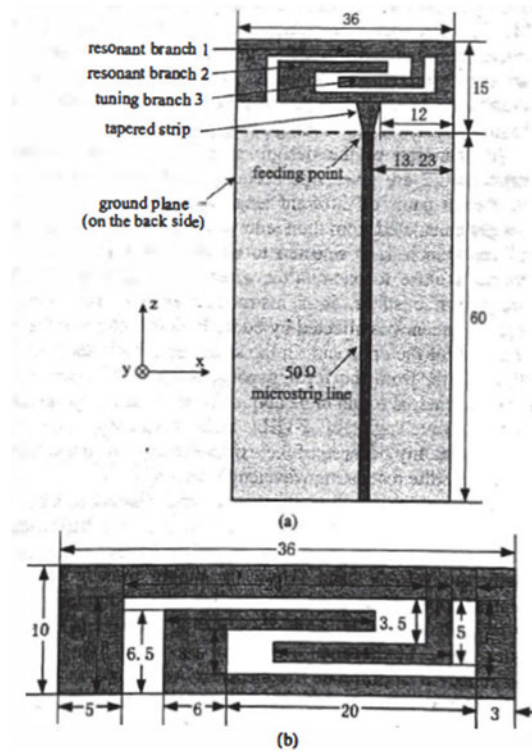


Fig. 1. Antenna structures. (a) A compound of inverted L and F elements (referred to as a *compounded LF*) with a parasitic L element above a co-planar ground plate (GP). (b) A compounded LF with a modified parasitic L element above a co-planar ground plate, referred to as the inverted FL antenna (InvFLA). The ground plate size in (a) is the same as that in (b): $L_x \times L_y = 30 \text{ mm} \times 25.5 \text{ mm}$.

vi. Jing

X. Jing *et al.* "Compact Planar Monopole Antenna for Multi-band Mobile Phones," *2005 Asia-Pacific Microwave Conference Proceedings*, vol. 4, pp. 2657-2660, IEEE, 2005 ("Jing" or EX1011), discloses a planar monopole antenna comprising a rectangular radiating patch with three branches, including two resonating branches and a tuning branch, allowing the antenna to resonate at three frequency bands. EX1011 at 2657; EX2010 at ¶ 47. As shown in Fig. 1, the antenna has an area of $36 \times 15 \text{ mm}^2$ and is positioned adjacent to one end of a ground plane

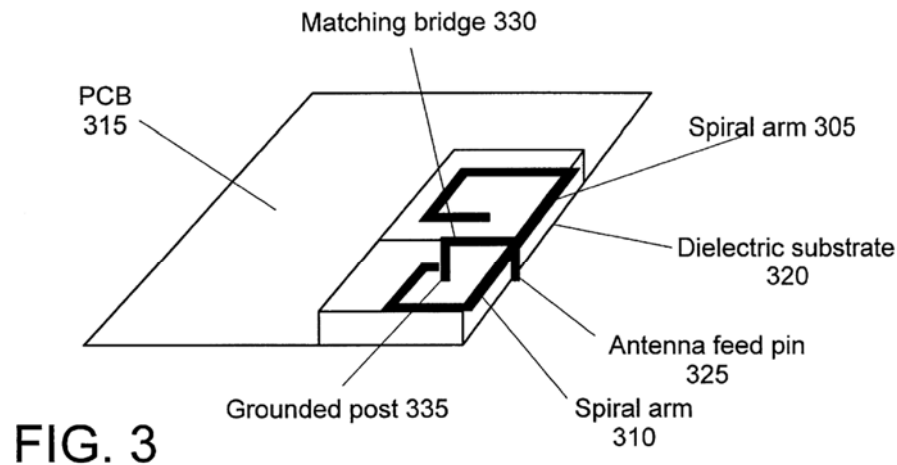
having a width of 36 mm and a length of 60 mm and extending from a short side of the PCB. EX1011 at 2658; EX2010 at ¶ 47. Jing identifies the lowest band of the antenna as 900-945 MHz, *i.e.*, 900 MHz is the lowest frequency of the Jing antenna. EX1011 at 2658; EX2010 at ¶ 47.



Because Jing does not attempt to provide antenna diversity, Jing includes only a single antenna located at one of the short ends of the ground plane. Jing, consequently, does not contend with the issue of a suitable spacing between two such antennas to provide spatial diversity or whether the size and shape of such an antenna is practical to enable spatial diversity in a wireless device. EX2010 at ¶ 48.

vii. Ying

U.S. Patent No. 6,166,694 to Ying, entitled "Printed Twin Spiral Dual Band Antenna" ("Ying" or EX1049), was filed on July 9, 1998 as U.S. Patent Application No. 09/112,152, and issued on December 26, 2000. Ying discloses a dual band antenna which includes two spiral conductor arms of different lengths and mounted on a substrate on a PCB of a mobile terminal. EX1049 at Abstract, 3:46-51; EX2010 at ¶ 49. For better radiation efficiency, the antenna is mounted at the edge of the PCB. EX1049 at 5:49-52; EX2010 at ¶ 49. The two spiral radiating arms are commonly fed via an antenna feed pin, which is connected to a grounded post via a matching bridge used to tune the antenna by matching the input impedance at the input terminal. EX1049 at 4:29-67; EX2010 at ¶ 41. The different lengths of the two spiral antennas allow the antenna to be tuned to two different resonant frequencies. EX1049 at 5:1-28; EX2010 at ¶ 41.



III. CLAIM CONSTRUCTION

Claims in this PGR are construed "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art." 37 C.F.R. § 42.200(b). Patent Owner does not necessarily agree with Petitioners' claim constructions as presented in the Petition (Petition at 13-16), or in any other proceeding, but any differences are not directly pertinent to any of the arguments Patent Owner makes in this Preliminary Response and, accordingly, are not addressed. Patent Owner, however, reserves the right to challenge Petitioners' claim construction and to provide different and additional constructions if a PGR is instituted.

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 '149 Patent.

IV. THE PERSON OF ORDINARY SKILL IN THE ART

For purposes of this Preliminary Response only, Patent Owner assumes a POSITA definition asserted in the Petition. Petition at 10. Patent Owner, however, reserves the right to present its own definition in the event a PGR is instituted.

V. ARGUMENT

The Board may institute PGR of the claims of the '149 Patent only if the information presented in the Petition "would demonstrate that it is more likely than not that at least 1 of the claims challenged in the petition is unpatentable." 35 U.S.C. § 324. The Petition has not met this threshold.

A. Ground 1A – Claims 7-9, 11-14, 16-17, and 19-20 are patentable over Dou in view of Ciais-Multiband

The Petition alleges that claims 7-9, 11-14, 16-17, and 19-20 would have been obvious to a POSITA at the time of invention based on the combined teachings of Dou and Ciais-Multiband. Petition at 17-55. Because the proposed combination of Dou with Ciais-Multiband provided in the Petition directly contradicts the teachings of Dou, the combination would not have been obvious, and a POSITA would not have had a reasonable expectation of success in implementing the combination.

EX2010 at ¶ 50. Therefore, post-grant review should not be instituted based upon Ground 1A.

An objective of Dou's antenna design is to achieve spatial diversity between two antennas. EX1013 at ¶¶ [0017], [0022], [0023]; EX2010 at ¶ 51. The combination of Dou and Ciais-Multiband proposed in the Petition would construct an antenna that violates the explicit design constraints specified by Dou – design constraints that are well known in the art as being necessary to achieve the spatial diversity Dou's antenna design seeks. *Id.* Because the Petition modifies Dou's antenna in a way that is contrary to Dou's design constraints, the proposed combination would not have been obvious. *Id.*

Dou's diversity antenna includes two antennas 206 and 208 located at opposite ends of a PCB 204 for the purpose of achieving spatial diversity. *See* Section II.C.i, *supra*; EX1013 at ¶ [0017]; EX2010 at ¶ 52. The Petition proposes to implement Patent Owner's claimed antenna system by replacing Dou's first antenna 206 with a first copy of Ciais-Multiband's antenna and by replacing Dou's second antenna 208 with a second copy of Ciais-Multiband's antenna. Petition at 19-23; EX2010 at ¶ 52. Despite the Petition showing many annotated diagrams throughout and carefully identifying the dimensions of the proposed combination, the Petition tellingly provides no diagram showing the structure resulting from the proposed combination of Dou and Ciais-Multiband. *Id.* Nor does the Petition include any discussion of

whether Dou's antenna arrangement – modified by substituting two copies of Ciais-Multiband's single antenna – satisfies Dou's specification of having at least a quarter-wavelength spacing between the two antennas to provide spatial diversity, the an objective of Dou's antenna design. *Id.*

The Petition relies on the embodiment shown in Figs. 2A and 2B of Dou, replacing each of antennas 206 and 208 with a copy of Ciais-Multiband's antenna. Petition at 24-25; EX2010 at ¶ 53. As explained in Section II.C.i, *supra*, Dou specifies that the first and second antennas 206 and 208 be "separated by a distance (D) that is no less than the quarter wavelength ($\geq \lambda/4$) of the lowest frequency." EX1013 at ¶ [0024]. The lowest frequency of Ciais-Multiband's antenna is 870 MHz. EX1010 at 920. The wavelength λ corresponding to a frequency of 870 MHz is 344.8 mm, and a quarter of this wavelength – the minimum spacing specified by Dou to achieve spatial diversity at this wavelength – is 86.2 mm. *See* Section II.C.i, *supra*.; EX2010 at ¶ 53.

In the proposed combination of Dou and Ciais-Multiband, the Petition "uses Dou's ground plane 210" (Petition at 23) but implements it using the 40.5 mm x 105 mm dimensions from Ciais-Multiband because it is "representative of the Printed Circuit Board (PCB) of a typical mobile phone." EX1010 at 920; Petition at 24-25. The Petition further asserts that the antenna of the Ciais-Multiband antenna is 38.5 x 28.5 mm. EX1010 at 920; Petition at 39. Factoring in the Ciais-Multiband

antenna's clearances of 0.5 mm from the end edge of the PCB (EX1010 at 920), the recipe for combining Dou and Ciais-Multiband prescribed by the Petition yields the following structure:

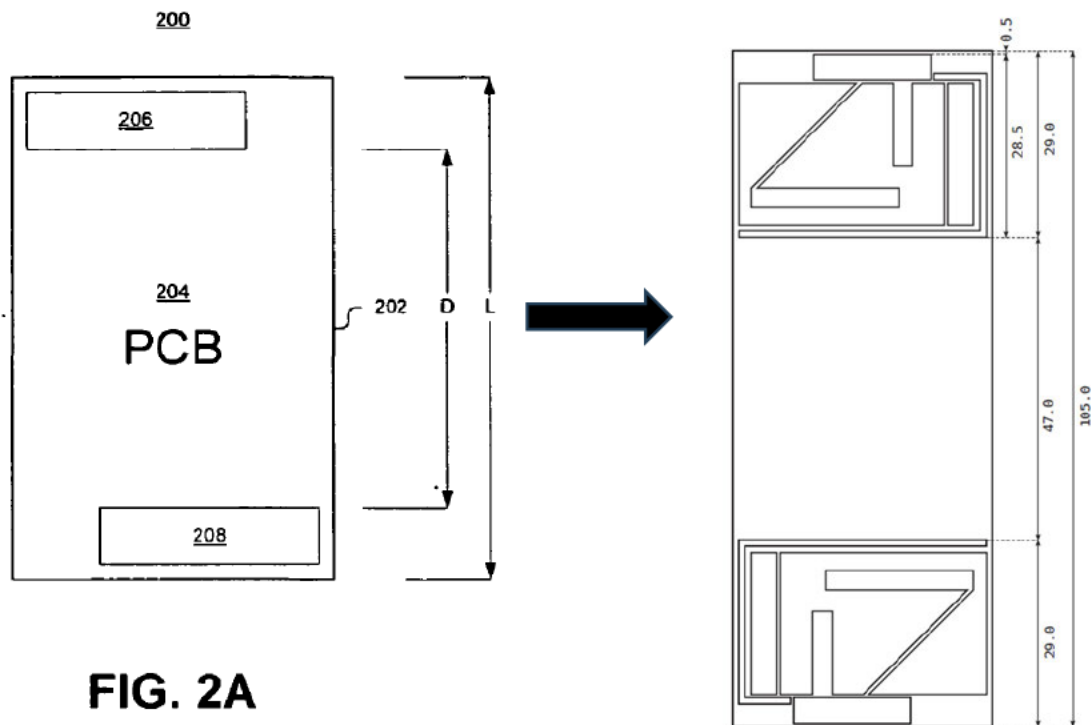


FIG. 2A

EX2010 at ¶ 54.

Subtracting the 29 mm required for the antennas at each end of the PCB from the 105 mm overall length of the PCB results in a spacing between the two antennas of 47.0 mm. This distance is **barely more than half** of the quarter-wavelength lower bound (86.2 mm) of the spacing specified by Dou to achieve spatial diversity at the antennas' lowest frequency (870 MHz). EX2010 at ¶ 55. Such a spacing between antennas is contrary to the express teachings of Dou and would have eliminated

effective spatial diversity, an important feature Dou's antenna architecture seeks to provide. *Id.* The proposed modification, therefore, would not have been obvious to a POSITA at the time of invention of the '149 Patent. *See In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (finding that a modification that renders the invention inoperable for its intended purpose is not obvious because it teaches away from the invention); *see also Ex Parte Bjarne Harbo & Lucas Willemoes Hesselhof*, No. APPEAL 2024-002314, 2025 WL 2159181, at *3 (P.T.A.B. July 25, 2025).

A POSITA, understanding that at least a quarter-wavelength spacing between antennas is necessary to achieve spatial diversity, and following Dou's express specification of this spacing, would not have expected the combination proposed in Ground 1A of the Petition to successfully provide the spatial diversity Dou's antenna arrangement is intended to provide. EX2010 at ¶ 56. Thus, the Petition fails to meet its burden of establishing that a POSITA would have been motivated to make such a combination, let alone yield predictable results doing so. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (noting that if an ordinarily skilled artisan would not believe that a particular combination has a reasonable expectation of "anticipated success," the combination may not be obvious). The combination of Dou and Ciais-Multiband proposed in Ground 1A of the Petition, consequently, would not have been obvious to a POSITA at the time of invention. EX2010 at ¶ 56.

Accordingly, it is not more likely than not that Petitioners would prevail with respect to invalidating claims 7 and 13 or their dependent claims under Ground 1A. *Id.*

B. Ground 1B – Claims 10 and 18 are patentable over Dou in view of Ciais-Multiband and Hilgers

The Petition alleges in Ground 1B that dependent claims 10 and 18 would have been obvious to a POSITA at the time of invention based on the combined teachings of Dou, Ciais-Multiband, and Hilgers. Because Hilgers does nothing to remedy the deficiencies of the combination of Dou and Ciais-Multiband proposed in Ground 1A of the Petition, a POSITA would not have combined Dou, Ciais-Multiband, and Hilgers for substantially the same reasons explained in Section V.A., *supra*. EX2010 at ¶ 57. Moreover, the Petition provides no guidance whatsoever as to how a POSITA could have combined or integrated Hilgers's three-dimensional wire antenna formed on the faces of a ceramic block having no ground plane with the proposed Dou+Ciais-Multiband antenna system. EX2010 at ¶ 57.

Regarding independent claims 7 and 13, the respective parent claims of claims 10 and 18, the Petition does not further rely on Hilgers in Ground 1B, merely relying on the arguments from Ground 1A. *Id.* at ¶ 58. That is, Ground 1B relies on Hilgers solely for limitations in dependent claims 10 and 18 and still proposes to replace Dou's two antennas 206 and 208 with duplicate copies of the Ciais-Multiband antenna to meet the requirements of their independent claims 7 and 13.

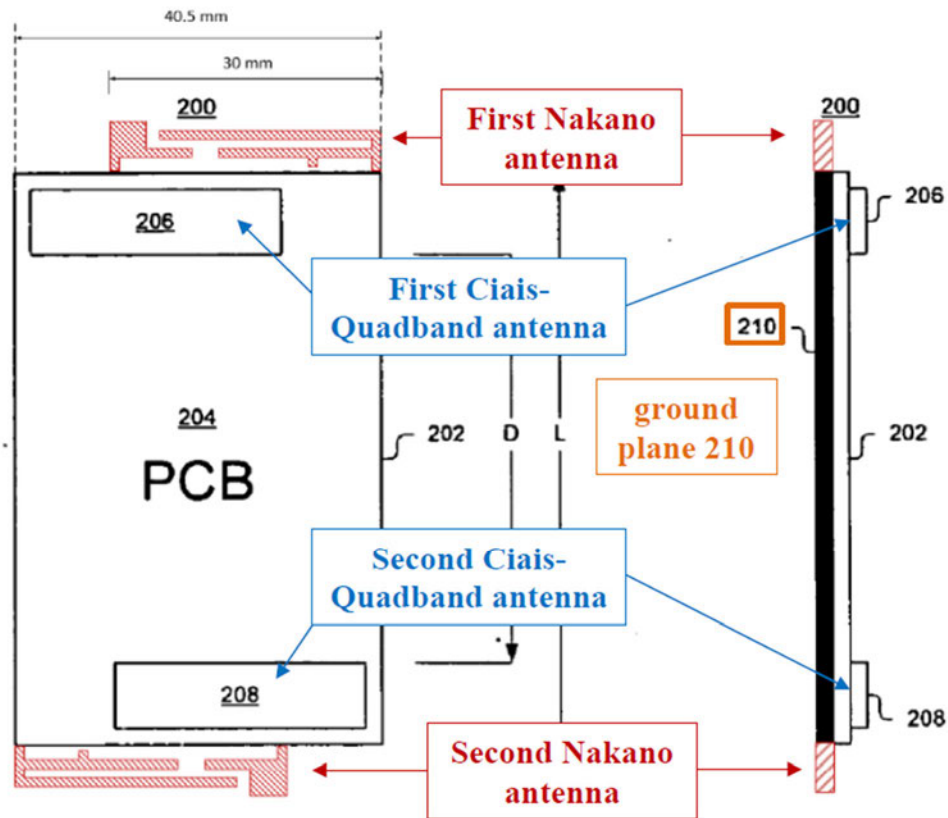
Consequently, the proposed addition of Hilgers' antenna does nothing to address the non-obviousness of replacing Dou's antennas with two copies of Ciais-Multiband's antenna, as explained in Section V.A., *supra*. *Id.* The proposed combination of Dou+Ciais-Multiband+Hilgers still destroys the spatial diversity Dou sought to achieve between antennas 206 and 208, because the spacing between the swapped-in Ciais-Multiband antennas is barely half that specified by Dou. *Id.* For this reason alone, it is not more likely than not that Petitioners would prevail with respect to invalidating claims 10 and 18 under Ground 1B as explained regarding Ground 1A in Section V.A., *supra*.

C. Ground 2 – Claims 1-20 are patentable over Dou in view of Ciais-Quadband and Nakano.

The Petition alleges that claims 1-20 would have been obvious to a POSITA at the time of invention based on the combined teachings of Dou, Ciais-Quadband, and Nakano. Petition at 59-120. Because the proposed combination of Dou with Ciais-Quadband and Nakano provided in the Petition directly contradicts the teachings of Dou, the combination would neither have been obvious nor would a POSITA have had a reasonable expectation of success in implementing the combination. EX2010 at ¶¶ 60-68. Therefore, post-grant review should not be instituted based upon Ground 2.

An objective of Dou's antenna design is to achieve spatial diversity between two antennas. EX1013 at ¶¶ [0017], [0022], [0023]; EX2010 at ¶ 61. The combination of Dou, Ciais-Quadband, and Nakano proposed in the Petition would construct an antenna that violates the explicit design constraints specified by Dou – design constraints that are well known in the art as being necessary to achieve the spatial diversity Dou's antenna design seeks. *Id.* Because the Petition modifies Dou's antenna in a way that is contrary to Dou's design constraints, the proposed combination would not have been obvious. *Id.*

Dou's diversity antenna includes two antennas 206 and 208 located at opposite ends of a PCB 204 for the purpose of achieving spatial diversity. *See* Section II.C.i, *supra*; EX1013 at ¶ [0017]; EX2010 at ¶ 62. The Petition relies on the embodiment shown in Figs. 2A and 2B of Dou and proposes to implement Patent Owner's claimed antenna system by replacing Dou's first antenna 206 with a first copy of Ciais-Quadband's quad-band antenna and by replacing Dou's second antenna 208 with a second copy of Ciais-Quadband's quad-band antenna. Petition at 64-66. The Petition further proposes to add copies of Nakano's single antenna extending from each of the short ends of the ground plane, for a total of four antennas. *Id.* The Petition provides a diagram of the proposed Dou+Ciais-Quadband+Nakano antenna system:



Id. at 66.¹

¹ For completeness, Patent Owner notes that, within Ground 2, the Petition maps the end-mounted copies of the Nakano antenna to the first and second antennas of independent claims 1 and 13 but maps the copies of the Ciais-Quadband antenna to the first and second antennas of independent claim 7. This inconsistency, however, is immaterial to Patent Owner's arguments presented here, because in all cases, Ground 2 proposes to replace Dou's antennas 206 and 208 with copies of the Ciais-Quadband antenna.

The Petition does not address whether Dou's antenna arrangement – modified by substituting two copies of Ciais-Quadband's single antenna for antennas 206 and 208 – satisfies Dou's specification of having at least a quarter-wavelength spacing between the two antennas to provide spatial diversity, an important objective of Dou's antenna design. EX2010 at ¶ 63. As explained in Section II.C.i, *supra*, Dou specifies that the first and second antennas 206 and 208 be "separated by a distance (D) that is no less than the quarter wavelength ($\geq \lambda/4$) of the lowest frequency." EX1013 at ¶ [0024]. The lowest frequency of Ciais-Quadband's antenna is 870 MHz. EX1009 at 149; EX2010 at ¶ 63. The wavelength λ corresponding to a frequency of 870 MHz is 344.8 mm, and a quarter of this wavelength – the minimum spacing specified by Dou to achieve spatial diversity at this wavelength – is 86.2 mm. *See* Section II.C.i, *supra*. *Id.* at ¶ 63.

In the proposed combination of Dou, Ciais-Quadband, and Nakano, the Petition implements a ground plane using the 40.5 mm x 105 mm dimensions from Ciais-Quadband because it is "representative of the Printed Circuit Board (PCB) of a typical mobile phone." EX1009 at 148; Petition at 64, 87. The Petition further asserts that the antenna of the Ciais-Quadband antenna is 38.5 x 28.5 mm. EX1009 at 149; Petition at 95, 100. Factoring in the Ciais-Quadband antenna's clearances of 0.5 mm from the end edge of the PCB (EX1009 at 148), the recipe for combining

Dou, Ciais-Quadband, and Nakano prescribed by the Petition yields the following structure²:

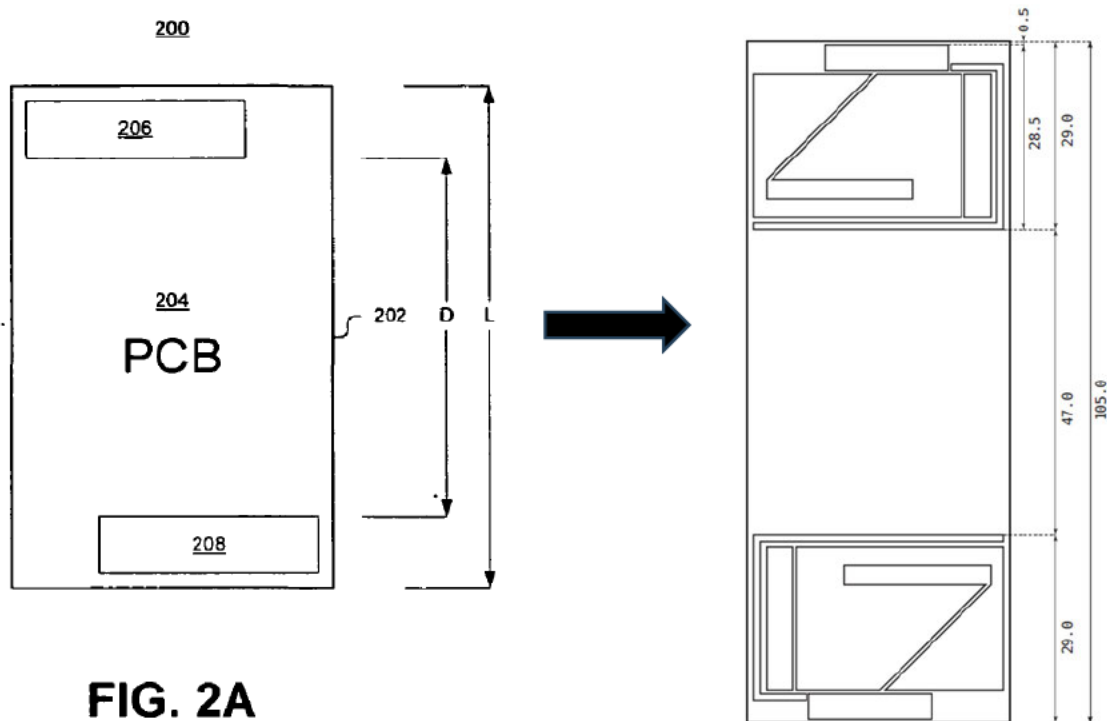


FIG. 2A

EX2010 at ¶ 64.

Subtracting the 29 mm required for the antennas at each end of the PCB from the 105 mm overall length of the PCB results in a spacing between the two antennas of 47.0 mm. EX2010 at ¶ 65. This distance is **barely more than half** of the quarter-

² The proposed end-mounted Nakano antennas have been omitted from this figure for simplicity, because they are not pertinent to the specified minimum spacing between Dou's antennas 206 and 208.

wavelength lower bound (86.2 mm) of the spacing specified by Dou to achieve spatial diversity at the antennas' lowest frequency (870 MHz). *Id.* Such a spacing between antennas is contrary to the express teachings of Dou and would eliminate effective spatial diversity, an important feature Dou's antenna architecture seeks to provide. *Id.* The proposed modification, therefore, would not have been obvious to a POSITA at the time of invention of the '149 Patent. *See In re Gordon* 733 F.2d at 902 (finding that a modification that renders the invention inoperable for its intended purpose is not obvious because it teaches away from the invention); *see also Ex Parte Bjarne Harbo* 2025 WL 2159181 at *3.

A POSITA, understanding that at least a quarter-wavelength spacing between antennas is necessary to achieve spatial diversity, and following Dou's express specification of this spacing, would not have expected the combination proposed in Ground 2 of the Petition to successfully provide the spatial diversity Dou's antenna arrangement is intended to provide. EX2010 at ¶ 66. Thus, the Petition fails to meet its burden of establishing that a POSITA would have been motivated to make such a combination, let alone yield predictable results doing so. *See KSR* 550 U.S. at 421 (noting that if an ordinarily skilled artisan would not believe that a particular combination has a reasonable expectation of "anticipated success," the combination may not be obvious). The combination of Dou, Ciais-Quadband, and Nakano proposed in Ground 2 of the Petition, consequently, would not have been obvious to

a POSITA at the time of invention. EX2010 at ¶ 66. Accordingly, it is not more likely than not that Petitioners would prevail with respect to invalidating independent claims 1, 7, and 13 or their dependent claims under Ground 2.

The Petition also proposes adding two copies of Nakano's single antenna. This proposed addition merely makes the proposed combination more complicated and does nothing to address the non-obviousness of replacing Dou's antennas with two copies of Ciais-Quadband's single antenna. *Id.* at ¶ 67. The proposed combination of Dou+Ciais-Quadband+Nakano still destroys the spatial diversity Dou sought to achieve between antennas 206 and 208, because the spacing between the swapped-in Ciais-Quadband antennas is barely half that specified by Dou. *Id.* .

Moreover, the Petition's proposed placement of the two copies of the Nakano antenna extending off of the respective short ends of Dou's PCB is predicated on a false characterization of Nakano's disclosure. *Id.* at ¶ 68. The Petition incorrectly states that "Nakano's InvFL antenna extends from a 'co-planar ground plate' on the **short side** of a rectangular 'card-type structure.' " Petition at 61 (emphasis added). But the opposite is true. EX2010 at ¶ 68. As shown in Fig. 1 of Nakano and explained in Section II.C.v, *supra*, Nakano's antenna extends from the **long side** of the ground plane having a length L_X of 30 mm and not the short side having a length $L_Y = 25.5$ mm. EX1012 at 2417-2418; Fig. 1; EX2010 at ¶ 68. Ground 2, which requires extending Nakano's antenna from the top and bottom **short sides** of Dou's ground

plane, is premised on this false characterization of Nakano's disclosure. *Id.* In fact, consistent with the length of the **long side** of Nakano's ground plane, Nakano's antenna dimensions are 30 mm x 5.5 mm. EX1012 at 2418-2420; EX2010 at ¶ 68. **That is, the length of Nakano's antenna is the same as the length of a long side of Nakano's ground plane.** See Section II.C.v, *supra*. The Petition's justification for extending the Nakano antennas from the short ends of Dou's ground plane is supported by nothing more than the false statement that Nakano's antenna extends from the short side when, in fact, Nakano teaches the opposite. *Id.* Thus, for this additional reason, the combination of Dou, Ciais-Quadband, and Nakano proposed in Ground 2 of the Petition would not have been obvious to a POSITA at the time of invention and it is not more likely than not that Petitioners would prevail with respect to invalidating independent claims 1, 7, and 13 or their dependent claims under Ground 2.

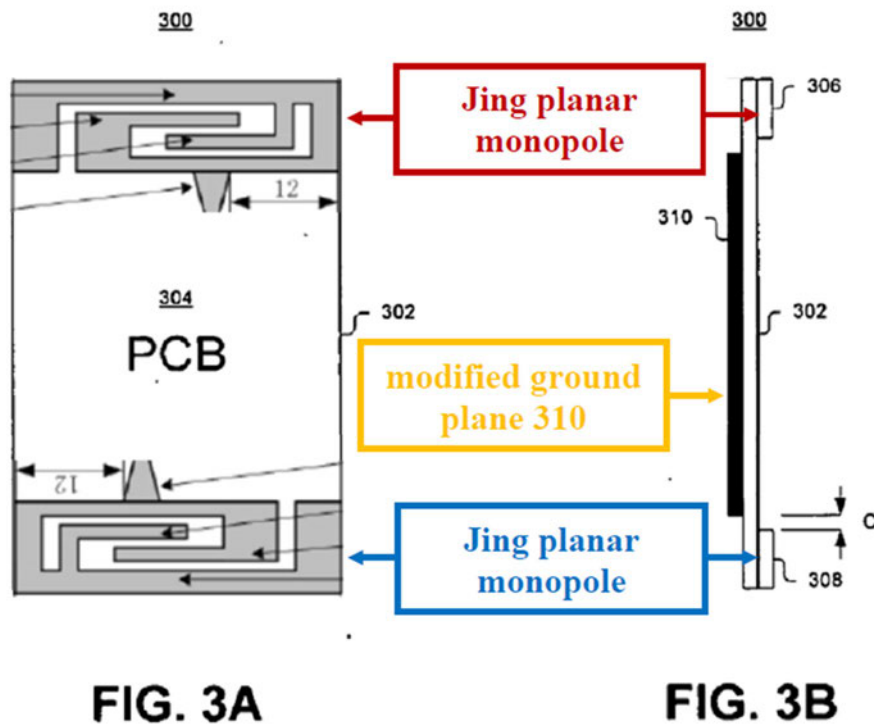
D. Ground 3A – Claims 1, 3-5, 13, 15, 17, and 19-20 are patentable over Dou in view of Jing

The Petition alleges that claims 1, 3-5, 13, 15, 17, and 19-20 would have been obvious to a POSITA at the time of invention based on the combined teachings of Dou and Jing. Because the proposed combination of Dou and Jing provided in the Petition directly contradicts the teachings of Dou, the combination would not have

been obvious. EX2010 at ¶ 69. Therefore, post-grant review should not be instituted based upon Ground 3A.

As mentioned above, an objective of Dou's antenna design is to achieve spatial diversity between two antennas. EX1013 at ¶¶ [0017], [0022], [0023]; EX2010 at ¶ 70. The combination of Dou and Jing proposed in the Petition would construct an antenna that violates the explicit design constraints specified by Dou – design constraints that are well known in the art as being necessary to achieve the spatial diversity Dou's antenna design seeks. *Id.* at ¶ 70. Because the Petition modifies Dou's antenna in a way that is contrary to Dou's design constraints, the proposed combination would not have been obvious, and a POSITA would not have had a reasonable expectation of success in implementing the combination. *Id.* at ¶¶ 69-77. Therefore, post-grant review should not be instituted based upon Ground 3A.

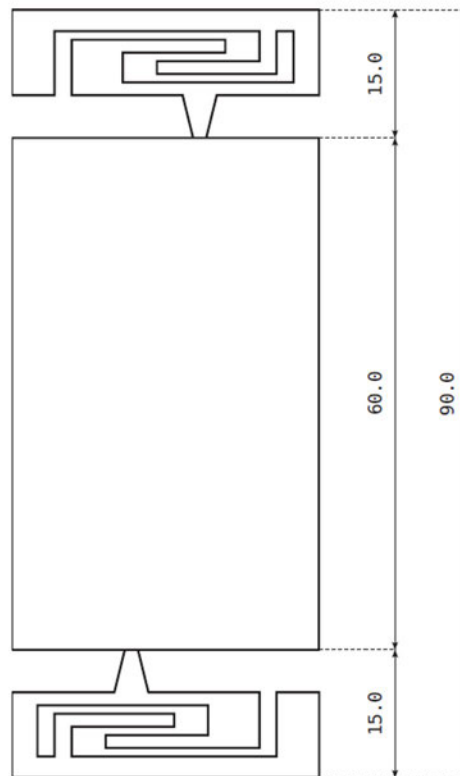
Dou's diversity system includes two antennas 306 and 308 located at opposite ends of a PCB 304 to achieve spatial diversity. *See* Section II.C.i, *supra*; EX1013 at ¶ [0017]; EX2010 at ¶ 71. Relying on the embodiment shown in Figs. 3A and 3B of Dou, the Petition proposes to implement Patent Owner's claimed antenna system by replacing Dou's first antenna 306 with a first copy of Jing's single antenna and by replacing Dou's second antenna 308 with a second copy of Jing's single antenna. Petition at 123-126; EX2010 at ¶ 71. This implementation is illustrated in the annotated figure provided on page 125 of the Petition, reproduced below.



Absent from the Petition is any discussion of whether Dou's antenna arrangement – modified by substituting two copies of Jing's antenna – complies with Dou's specification of having at least a quarter-wavelength spacing between the two antennas to provide spatial diversity, an important objective of Dou's antenna design. *Id.* at ¶ 72. It does not. As explained in Section II.C.i, *supra*, Dou specifies that the first and second antennas be "separated by a distance (D) that is no less than the quarter wavelength ($\geq \lambda/4$) of the lowest frequency." EX1013 at ¶ [0024]; EX2010 at ¶ 72. The lowest frequency of Jing's antenna is 900 MHz. EX1011 at 2658; EX2010 at ¶ 72. The wavelength λ corresponding to a frequency of 900 MHz is 333.3 mm, and a quarter of this wavelength – the minimum spacing specified by

Dou to achieve spatial diversity at this wavelength – is 83.3 mm. *Id.*; *see also* Section II.C.i, *supra*.

In the proposed combination of Dou and Jing, the Petition further explains "POSAs would have implemented Dou's antenna 306 and 308 using a Jing antenna for each and Jing's 36 × 60 mm ground plane as a modified ground plane 310, to achieve Dou's diversity architecture. ... As shown in modified Dou Figs. 3A-3B (below), consistent with Jing's teachings, POSAs would have limited the extent of Dou's ground plane 310 to not extend behind Jing's antenna at 306, just like Dou does not extend it behind antenna 308." Petition at 125. Thus, the recipe for combining Dou and Jing prescribed by the Petition results in the following structure:



EX2010 at ¶ 73.

The 60 mm spacing between the two antennas in the Petition's modified antenna is well short of the lower bound (83.3 mm) of the spacing specified by Dou to achieve spatial diversity at the antennas' lowest frequency (900 MHz). EX2010 at ¶ 74.

For completeness, Patent Owner notes that the separation constraints discussed above are described in Dou with reference to Figs. 2A and 2B, while Petitioners' invalidity ground is based upon Figs. 3A and 3B. *Id.* at ¶ 75. As explained in Dou, however, "the wireless device 300 may be similar in some structural and operational aspects as wireless device 200, as described above."

EX1013 at ¶ [0031]. Accordingly, a POSITA would understand that the design constraints described with respect to Figs. 2A and 2B apply with equal force to Figs. 3A and 3B. EX2010 at ¶ 75; *See also* EX1013 at ¶ [0035] ("FIG. 4A illustrates one embodiment of a wireless device 400 having an internal diversity antenna architecture. In various embodiments, the wireless device 400 may be similar in some structural and operational aspects as wireless device 200 and/or wireless device 300, as described above."); EX2010 at ¶ 75. Further, an antenna separation of no less than the quarter wavelength ($\geq \lambda/4$) of the lowest frequency is a generally accepted requirement for an antenna diversity system. *Id.* Therefore, even absent the specific requirement for such separation in Dou, a POSITA would have nevertheless understood that such separation was required to implement the spatial diversity sought in Dou. *Id.*

Because the antenna spacing proposed in Ground 3A of the Petition is contrary to the express teachings of Dou (as well as the general understanding in the art at the time of invention), the combination proposed in the Petition would have eliminated effective spatial diversity, a feature Dou's antenna architecture seeks to provide. *Id.* at ¶ 76. The proposed modification, therefore, would not have been obvious to a POSITA at the time of invention of the '149 Patent. *Id.*; *see In re Gordon* 733 F.2d at 902 (finding that a modification that renders the invention inoperable for its

intended purpose is not obvious because it teaches away from the invention); *see also Ex Parte Bjarne Harbo* 2025 WL 2159181 at *3. .

A POSITA, understanding that at least a quarter-wavelength spacing between antennas is implemented to achieve spatial diversity, and following Dou's express teaching of this spacing, would not have expected the combination proposed in Ground 3A of the Petition to successfully provide the spatial diversity Dou's antenna arrangement intended to provide. EX2010 at ¶ 77. Thus, the Petition fails to meet its burden of establishing that a POSITA would have been motivated to make such a combination, let alone yield predictable results doing so. *See KSR* at 550 U.S. at 421 (noting that if an ordinarily skilled artisan would not believe that a particular combination would have a reasonable expectation of "anticipated success," the combination may not be obvious). The combination of Dou and Jing proposed in Ground 3A of the Petition, consequently, would not have been obvious to a POSITA at the time of invention. EX2010 at ¶ 77. Accordingly, it is not more likely than not that Petitioners would prevail with respect to invalidating claims 1 and 13 or their dependent claims under Ground 3A.

E. Ground 3B – Claims 6 and 18 are patentable over Dou in view of Jing and Ying

The Petition alleges in Ground 3B that dependent claims 6 and 18 would have been obvious to a POSITA at the time of invention based on the combined teachings

of Dou, Jing, and Ying. Because Ying does nothing to remedy the deficiencies of the combination of Dou and Jing proposed in Ground 3A of the Petition, a POSITA would not have combined Dou, Jing, and Ying for substantially the same reasons explained in Section V.D., *supra*. EX2010 at ¶ 78-79. Moreover, the Petition provides no guidance whatsoever as to how a POSITA could have combined or integrated Ying's antenna with the proposed Dou+Jing antenna system. *Id.*

Regarding independent claims 1 and 13, the respective parent claims of claims 6 and 18, the Petition does not further rely on Ying in Ground 3B, merely relying on the arguments from Ground 3A. *Id.* at ¶ 79. That is, Ground 3B still proposes to replace Dou's two antennas 306 and 308 with duplicate copies of the single Jing antenna. Consequently, the proposed addition of Ying's antenna does nothing to address the non-obviousness of replacing Dou's antennas with two copies of Jing's antenna, as explained in Section V.D., *supra*. *Id.* The proposed combination of Dou+Jing+Ying still destroys the spatial diversity Dou sought to achieve between antennas 306 and 308, because the spacing between the swapped-in Jing antennas is only a fraction of that specified by Dou. *Id.* For this reason alone, it is not more likely than not that Petitioners would prevail with respect to invalidating claims 6 and 18 under Ground 3B, as explained for Ground 3A in Section V.D., *supra*.

VI. CONCLUSION

In light of the foregoing, it is not "more likely than not" that Petitioners would prevail with respect to at least one of the claims challenged in the Petition, and post-grant review should not be instituted based upon the proposed invalidity grounds. Accordingly, pursuant to 35 U.S.C. § 324, Patent Owner respectfully requests that the Board decline to institute post-grant review for the reasons stated herein.

Dated: October 8, 2025

Respectfully submitted,
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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 **EXHIBITS** were served via email (as previously consented to by counsel) on October 8, 2025 to lead and backup counsel of record for Petitioners as follows:

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Dated: October 8, 2025

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Fractus S.A.

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 8554 total words.

Dated: October 8, 2025

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