

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.
NOKIA OF AMERICA CORPORATION
Petitioners,

v.

XR COMMUNICATIONS LLC
Patent Owner.

U.S. PATENT NO. 8,737,511
Title: DIRECTED MIMO COMMUNICATIONS

Inter Partes Review No.: IPR2024-00868

PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE FOR *INTER PARTES* REVIEW OF U.S. PAT. NO. 8,737,511

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Petitioners' Exhibit List

<i>Exhibit #</i>	<i>Description</i>
1001	U.S. Patent No. 8,737,511 (“’511 Patent”)
1002	Prosecution History for the ’511 Patent
1003	Declaration of Dr. Kevin Negus
1004	U.S. Patent Publication No. 2011/0150050 to Trigui et al. (“Trigui”)
1005	U.S. Patent No. 6,801,790 to Rudrapatna (“Rudrapatna”)
1006	A. Molisch, <i>Wireless Communications</i> , Second Edition, ISBN: 878-0-470-74187-0
1007	U.S. Patent Publication No. 2002/0132600 to Rudrapatna
1008	PCT Application No. WO 2011/078898 to Trigui et al.
1009	Plaintiff XR Communications, LLC’s Preliminary Disclosure of Asserted Claims and Infringement Contentions
1010	Jose Vilches, “Everything You Need to Know about 4G Wireless Technology,” (April 29, 2010), available at: https://www.techspot.com/guides/272-everything-about-4g/
1011	Joy Huang, Commscope, “Re-shaping Wind Load Performance for Base Station Antennas,” available at: https://www.commscope.com/globalassets/digizuite/762340-bsa-enhanced-wind-load-performance-wp-115177-en.pdf
1012	Philip Sorrells, “The Problems with Overweight Cell Towers,” (September 2, 2014), available at: https://www.commscope.com/blog/2014/the-problems-with-overweight-cell-towers/
1013	Columbia Telecommunications Corp., “Cellular Tower Requirements Study for Talbot County, Maryland” (April 2009), available at: https://talbotcountymd.gov/uploads/File/council/Cellular_Study_FINAL.pdf

<i>Exhibit #</i>	<i>Description</i>
1014	U.S. Patent Publication No. 2003/0032424 (“Judd”)
1015	U.S. Patent Publication 2008/0026796 (“Thomas”)
1016	PCT Application No. WO 92/12579 (“Prokkola”)

I. Introduction

The Patent Owner's ("PO") Response ("POR") confirms that the Challenged Claims are unpatentable. The POR relies upon legally and factually insufficient analysis including:

- The POR incorrectly analyzes individual Figures and disclosures from Trigui in isolation without considering what Trigui's disclosure as a whole, using the building blocks within Trigui, would teach or suggest to a person of ordinary skill in the art ("POSA").
- The POR relies upon Dr. Cooklev's declaration that contains a wide variety of conclusory *ipse dixit* assertions that lack the requisite supporting analysis to be considered as proper expert testimony.
- The POR ignores the actual proposed invalidating disclosure to create a strawman analysis of issues not relied upon in the Petition.

Petitioners demonstrated that Trigui's disclosure renders obvious the claimed subject matter when considered as a whole as required by the Supreme Court:

[T]he analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 418 (2007). The Petition and Dr. Negus detailed the "creative steps that a [POSA] would employ" in evaluating Trigui's disclosure and explaining how the interrelated teachings of Trigui would be

understood to a POSA employing ordinary creativity.

The Board should reject PO's improper, conclusory analysis that improperly focuses on individual portions of Trigui and does not address the full obviousness teachings of Trigui that were the basis of the Petition's obviousness challenge.

II. The POR Does Not Challenge Claim 20 Or Any Dependent Claim.

The POR does not challenge the Petition's analysis for certain claims. For example, claim 20 is an independent claim¹ that recites “n different transmit beams” and “n multiple-input multiple-output transmitters (MIMO).”

The POR challenges the existence of “n bidirectional beams” but does not address “transmit beams.” POR 14-18. Similarly, the POR challenges “MIMO receivers.” POR, 19-27, 22 (Trigui's “modem ... is not a ‘MIMO receiver configured to process m different received signals’”). However, the POR does not challenge the “MIMO transmitters” in claim 20. POR, 19-27. Dr. Cooklev mirrors the POR challenges. EX-2003, ¶¶89-99 (“bi-directional beams”), 100-126, 112 ((Trigui's “modem ... is not a ‘MIMO receiver configured to process m different received signals’”).

Thus, the POR's arguments apply to claims 1 and 10 (both with “bi-directional beams” and a “MIMO receiver”) and claim 19 (with a “MIMO receiver”).

¹ The POR mischaracterizes claim 20 as a “dependent” claim. POR, 5, 20.

Therefore, regardless of the POR arguments, the Board may hold that claim 20 is invalid over the arguments in the Petition. Analogously, the POR does not address any dependent claim. POR, 14-28.

III. The POR Arguments Are Legally And Factually Insufficient To Prevent The Invalidity Of Any Challenged Claim.

For the claims addressed in the POR, the POR contains sparse rebuttal of the Pet., only pages 14-27. For conciseness, this Reply addresses the POR's overall (and repeated) inadequacies first and then addresses the POR's limited specific arguments.

A. The POR's Approach Is Replete With Repeated Errors.

1. The POR Violates KSR To Ignore A POSA's Understanding Of Trigui's Full Disclosure.

The POR focuses on Trigui's individual Figures in isolation to argue that those Figures do not "disclose" the claimed invention.² First, the POR uses "disclose" to effectively argue anticipation – which is not the Petition's theory. Rather, the Petition states an obviousness theory and notes that "[a]s used herein, 'discloses' or 'teaches' encompasses what a reference would teach, suggest or otherwise render obvious to a POSA in view of the prior art." Pet., 18 (n.2).

² E.g., POR at 17-18 (arguing Figure 6 "does not disclose Claim 1"); 16-17 ("Figures 4A and 4B... do[] not disclose the claim element"); 20-22 and 25-26 (arguing Figure 10 does not "disclose" the claimed invention); 23-24 (arguing Figure 2A does not "disclose" the claimed invention).

Second, and more fundamentally, the POR fails to credit the full disclosure of Trigui when considered as a whole as required by *KSR*.

[I]t will often be necessary to look to interrelated teachings of multiple patents; to the effects of demands known to the design community or present in the marketplace; and to the background knowledge possessed by a person having ordinary skill in the art. To facilitate review, this analysis should be made explicit. But it need not seek out precise teachings directed to the challenged claim's specific subject matter, for a court can consider the inferences and creative steps a person of ordinary skill in the art would employ.

KSR, 550 U.S. 405. Such ordinary creativity analysis applies to disclosures within a patent. *E.g.*, *GUI Glob. Prods. v. Samsung Elecs. Co.*, 2024 U.S. App. LEXIS 8708, at *8-9 (Fed. Cir. Apr. 11, 2024) (affirming obviousness because “a skilled artisan employing ordinary creativity would have applied [a prior art reference’s] instructions to combine its [] embodiments”).

Dr. Negus applied a POSA’s “ordinary creativity” in evaluating Trigui’s full teachings – which the POR and Dr. Cooklev ignore. Trigui expressly teaches its disclosure as providing building blocks that should be combined to understand Trigui’s full teachings. For example, Trigui teaches that “FIG. 2A illustrates a general high-level implementation of the digital integrated antenna array (‘DIAA’) and represents a single MIMO branch of a DIAA system.” EX-1004, [0036]. Figures 6 and 7-11 use “multiples of the hardware of FIGS. 2A and 2B.” EX-1004, [0036].

Trigui stated that its broad disclosures should be considered together to

provide a “multiple MIMO branch” system:

Although FIG. 2A illustrates only a single MIMO branch DIAA, the present invention contemplates the use of multiple MIMO branches (as will be illustrated below with references to FIGS. 6-11). ... Similarly, I/Q signals 215 from any of the modems, as well as the beamforming weights 214, can be sent to other MIMO branches.

EX-1004, [0041].

Moreover, Trigui’s basic concepts include “enabling a versatile solution for sharing antenna elements and active electronics between multiple operators.” EX-1004, [0002].

An additional feature of the present invention is enabling multiple operator sharing of a passive antenna array, transceivers, and the total available power of the DIAA. Additionally, splitting resources between the multiple operators is flexible and should be done on the basis of the individual operator needs.

EX-1004, [0048]. To facilitate such sharing, each operator may have its own modem, as Dr. Negus and Cooklev agree. EX-1003, ¶¶226-228, EX-2003, ¶107.

Dr. Negus’ analysis (reflected in the Petition) uses a POSA’s ordinary creativity in light of Trigui’s full and interrelated disclosure from all of the Figures and for their intended purposes. Neither PO nor Dr. Cooklev challenge the Petition’s explanations of the reasons for using Trigui’s building block disclosure to teach the invalidating configuration.

2. Dr. Cooklev’s *Ipse Dixit* Conclusory Declaration Does Not Provide Any Evidentiary Support Or Analysis For PO’s Positions.

The POR cites, and largely copies verbatim, the declaration of PO’s expert,

Dr. Cooklev. EX-2003. Dr. Cooklev merely makes conclusory *ipse dixit* statements without supporting reasoning. Such expert declarations are generally not admissible or given much weight due to the lack of reasoning therein. *EcoFactor, Inc. v. Google LLC*, 137 F.4th 1333 (Fed. Cir. 2025) (*en banc*) (quoting *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (“[N]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert.”). “[T]he Board [is] not required to credit [Dr. Cooklev’s] expert evidence simply because [PO] offered it.” *Skky, Inc. v. MindGeek s.a.r.l.*, 859 F.3d 1014, 1022 (Fed. Cir. 2017) (citations omitted); 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

Dr. Negus’ declaration sharply contrasts with Dr. Cooklev’s declaration. Dr. Negus provides a detailed step-by-step reasoning for his conclusions allowing review of the bases of those conclusions. Dr. Cooklev merely states high level conclusions. “Conclusory expert testimony does not qualify as substantial evidence.” *Bennett Regulator Guards, Inc. v. Atlanta Gas Light Co.*, 825 F. App’x 773, 778 (Fed. Cir. 2020)(rejecting conclusory testimony from patent owner’s expert)(citations omitted)

B. PO’s Cursory Arguments Do Not Address Or Rebut The Invalidity Analysis in the Petition.

The POR lacks both legal and factual merit and focuses on straw man

arguments that do not address the Petition's obviousness presentation.

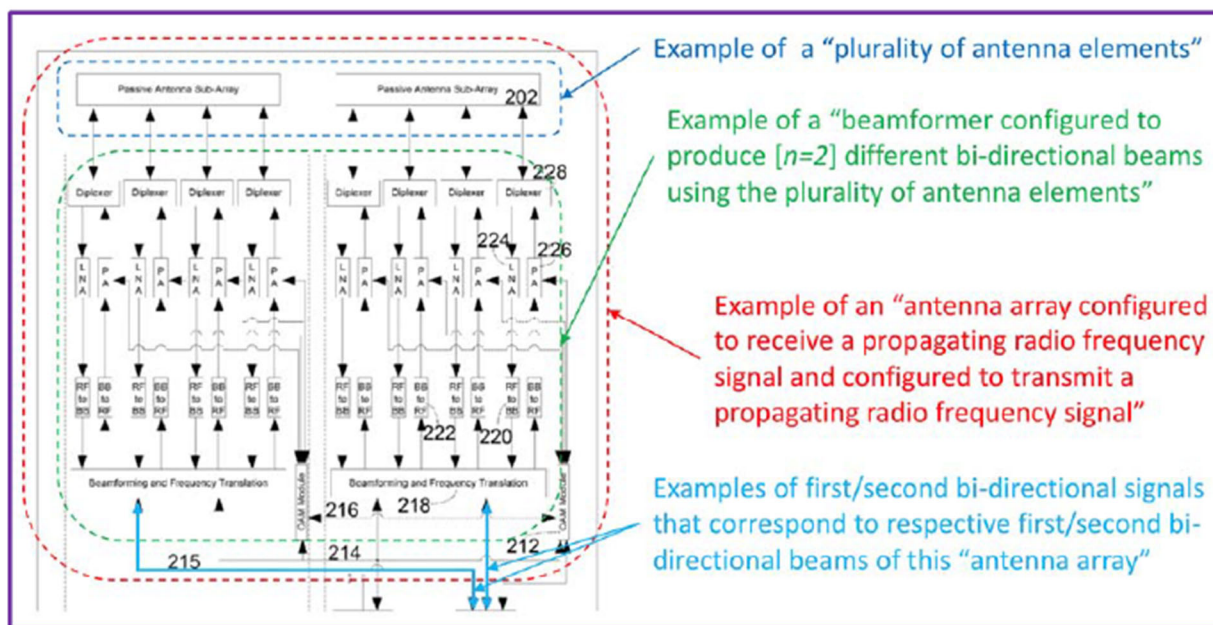
1. Trigui Contradicts PO's Arguments Regarding the "Antenna Array" Limitation in [1a].

As Petitioners explained, Trigui renders obvious limitation [1a] through its "Digitally Integrated Antenna Array" (DIAA) system that included an antenna array (which could contain subarrays) with a beamformer. Pet., 23-30. Petitioners explained that Figure 6, for example, disclosed a 2xN DIAA system that had a single antenna array with two beams (one beam per sub-array), and that Figure 10 may be used to depict a disclosed DIAA system that replicated Figure 6 and thus disclosed two antenna arrays, each of which had two beams. Pet., 29-30.

PO's attacks do not address the Petition's actual obviousness positions. PO first argues that Petitioners rely on Trigui's Figures 4A and 4B to teach the "n different bidirectional beams" limitation. POR at 16. PO attacks a position that Petitioners do not take: Petitioners rely on Figures 4A and 4B only for the proposition that each of Trigui's antenna arrays can produce multiple beams. Pet., 26. PO agrees with this concept. POR at 16; Ex. 2003, ¶91. Instead, PO argues Figures 3A, 4A and 4B do not disclose the "right" number of beams. POR at 16-17. Petitioners do not make this argument for those Figures. Pet. at 26.

Instead, Petitioners rely on Figure 6 as disclosing a "2xN DIAA" that has "two MIMO branches." Pet., 27; Ex-1004, [0081], Abstract. As Petitioners previously explained, "each MIMO transceiver branch" in Figure 6 has "one beam for transmit

and receive.” Pet., 27; Ex-1004, [0077]. Figure 6 with its two MIMO branches thus discloses two bi-directional beams, and thus discloses an “antenna array” with “ n bi-directional beams” where “ $n = 2$ ” as illustrated by Dr. Negus below.



Pet., 27-28; Ex-1003, ¶¶189, 192-193.

PO makes two arguments about the disclosure in Trigui’s Figure 6. POR at 17-18. PO’s first argument is that Figure 6’s express disclosure shows “two sub-arrays and at most one MIMO transceiver, identified as modem A.” POR at 17. Thus, according to PO, Figure 6 “does not disclose claim 1.” PO’s improperly argues that, because Figure 6 does not anticipate claim 1, the teachings of Figure 6 cannot be used by a POSA’s ordinary creativity in evaluating obviousness in light of Trigui’s full disclosure. *KSR*, 550 U.S. 420-421.

PO’s first argument against Figure 6 is untenable. Whether Figure 6 “does

not disclose Claim 1” (POR, 17) is not the proper standard when Figure 6 is used as part of an obviousness analysis using Trigui’s entire disclosure. Moreover, PO’s “MIMO transceiver” arguments are not applicable to element 1[a] which does not include that term.³

PO’s second argument is that “Figure 6 does not show a single antenna array with two beams” and “a POSA would not understand the arbitrary combination as an antenna array.” POR, 17-18 (citing/quoting Dr. Cooklev’s report). Trigui directly belies this argument. Figure 6 is plainly an antenna array.

[0081] FIG. 6 illustrates a $2 \times N$ MIMO DIAA system. ... FIG. 6 illustrates two MIMO branches configured to provide a $2 \times N$ MIMO DIAA system. Additionally, the $2 \times N$ MIMO DIAA could be configured such that each antenna sub-array of FIG. 6 may provide a specified polarization as required by an application.

EX-1004, [0081]. A “DIAA” is an antenna array and Fig. 6 is shown with two sub-arrays. EX-1004, [0018], [0063] (“each sub-array...”). Figure 6 discloses “two beams” in two different ways. First, “FIG. 6 illustrates two MIMO branches” and, in one embodiment, “each MIMO transceiver branch has one beam for transmit and receive.” EX-1004, [0081], [0077]. Second, Trigui teaches that “each antenna sub-array of FIG. 6 may provide a specified polarization as required by an application” thus providing two polarizations. Each polarization (sub-array) corresponds to a

³ The MIMO transceiver element was separately explained in the Petition as part of elements 1[b], 1[c] and is discussed *infra*. Pet., 30-49.

beam thus providing two beams. Pet., 32; EX-1003, ¶¶204, 233-237, 251-253 (Dr. Negus’ analysis which Dr. Cooklev and PO do not dispute).

PO and Dr. Cooklev make an unintelligible argument on “grating lobes when steering off a boresight direction.” POR, 18 (quoting EX-2003, ¶97 which quotes EX-1004, [0050]). Trigui’s paragraph [0050] discusses the placement of individual antenna elements which seemingly has no discernable relationship about the specific disclosure of Figure 6’s array, with two sub-arrays, each generating one beam.

Dr. Cooklev and PO support the Petition’s invalidity position in acknowledging that “Trigui also teaches that ‘[e]ach sub array is allocated to one operator.’” POR, 18 (quoting EX-1004, [0063]); EX-2003, ¶97. This matches the analysis in the Petition and by Dr. Negus explaining that one sub-array within each of the two arrays would be connected to the modem allocated to a particular operator. Pet., 32-33.

Finally, PO includes a single throwaway sentence regarding Figure 10. POR, 18 (“Figure 10 shows four subarrays, not ‘two antennas.’”) (citing Dr. Cooklev’s equally terse and *ipse dixit* sentence in Ex. 2003, ¶98). This one-line statement by PO and Dr. Cooklev does not address any actual argument in the Petition. Rather, as the Petition and Dr. Negus explain, using Trigui’s full disclosure and the ordinary creativity of a POSA, the Figure 6 array, with two sub-arrays each producing one beam, can be replicated to provide two arrays, each with two sub-arrays, each

producing one polarized beam.

Trigui teaches this replication. “FIG. 6 illustrates a $2 \times N$ MIMO DIAA system.” EX-1004, [0081]. “[A] $4 \times N$ MIMO DIAA system [may be] implemented as two independent $2 \times N$ MIMO DIAAs” from Fig. 6. EX-1004, [0082]. “FIG. 10 illustrates a $4 \times N$ MIMO DIAA system.” EX-1004, [0085]. Thus, a POSA using “ordinary creativity” would understand that Trigui’s teaches (including rendering obvious) that Figure 10 can be implemented with two replications of Figure 6. Pet. at 28-29; EX-1003, ¶¶194-198. *See KSR*, 505 U.S. 405 (“the inferences and creative steps a person of ordinary skill in the art would employ”); 420-421 (“Common sense teaches, however, that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple [teachings] together like pieces of a puzzle. ... A person of ordinary skill is also a person of ordinary creativity, not an automaton.”); *Tyco Healthcare Grp. LP v. Ethicon Endo-Surgery, Inc.*, 774 F.3d 968, 978 (Fed. Cir. 2014) (overturning finding of non-obviousness because “one of ordinary skill is also one of ‘ordinary creativity’ that knows how to combine familiar prior art elements to achieve the same functions.”).

In sum, PO’s argument for limitation [1a] relies upon: (1) countering arguments not made in the Petition; (2) ignoring Trigui’s plain language and the full disclosure of Trigui’s interrelated disclosures; and (3) citing to Dr. Cooklev’s *ipse*

dixit assertions that lack any supporting reasoning and also contradict the plain language of Trigui. As detailed in the Petition and Dr. Negus' detailed analysis, Trigui's teaching, when viewed through the prism of a POSA's ordinary creativity and reasonable inferences about the full disclosure of Trigui, disclose element 1[a].

2. PO's Arguments Regarding the MIMO Transceiver Limitations in [1b] and [1c] Do Not Rebut The Petition's Obviousness Showing.

As Petitioners explained, Trigui renders obvious limitations [1b] and [1c] through at least its multiple modems that are "cross-connected" to multiple 2xN DIAAs. Pet., 33-50. PO makes three categories of arguments: (1) that Trigui does not disclose a MIMO transceiver, (2) that a POSA would not use multiple modems with Trigui's DIAAs, and (3) that even if a POSA would use multiple modems with Trigui's DIAAs, they would not be "cross-connected." POR at 19-27.

a. Trigui Renders Obvious The Claimed "MIMO Transceiver"

To dispute Trigui's disclosure of the claimed "MIMO transceivers," the POR relies upon: (1) irrelevant straw man arguments; (2) importing new limitations into the claims; and (3) ignoring Trigui's disclosure.

PO first argues the irrelevant statement that "a 'MIMO transceiver branch' of Trigui is different from the claimed MIMO transceiver." POR, 19. This is an irrelevant straw man because the Petition asserted that Trigui's modems (which connect to the MIMO transceiver branches) are the claimed "MIMO transceiver."

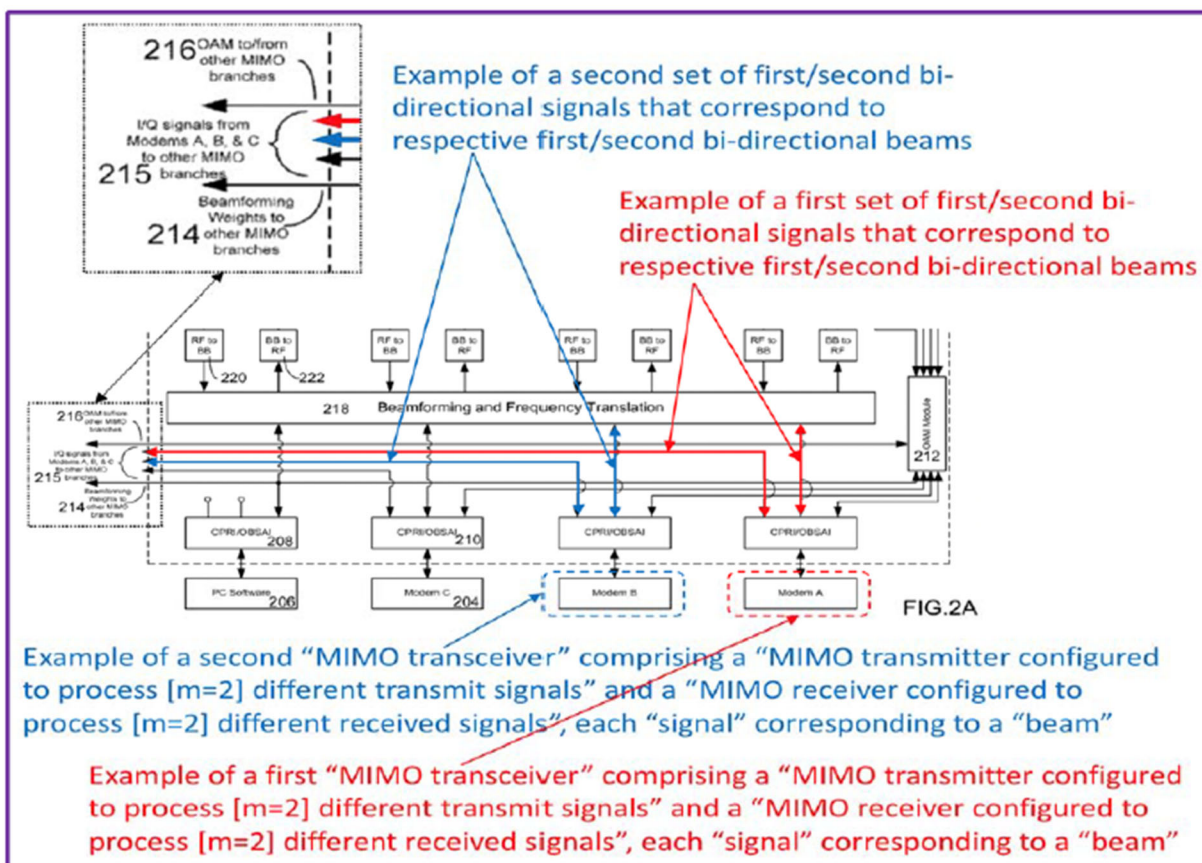
Pet., 34-38; Ex-1003, ¶¶220-221.

PO supports its (irrelevant) argument by asserting that “[a] MIMO transceiver ... performs baseband DSP” functions “such as modulation/demodulation, coding/decoding, etc.” POR at 19; Ex. 2003, ¶¶103-104. Neither the POR nor Dr. Cooklev cite any support (intrinsic or extrinsic) for their proffered construction. Furthermore, PO did not ask for “MIMO transceiver” to be construed.

Regardless, Petitioners explain Trigui’s modem are MIMO transceivers because they each include a “MIMO transmitter” and a “MIMO receiver” and performs functions that the ’511 Patent associates with MIMO transceivers. Pet., 34-35; Ex-1003, ¶¶220-221. Moreover, “modems” (such as Trigui’s) perform “modulation” and “demodulation” – hence the name “modem.” Petitioners argue in the alternative that, Trigui’s modem plus “remote radio head” discloses a “MIMO transceiver.” Pet., 36. PO never addresses this alternative.

PO makes a single, irrelevant argument “Trigui’s modem is not necessarily MIMO, but rather could be single-input single-output (SISO).” POR, 19. Trigui teaches that “the DIAA is not limited to deployment as a MIMO device and may be deployed to operate in SISO mode.” EX-1004, [0075]. Trigui’s additional SISO capabilities do not negate its MIMO teachings. This reflects just another example of the improper approach by Dr. Cooklev and PO to myopically view only limited portions of Trigui to the exclusion of other teachings.

Further, Petitioners explain in detail why Trigui's modem is a MIMO transceiver because each modem (which is described as a baseband module of a cellular base station) performs the modulation and demodulation functions that the '511 Patent associates with MIMO transceivers. Pet., 35-36; Ex-1003, ¶¶220-221; Ex-1004, [0037]. A POSA would understand that each modem processes multiple I/Q signals and thus processes multiple transmit and receive signals, as shown in the annotated composite of Figure 2A below, and Trigui further shows these I/Q signals being sent to/from a different array (MIMO branch). Pet., 34-36; *see also* Ex-1004, [0009] (a modem transmits/receives streams along two paths). Trigui expressly contradicts PO's argument that Trigui's modems do not support MIMO. Notably, the POR does not address any of these arguments.



Pet., 35-36; Ex-1003, ¶¶219-221.

b. Trigui Expressly Contemplates Multiple Modems Being Used With the Same Antenna Resources

As Petitioners explained, Trigui teaches that its system has multiple modems and “multiple operator sharing” of antenna resources. Pet., 37-38; Ex-1004, [0048], [0060], [0068]-[0070]. Petitioners explained that, in the scenario where two operators were sharing the DIAA of Figure 10, each operator would have its own modem. Pet., 39-40; Ex-1003, ¶¶223-226.

From pages 20-23, the POR challenge that Trigui discloses using multiple modems, but do not address the actual arguments in the Petition.

The POR asserts that “[e]ven if it is MIMO, Dr. Cooklev explains that Trigui does not teach any relationship between the number of MIMO transceivers and the number of beams.” POR 19-20. The sum of Dr. Cooklev’s “explanation” is to copy this *ipse dixit* sentence, with no explanation. Ex. 2003, ¶105. Neither Dr. Cooklev nor PO attempt to challenge the detailed explanation that a POSA, using ordinary creativity, would understand that Trigui’s full disclosure teaches (including rendering obvious) a configuration in which there are two MIMO transceivers each connected to two beams (one from each array) as detailed in the Petition and by Dr. Negus based upon two operators sharing the DIAA. Pet., 37-51; EX-1003, ¶¶220-270.

The POR and Dr. Cooklev incorrectly cite Dr. Negus’ report to create yet another straw man argument about what Figure 10 “discloses”:

Dr. Cooklev also explains that Petitioners’ and Dr. Negus’s theory that “Trigui’s Figure 10 discloses two MIMO transceivers with two inputs that correspond to a beam from each of the two antenna arrays (i.e., $m=2$ for both)” is not correct. Ex. 2003, ¶106 (quoting Ex. 1003, ¶¶251-253).

POR, 20. The quoted sentence is not in Dr. Negus’ report but rather in the Petition (at 31). The statement’s reference to “‘discloses’ encompasses what a reference would teach, suggest or otherwise render obvious to a POSA in view of the prior art.” Pet., 18, n.2. This is true. The Petition and Dr. Negus explain the relationship between Trigui’s modems (claimed MIMO transceivers) and a beam from each of

the two antenna arrays in great detail for purposes of obviousness. Pet., 30-51; EX-1003, ¶¶213-254.

PO apparently argues “discloses” in terms of anticipation – which is not the argument presented in the Petition. For example, PO argues that “[t]here is no ‘modem B’ on Figure 10; it is added by Dr. Negus.” PO’s statement is true, but irrelevant because it does not address Dr. Negus’ argument (or that in the Petition) explaining that the full teachings of Trigui, using a POSA’s ordinary creativity, render obvious the configuration with two modems as presented.

PO then supports the Petition’s obviousness position by noting “even if a second modem is added, it would be for a different operator.” POR, 20. This reflects part of Dr. Negus’ explanation for why Trigui (with its focus on sharing between operators) renders obvious a configuration with two modems – one for each operator.

PO then veers into irrelevant arguments. PO argues:

A POSA would have known that there is no relationship between the modems of two operators. Id. Every operator would be transmitting independently, in a different frequency band, and without coordination with the other operator.. Id.

POR, 20. The ‘511 claims do not recite a “relationship between” MIMO transceivers or “coordination with” other operators. Rather, the MIMO transceivers process beams of different arrays as recited in the claims. Neither PO nor Dr. Cooklev explain a “coordination” or a “relationship” claim limitation. PO reiterates its

“coordination” argument (POR, 21) but again does not cite any support.

The POR then presents another irrelevant argument about modems (or operators) using different “number of MIMO branches.” POR, 20. Again, this argument (at most) states that Trigui has broad teachings that allow for flexibility. It does not negate the analysis (in the Petition and by Dr. Negus) of a configuration in which each operator provides a 2x2 MIMO system using one of the MIMO branches from each of the two arrays. Extra teachings do not negate invalidating teachings.

PO suggests that even if the modems were “identical,” such a system would not produce the same number of beams as the number of transceivers because Trigui teaches no such relationship. POR at 21; Ex. 2003, ¶107. PO is again restating its position that the claims cannot be obvious in view of Trigui because they are not anticipated by Trigui. The correct analysis is what configurations that Trigui suggests to a POSA employing ordinary creativity and the inferences and creative steps a person of ordinary skill in the art would employ in evaluating the prior art. *KSR*, 550 U.S. 405.

Applying the proper *KSR* standard, as Petitioners explained, a two-operator scenario implementing Figure 10 (as annotated by Dr. Negus) would have two independent modems with one modem for each operator. Pet., 39; Ex-1003, ¶¶223-226. Using Figure 10 to explain the implementation of two Figure 6 DIAA

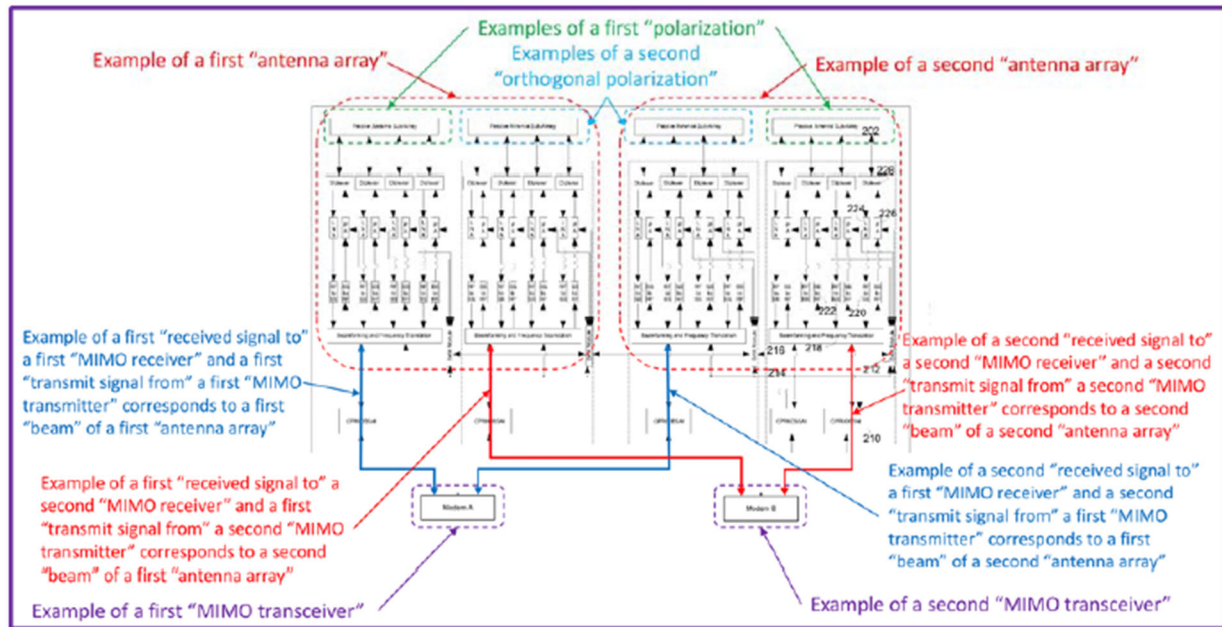
replicated as discussed above, which has two arrays (2xN DIAAs), as explained by Dr. Negus and discussed above in limitation [1a], each array has two beams. Pet., 27-29; Ex-1004, [0081], Ex-1003, ¶¶189, 192, 196-197. PO does not rebut this analysis.

A POSA, using ordinary creativity, would understand that in this two-operator scenario described in the Petition, each of the two modems would be connected to one of the two beams from each array. Pet., 41-42; Ex-1003, ¶¶223-226. A POSA thus understands that a proposed implementation, using Figure 10 to explain the proposal (which is two copies of Figure 6) with two operators (and thus two modems) is obvious. This obvious implementation teaches the MIMO transceiver limitations.

Indeed, PO has no substantive response to this obviousness argument. Instead, PO offers two arguments. First, PO discusses Trigui's disclosures in isolation without regard to how the overall disclosure is viewed by a skilled artisan exercising ordinary creativity. POR, 20-22. This is improper. *See* Section III.A.1 *supra*.

Second, PO relies on a series of *ipse dixit* opinions from its expert that amount to "Petitioner and Dr. Negus are wrong" without providing any explanation as to why or how. This is improper. *See* Section III.A.2 *supra*. For example, PO and Dr. Cooklev argue that Trigui's disclosure of Figure 10 contradicts Dr. Negus's

explanation, but all PO says is that each MIMO branch in Figure 10 has its own OBSAI/CPRI interface. POR at 21; Ex. 2003, ¶109. But PO provides no explanation as to how such a contradiction exists. PO cannot point to any such contradiction because Dr. Negus shows that modems connect to the MIMO branches through the OBSAI/CPRI interface, as shown in Dr. Negus's annotation using Figure 10 with two modems:

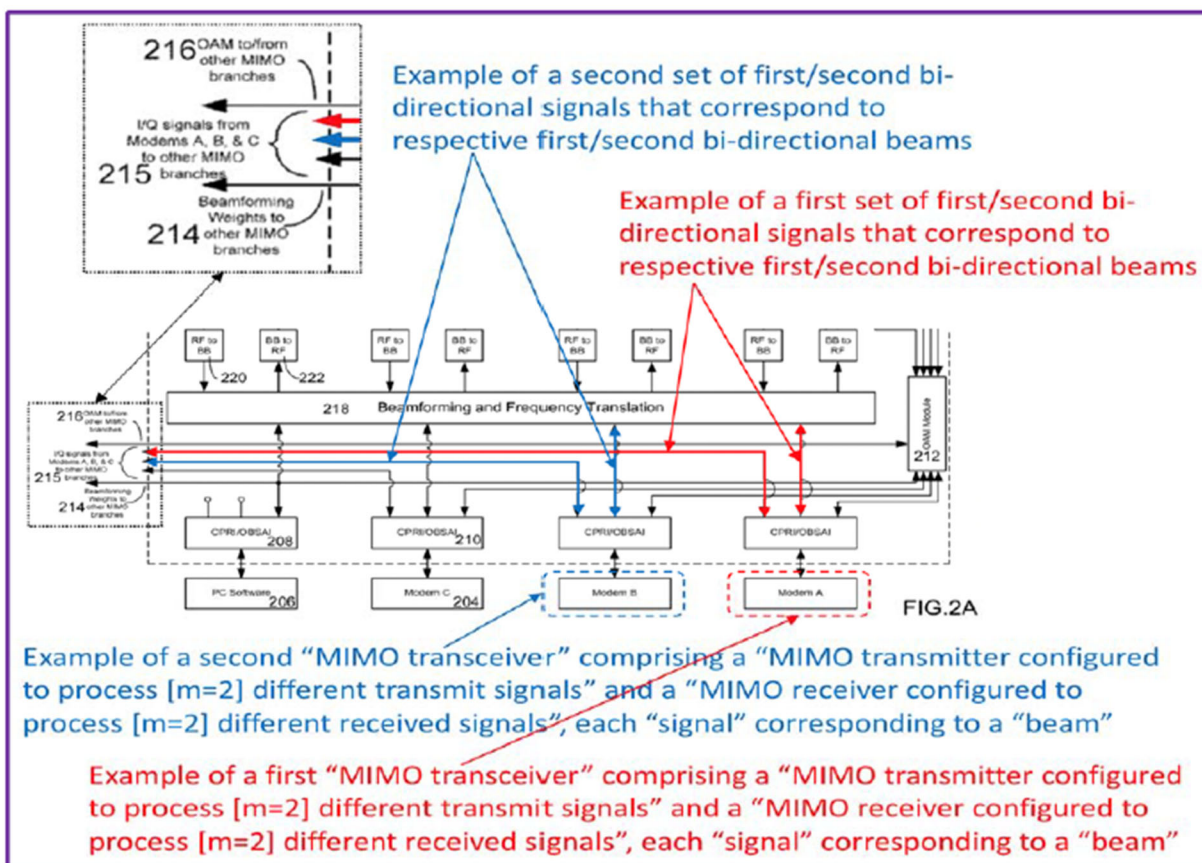


Pet. 37-40; EX-1003, ¶¶226-232, 251-253.

This implementation of Figure 10 has two antenna arrays, where each antenna array has two MIMO transceiver branches (or sub-arrays). Trigui expressly discloses that each sub-array (or MIMO transceiver branch) may be allocated to a different operator, and so each array supports two operators. Ex-1004, [0063]. In this implementation, the number of MIMO transceivers matches the number of

beams per array and thus renders limitations [1b] and [1c] obvious. PO's only response to this explanation is that Trigui does not expressly disclose the proposed obviousness configuration, but that is not the standard for showing that a limitation is obvious. POR, 22

PO and Dr. Cooklev again ignore the proposed combination to assert that "there is no support that each modem has 'a pair' of bi-directional IQ signals; it is a mere possibility. Ex. 2003, ¶114." POR, 22. First, "a mere possibility" still teaches obviousness. Second, Figure 2A expressly discloses (and states) that each modem would have a separate IQ signal for each of the MIMO branches as shown in Dr. Negus' annotated version of Fig. 2A:



Pet. 35. As shown in the blowout in the upper left, Figure 2A teaches that each modem has “I/Q signals ... to other MIMO branches.” *See also* EX-1004, [0041]. In other words, Trigui teaches that the number of IQ signals from each modem corresponds to the number of MIMO branches. In the proposed combination, each modem connects to two MIMO branches and thus has two (“a pair of”) IQ signals.

While “Dr. Cooklev disagrees” with this analysis (POR at 23-24), Dr. Cooklev and PO just ignore Figure 2A – a further reason why Dr. Cooklev’s opinions should be discounted.

Thus, PO and Dr. Cooklev might disagree with the Petition's invalidity

position, but Dr. Cooklev and PO merely consider Trigui's teachings in isolation and ignore the Petition's actual obviousness analysis.

c. Trigui Renders Obvious the "Interconnect" Limitations

As Petitioners explained, in the two-operator implementation in which Figure 10 is implemented by replicating Figure 6 (as discussed above), where two operators with separate modems are sharing the two arrays (where each array has two sub-arrays), there are only two possible ways to interconnect the modems with the arrays. Pet., 42-50; Ex-1003, ¶¶235-254. It would be obvious to try the interconnect way proposed by the Petition for the reasons stated therein. *KSR*, 505 U.S. 421. PO and its expert present several purported disagreements. POR at 24-26; Ex. 2003, ¶¶122-125.

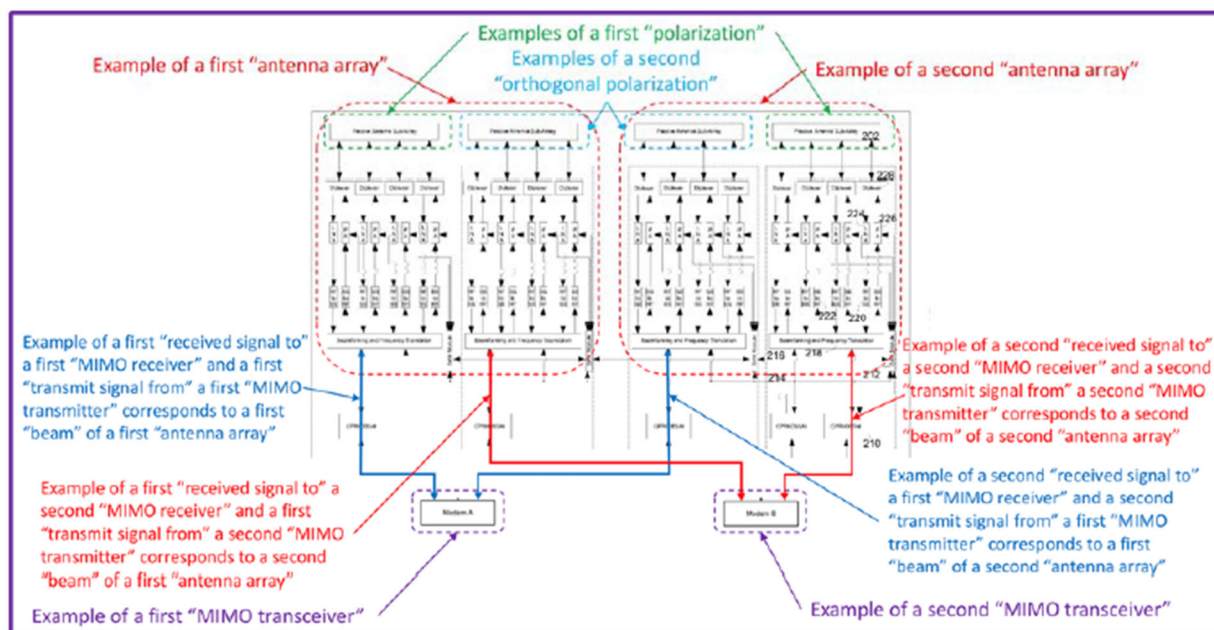
PO first argues that Figure 10 contradicts Dr. Negus's theory because Figure 10 discloses a single modem that is connected to all four sub-arrays. POR at 24-25; Ex. 2003, ¶¶122-123. PO's argument ignores the Petition's obviousness configuration (two modems) that reflects the full teachings of Trigui viewed a skilled artisan employing ordinary creativity. PO's arguments about how Figure 10 would be implemented with one modem in a single-operator system does not inform a POSA as to how the two DIAAs in the proposed configuration may be implemented in a two-operator system.

PO apparently argues that implementing Trigui's disclosure (e.g., Figures 6-

11, including Figure 10) in a multi-operator system would contradict the teachings of Trigui. POR, 25. PO thus ignores the express teachings of Trigui which seeks to “enabling a versatile solution for sharing antenna elements and active electronics between multiple operators.” EX-1004, [0002]. *See also* EX-1004, [0048] (“enabling multiple operator sharing of a passive antenna array” and that “splitting resources between the multiple operators is flexible and should be done on the basis of individual needs.”). Trigui’s teachings should be understood to be combinable to accomplish its stated goal of facilitating multi-operator sharing of the DIAA.

PO next argues that the cross-connect approach is not desirable because it “reduce[s] the number of branches to which an operator can connect” and that “that type of sharing is not attractive and even not viable given the OBSAI/CPRI interface to every branch.” POR at 25-26; Ex. 2003, ¶124. PO provides no explanation for why it believes this to be the case and does not explain why the cross-connect approach is not viable or desirable.

In contrast, Dr. Negus’s composite annotation using Figure 10 shows that it uses the OBSAI/CPRI interfaces to connect the modems to the MIMO branches.



Pet., 39-49; Ex-1003, ¶¶251-253.

Finally, PO disputes Petitioners' explanation for why the "cross-connect" approach minimizes the undesirable cross-correlation of signals. POR at 26-27; Ex. 2003, ¶125. According to PO, a POSA would have understood that an apparatus constructed according to Trigui's teachings would have "minimal correlation between any two antenna sub-arrays." POR 26-27; Ex. 2003, ¶125. PO's only support for this argument is again the *ipse dixit* of Dr. Cooklev, who provides no basis for why a POSA would understand Trigui to disclose minimal correlation between any of the sub-arrays.

PO and Dr. Cooklev ignore the detailed analysis in the Petition and Dr. Negus' report explaining why cross-correlation would be an issue considered by a POSA and how such cross-correlation would be addressed by a POSA exercising ordinary

creativity in light of the problem to be solved. Pet, 44-50. *KSR*, 550 U.S. 405, 420-421.

Without any supporting analysis, the PO (and Dr. Cooklev) challenge that the sub-arrays “would be [physically] close (and therefore the correlation among them would be high).” POR, 26. PO and Dr. Cooklev again ignore Trigui’s disclosure. Trigui teaches that its DIAA may be “shared” and that such DIAA components may be placed on a “tower” consistent with known cellular deployments. EX-1004, [0069-0072].

In contrast, the Petition and Dr. Negus explain that the installed equipment would be placed on a tower to be shared. Pet. at 15-16, 33, 38. The Petition (and Dr. Negus) explain the physics behind correlation including that the distance impacts correlation. Pet. at 44-46 (citing to Rudrapatna (EX-1005)). The Petition and Dr. Negus explains that Trigui’s disclosure would benefit from particular positioning of having the sub-arrays “maximally separated” due to correlation concerns. Pet. at 44-46; Ex-1003, ¶¶239-250. PO and Dr. Cooklev just ignore these considerations to assert, without any analysis or justification, that “a POSA would have understood that in an apparatus constructed according to Trigui’s teachings there is minimal correlation between any two antenna sub-arrays.” POR, 26-27. PO’s (unsupported) assertion appears to conflict with the undeniable physics of antennas and the arrangement of components in the proposed configuration demonstrating

obviousness.

PO cannot overcome the clear showing of obviousness over Trigui's full disclosure by arguing against individual pieces of disclosure in isolation and relying upon a conclusory expert declaration that fails to explain its positions.

Respectfully submitted,

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Dated: June 30, 2025

CERTIFICATION OF SERVICE ON PATENT OWNER

Pursuant to 37 C.F.R. §§ 42.6(e), 42.8(b)(4) and 42.105, the undersigned certifies that on the 30th of June, 2025, a complete and entire copy of this Petitioners' Reply To Patent Owners Response and all supporting exhibits were served via email and/or electronic download by agreement of Patent Owner, to the Patent Owner's counsel of record in this manner.

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 *et seq.*, the undersigned certifies that this document complies with the type-volume limitations. This document contains 5184 words as calculated by the “Word Count” feature of Microsoft Word, the word processing program used to create it.

Dated: June 30, 2025

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