

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.
NOKIA OF AMERICA CORPORATION
Petitioner,

v.

XR COMMUNICATIONS LLC
Patent Owner

IPR2024-00868
Patent 8,737,511

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF EXHIBITS

Ex.	Description
2001	<i>XR Communications LLC v. AT&T Services Inc., AT&T Mobility LLC, and AT&T Corp.</i> , Case 2:23-cv-00202-JRG-RSP (E.D. Tex.), Dkt. 89 (Joint Claim Construction Chart)
2002	<i>XR Communications LLC v. AT&T Services Inc., AT&T Mobility LLC, and AT&T Corp.</i> , Case 2:23-cv-00202-JRG-RSP (E.D. Tex.), Dkt. 95 (Amended Docket Control Order)

I. INTRODUCTION

The Board should deny institution of *inter partes* review (“IPR”) of U.S. Patent No. 8,737,511 (“’511 patent”). According to the Petition, the ’511 patent relies upon “a very exacting architecture” that requires “specific relationships between the number of antenna arrays, the number of beams generated by each antenna array and the of ‘MIMO transceivers’ that must be connected to specific beams from specific antenna arrays.” Pet. at 6. Trigui, the primary reference at issue in this IPR, fails to disclose this architecture.

Specifically, under the Petition’s theory, each beamformer in Trigui is configured to produce only one bi-directional beam. This violates the claim requirement that each beamformer is “configured to” (i.e., designed to) “produce *n different bi-directional beams* using the plurality of antenna elements.”¹ Notably, the Petition’s theory is that Trigui’s figures “disclose” this limitation. This is wrong. And no obviousness theory (which was not presented for this limitation), nor expert testimony, can make up for what Trigui fails to disclose.

Moreover, the Board should exercise its discretion to deny institution under 35 U.S.C. § 314(a) and the *Fintiv* factors. In parallel district court proceedings, the parties have already completed claim construction for the ’511 patent. Trial is also

¹ All emphasis added unless otherwise noted.

scheduled for July 2025—about six months before the FWD deadline in this IPR (in December 2025). Where Petitioner has not provided a *Sotera* stipulation, the *Fintiv* factors weigh strongly against institution.

II. THE '511 PATENT

A. Overview

The '511 patent, entitled “Directed MIMO communications” generally relates to multiple-input multiple-output (MIMO) wireless communications and beamforming antennas. '511 patent (Ex. 1001) at (54), 1:5-7. As background, MIMO wireless communication systems utilize multiple transmit antennas and multiple receive antennas instead of a single antenna. *Id.* at 1:11-13. MIMO systems often have multiple transmitters (e.g., one associated with each transmit antenna) and multiple receivers (e.g., one associated with each receive antenna). *Id.* at 1:13-16. A transceiver may modulate transmit signals and demodulate receive signals and may perform further processing of receive signals after demodulation and of transmit signals prior to modulation. *Id.* at 1:16-19.

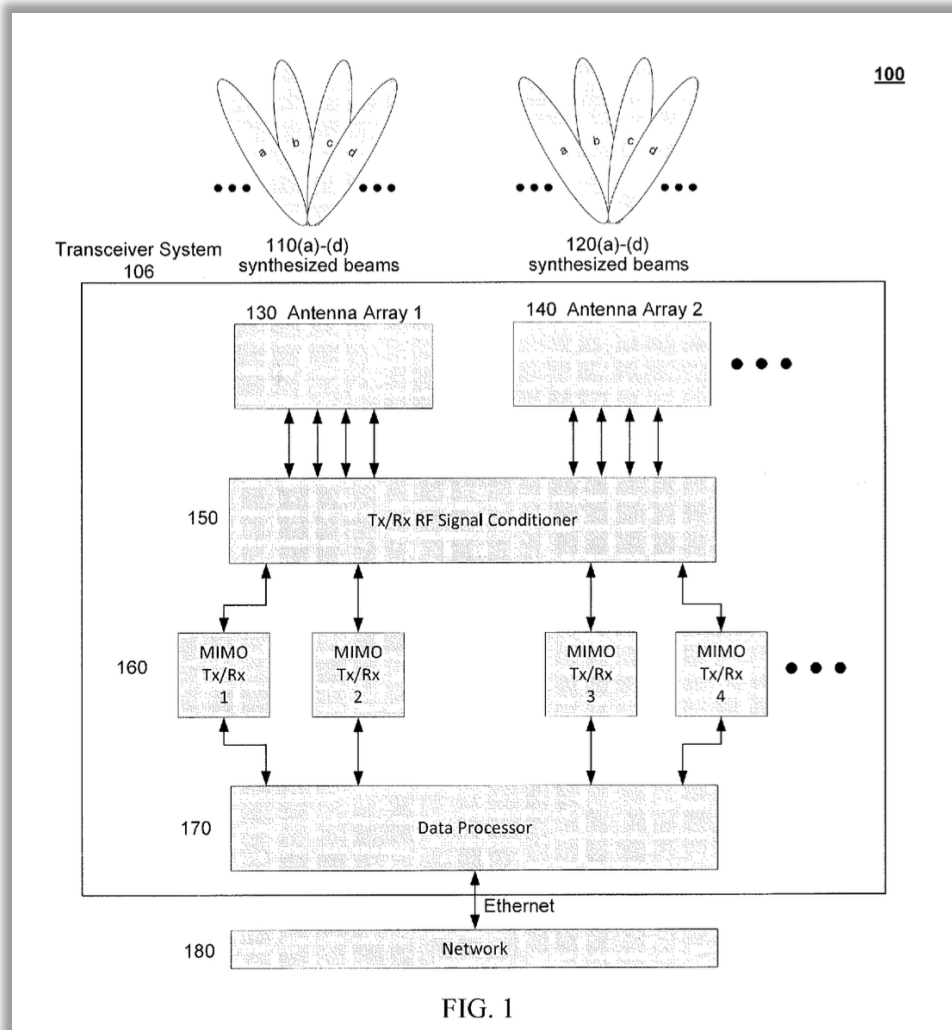
The '511 patent teaches a novel architecture of a MIMO system for wireless communications. Specifically, according to the Abstract:

A system is disclosed that includes a plurality of m antenna arrays configured to receive a propagating radio frequency signal. Each antenna array includes a plurality of antenna elements and a

beamformer configured to produce n different bi-directional beams using the plurality of antenna elements. The system includes a plurality of n multiple-input multiple-output transceivers (MIMO). Each MIMO transceiver includes a MIMO receiver configured to accept m received signals, wherein the i -th input signal to the j -th MIMO receiver corresponds to the j -th beam of the i -th antenna array. Each MIMO transceiver also includes a MIMO transmitter configured to provide m transmit signals, wherein the v -th output signal from the z -th MIMO transmitter corresponding to the z -th beam of the v -th antenna array is selected for transmission. m , n , v , and z are integer number values, and $i=1, \dots, m, j=1, \dots, n$, and $v=1, \dots, m$.

Id. at (57).

Figure 1 of the '511 patent illustrates the arrangement described in the specification and claims. Figure 1 shows two antenna arrays ($m=2$) each producing four beams (e.g., 110(a)-110(d)) ($n=4$), corresponding to the four provided MIMO transceivers 160(1)-160(4) ($n=4$):



Id. at Fig. 1.

Figure 2 of the '511 patent likewise illustrates the arrangement. In Figure 2, each antenna array includes a beamformer configured to produce a specific number of beams greater than 2. Specifically, each array's beamformer produces six beams (e.g., 212 (a)-(f)), corresponding to six MIMO receivers 250(a)-(f) ($n=6$):

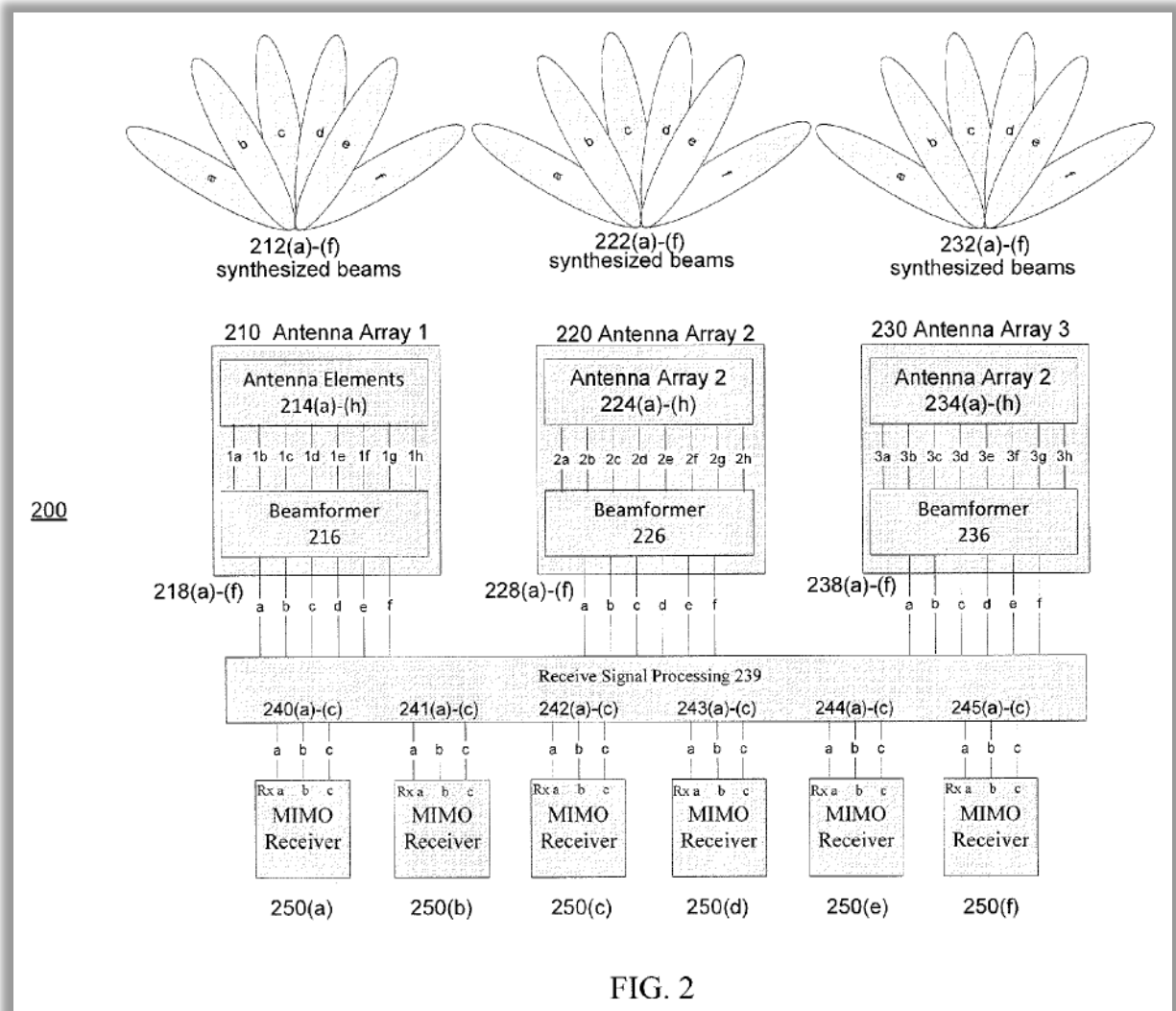


FIG. 2

Id. at Fig. 2.

In both examples, and as taught by the '511 patent, the number of beams supported by the array and beamformer is determined by the design of the array and beamformer. As the patent states: “*The number of beams produced by antenna arrays 130, 140 is a parameter determined by design of the array.* Although FIG. 1 shows four beams per array, a greater or smaller number of beams is also possible.”

Id. at 3:64-67. For example, although an embodiment of Figure 1 configured to generate multiple beams per beamformer (e.g., 2, 4, 6, 16, 32, 64) is possible, the number of beams is a design parameter of the array and its beamformer.

B. Challenged Claims

The challenged claims of the '511 patent are claims 1-2, 4-6, 9-11, 13-15, and 18-20. *See* Pet. at 17-18. Claims 1, 10, and 19 are independent claims, and claims 2, 4-6, 9, 11, 13-15, 18, and 20 are dependent claims. Independent claim 1 is representative of the challenged claims. Claim 1 recites:

Identifier		Claim Language
[1pre]		A system comprising:
[1a]	[1a.i]	m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:
	[1a.ii]	a plurality of antenna elements; and
	[1a.iii]	a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
[1b]	[1b.i]	n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:
	[1b.ii]	a MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and
	[1b.iii]	a MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th

Identifier		Claim Language
		MIMO transmitter corresponds to a z-th beam of a v-th antenna array,
[1c]	[1c.i]	wherein m, n, v, and z are integer number values,
	[1c.ii]	wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$,
	[1c.iii]	wherein $n \geq 2$ and $m \geq 2$,
	[1c.iv]	wherein $z=1, \dots, w$, and
	[1c.v]	wherein $n \geq w \geq 2$.

C. Prosecution History

The application leading to the '511 patent, Application No. 13/447,139, was filed on April 13, 2012. '511 Pros. Hist. (Ex. 1002) at 1. On, June 29, 2012, the PTO issued a first office action, rejecting claim 1 and certain other claims as obvious over U.S. Patent Pub. 2009/0322608 (Adams) and U.S. Patent Pub. 2002/1032600 (Rudrapatna). *Id.* at 64-73. On September 21, 2012, the Applicant amended claim 1 and other claims “to more clearly define the features of those claims and improve form.” *Id.* at 87. Regarding obviousness, the Applicant distinguished Adams and noted that Rudrapatna fails to cure the deficiencies of Adams. *Id.* at 89-92.

On January 25, 2013, the Examiner issued a final obviousness rejection and an Examiner-Initiated Interview Summary. *Id.* at 96-99. The interview summary notes: “claim 1 was discussed with regard to the amendment made” and suggestions

“were provided as to how the claim be improve[d] in order to further prosecution and potentially put the case in condition for allowance.” *Id.* at 98.

On March 23, 2013, the Applicant amended the claims again. *Id.* at 115. The Applicant also made arguments distinguishing Adams to overcome the obviousness rejection. *Id.* at 121-126. In notable part, the Applicant argued that:

- “Thus, nowhere does Adams describe an implementation where the number of beams per antenna array is equal to the number of MIMO transceivers.”
- “Thus, nowhere does Adams describe an implementation where the number of inputs/outputs per MIMO transceiver is equal to the number of antenna arrays.”

Id. at 124.

The Applicant did not substantively discuss Rudrapatna. This is because, as the Applicant stated: “Rudrapatna fails to cure the above-noted deficiencies of Adams. Nor does the Office allege that Rudrapatna does.” *Id.* at 125. Thus, as the Applicant argued, Adams and Rudrapatna, whether taken alone or in combination fail to disclose or suggest the features of claim 1 and the obviousness rejection for all pending claims should be withdrawn. *Id.* at 125-126.

On January 16, 2014, the Examiner issued a Notice of Notice of Allowance accompanied by the Detailed Action. *Id.* at 193-206. The Examiner found that

Adams alone, as well as the combination of Adams and Rudrapatna “fails to teach ‘a beam configured to produce n different bi-directional beams using the plurality of antenna elements: and n multiple input-multiple-output transceivers” and it would have been obvious to one having ordinary skill in the art.” *Id.* at 206. Therefore, “the office found the claimed invention to be allowable over the cited prior art.” *Id.*

On April 14, 2014, the Applicant submitted a comment on the Examiner’s reasons for allowance. *Id.* at 222. The Applicant Clarified that entry of the reasons for allowance “should not be construed as any agreement with or acquiescence in the reasoning stated by the Examiner” (as the only reasons for allowance). The Applicant noted that “Each of the claims stands on its own permits and is patentable because of the combination it recites and not because of the presence or absence of any particular element.” *Id.*

D. Priority Date

The '511 patent was filed on April 13, 2012, and the challenged claims are entitled to a priority date no later than April 13, 2012. '511 patent at (22). Petition does not challenge the April 13, 2012, priority date of the challenged claims. Pet. 14. Thus, the parties are adopting that date for purposes of this IPR.

III. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner proposes that for the '511 patent:

A POSA would have had at least a Bachelor’s degree in

Electrical Engineering or a related field and at least two years of professional experience in developing MIMO-based wireless communications products. Alternatively, a POSA could have had a more advanced degree, such as a Master's degree in Electrical Engineering or an equivalent field, combined with at least one year of work experience in developing MIMO-based wireless communications products.

Pet. at 14 (citations omitted).

For purposes of this preliminary response, Patent Owner does not challenge Petitioner's proposed definition. Patent Owner reserves the right to challenge the definition or propose an alternative definition if this IPR is instituted.

IV. CLAIM CONSTRUCTION

The Petition contends that no formal claim constructions are necessary and that each term carries its plain and ordinary meaning. Pet. at 13-14. For purposes of this preliminary response, Patent Owner agrees that no formal claim construction is necessary. But Patent Owner informs the Board about claim construction proceedings in the parallel district court action.

The related district court actions are (collectively, "Related Actions"):

- *XR Communications LLC v. Verizon Communications, Inc. et al.*, Case 2:23-cv-00203-JRG-RSP (E.D. Tex.);

- *XR Communications LLC v. T-Mobile USA, Inc.*, Case 2:23-cv-00204-JRG-RSP (E.D. Tex.);
- *XR Communications LLC v. AT&T Services Inc., AT&T Mobility LLC, and AT&T Corp.*, Case 2:23-cv-00202-JRG-RSP (E.D. Tex.);
- *XR Communications LLC v. Verizon Communications, Inc. et al.*, Case 2:23-cv-00470-JRG-RSP (E.D. Tex.);
- *XR Communications LLC v. T-Mobile USA, Inc.*, Case 2:23-cv-00469-JRG-RSP (E.D. Tex.); and
- *XR Communications LLC v. AT&T Services Inc., AT&T Mobility LLC, and AT&T Corp.*, Case 2:23-cv-00468-JRG-RSP.

In the Related Actions, the parties have proposed the following constructions for the '511 patent, as shown the parties' Joint Claim Construction Chart filed on August 28, 2024:

'511 Patent Claim Term	Patent Owner / Plaintiff XR's Proposed Construction	Petitioners / Intervenors Ericsson & Nokia's Proposed Construction
"n multiple-input multiple- output Transceivers (MIMO)" ('511 Patent claims 1, 10)	No construction necessary; plain and ordinary meaning	"a single unit comprising a MIMO transmitter and a MIMO receiver, with common circuit components"

'511 Patent Claim Term	Patent Owner / Plaintiff XR's Proposed Construction	Petitioners / Intervenors Ericsson & Nokia's Proposed Construction
“MIMO transmitter configured to process . . . “Z-th MIMO transmitter” “in multiple-input multiple-output transmitters (MIMO)” / “a Z-th MIMO transmitter” ('511 Patent claims 1, 10, 20)	No construction necessary; plain and ordinary meaning	“transmitter that processes MIMO signals for transmission”
“MIMO receiver configured to process . . .” / “j-th MIMO receiver” / “n multiple-input multiple-output receivers (MIMO)” ('511 Patent claims 1, 10, 19)	No construction necessary; plain and ordinary meaning	“receiver that processes received MIMO signals”
“2nd Generation Partnership Project (3GPP) Long Term Evolution (LTE), 3GPP LTE-Advanced, 3GPP LTE-TDD, 3GPP LTE-FDD” ('511 Patent claims 2, 11)	No construction necessary; plain and ordinary meaning	“one of the 3GPP LTE, LTE-Advanced, LTE-TDD or LTE-FDD standards that existed at the time of the invention”

XR Communications LLC v. AT&T Services Inc., AT&T Mobility LLC, and AT&T Corp., Case 2:23-cv-00202-JRG-RSP, Dkt. 89 (JCCC) at 13-16 (E.D. Tex. Aug. 28, 2024) (attached as Ex. 2001).

Notably, Petitioners / Intervenors proposed four constructions for terms of the '511 patent in the Related Actions that they have not proposed in this IPR. The

district court conducted a claim construction hearing on September 11, 2024. As of the date of this preliminary response (September 18, 2024), the district court has not issued its claim construction order.

V. OVERVIEW OF PRIOR ART

A. Trigui (Ex. 1004)

Trigui is a US patent application publication entitled “Digital integrated antenna array for enhancing coverage and capacity of a wireless network.” Trigui (Ex. 1004) at (54). According to the Abstract:

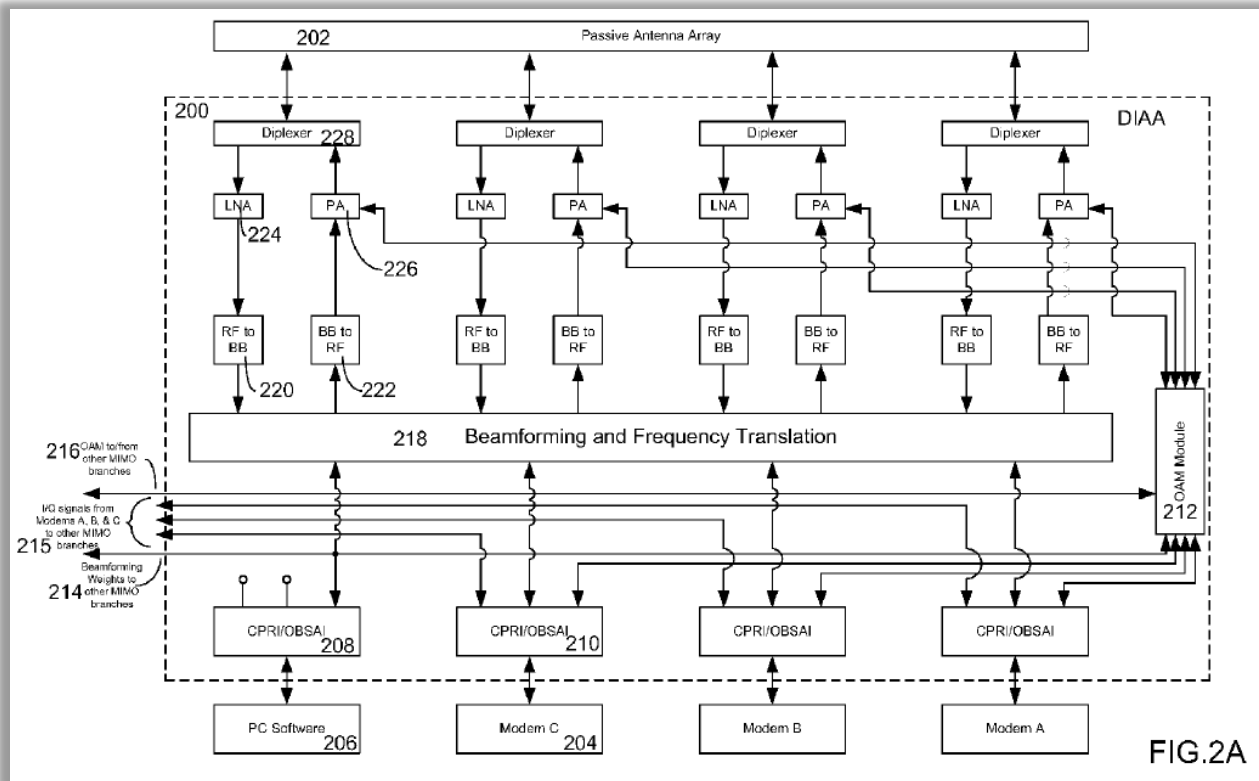
An embodiment of the invention relates to a digital integrated antenna array system having one or more antenna modules, one or more transceiver modules each having one or more signal processing paths for transmitting data to or receiving data from the one or more antenna modules, a signal processing unit able to process data for each the one or more signal processing paths of the one or more transceiver modules Such that the data transmitted from the one or more transceiver modules to the one or more antenna modules is radiated by the one or more antenna modules into one or more radiation patterns.

Id. at (57).

Figure 2A of Trigui illustrates “an exemplary digital integrated antenna array system for carrying out an embodiment of the present invention.” *Id.* at [0036]. In

particular it illustrates “a general high-level implementation of the digital integrated antenna array (‘DIAA’) and represents a single MIMO branch of a DIAA system.”

Id. Figure 2A is reproduced below:



B. Rudrapatna (Ex. 1005)²

Rudrapatna is a US patent entitled “Structure for Multiple Antenna Configurations.” Rudrapatna (Ex. 1005). According to the Abstract:

² The Petition relies on secondary reference Rudrapatna only to meet certain limitations of dependent claims for Ground 1B. *See* Pet. at 17-18. Accordingly, Rudrapatna is not material to the issues in this Preliminary Response.

An antenna array comprising at least two groups of antennas where each group comprises at least two pairs of antennas. Each of the pairs in a group contains orthogonally polarized antennas and at least one antenna in a pair is similarly polarized to one antenna in at least another pair in the group. The antenna array further comprises circuitry coupled to the antenna groups to select and activate certain antennas in a group to enable the antenna array to operate in either a beam forming/steering mode, a diversity mode or a MIMO mode or any combination thereof. The antennas in the groups are activated based on the characteristics of the signals being transmitted or received by the antenna array.

Id. at (57).

VI. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD OF UNPATENTABILITY FOR ANY CHALLENGED CLAIM

The Petition fails to show that Trigui renders obvious claim 1 of the '511 patent. The Petition fails to present a theory that satisfies the requirement in claim limitation [1a] that each antenna array includes a “beamformer configured to produce n different bi-directional beams using the plurality of antenna elements.” The claim language requires each beamformer to produce multiple bi-directional beams. But the Petition’s theory is that each antenna array comprises beamformers that are each configured to produce, at most, one bi-directional beam.

Claim 1 requires, in Petitioner's own words, "a very exacting architecture" for the claimed plurality of antenna arrays. Pet. at 6. Because the Petition fails to show that Trigui teaches or suggests the specific arrangement of the claims, it fails to show that claim 1 of the '511 patent is unpatentable. Petitioner's showing for all grounds and all challenged claims depend on the same theory. Accordingly, the Petition fails to show a reasonable likelihood of unpatentability for any challenged claim, and institution should be denied.

A. Claim Limitation [1a] Requirements

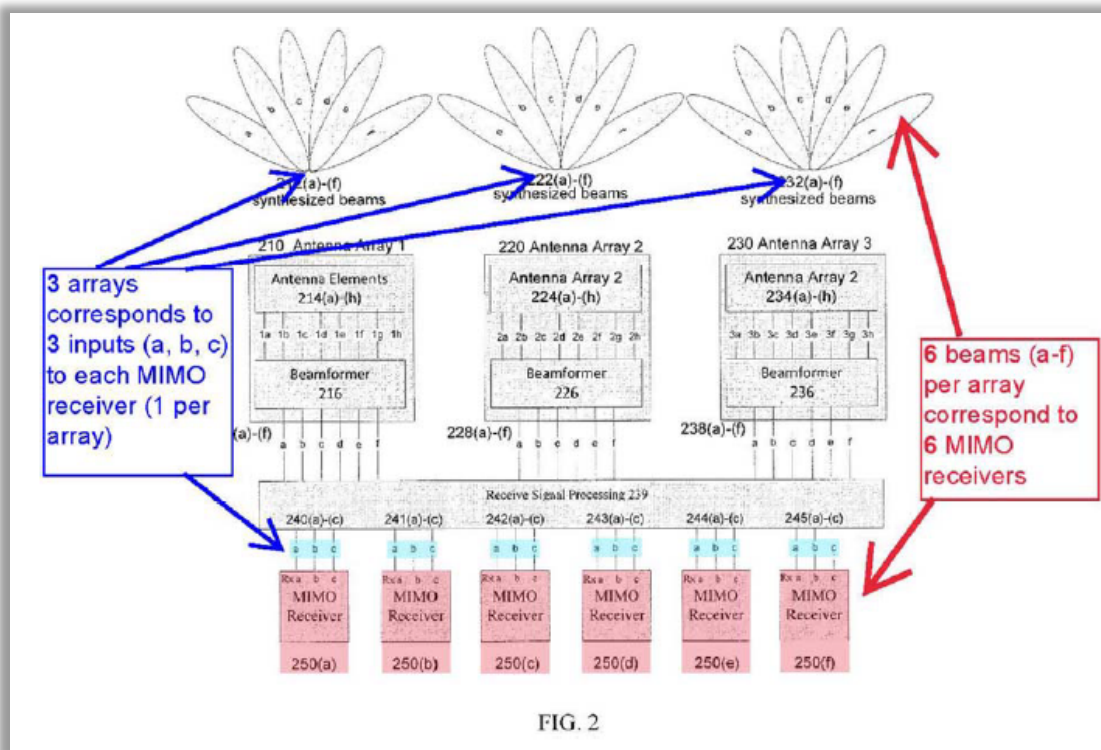
Claim limitation [1a] of the '511 patent recites:

Identifier		Claim Language
[1a]	[1a.i]	m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, <i>each</i> of the antenna arrays comprising:
	[1a.ii]	<i>a plurality of antenna elements; and</i>
	[1a.iii]	<i>a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements</i>

As the Petition concedes, the '511 Patent requires "a very exacting architecture" in which each of a plurality of antenna arrays includes a beamformer that "produce[s] a specific number of . . . beams" and "the number of beams ('n') is equal to the number of MIMO transceivers." Pet. at 6-7. For example, claim 1 recites a system comprising *m* antenna arrays, where "each of the antenna arrays" comprises

a “beamformer configured to produce n different bi-directional beams using the plurality of antenna elements” of the array. The claims further clarify that the n different bi-directional beams produced by each beamformer must be greater than or equal to 2. *See* claim [1c.iii] (“wherein $n \geq 2$ and $m \geq 2$ ”).

The claimed arrangement is reflected in the figures of the '511 patent, as Petitioner acknowledges. *See* '511 patent, Figs. 1-2. For example, in Figure 2, each antenna array includes a beamformer configured to produce a specific number of beams greater than 2. Specifically, each array's beamformer produces six beams (e.g., 212 (a)-(f)), corresponding to six MIMO receivers 250(a)-(f) ($n=6$). This is shown by the following version of Figure 2 annotated by Petitioner:



Pet. at 7 (Petitioner's annotated version of Fig. 2 of '511 patent).

Importantly, the number of beams produced by the array and beamformer is determined by the design of the array and beamformer. As the '511 patent states: "*The number of beams produced by antenna arrays 130, 140 is a parameter determined by design of the array.* Although FIG. 1 shows four beams per array, a greater or smaller number of beams is also possible." '511 patent at 3:64-67. For example, although an embodiment of Figure 1 configured to generate multiple beams per beamformer (e.g., 2, 4, 6, 16, 32, 64) is possible, the number of beams is a design parameter of the array and its beamformer.

Thus, each antenna array and corresponding beamformer must be "configured to" or *designed to* satisfy the claims. The mere fact that an array or beamformer has the *capability* to produce certain beams is insufficient, where the array and beamformer are not so configured.

B. The Petition's Reliance on Trigui's Figs. 2A, 6, and 10

Petitioner asserts that Trigui "discloses" claim limitation [1a] and does not provide any obviousness theory or modification for this limitation. *See* Pet. at 23 (asserting that "Trigui discloses this limitation"). Petitioner's theory is based on a discussion of Trigui's Figs. 2A, 6, and 10, and can be summarized as follows.

1. Trigui Fig. 2A

According to Petitioner, “Figure 2A shows a DIAA which ‘represents a single MIMO branch of a DIAA system’ and includes a ‘passive antenna array 202.’ Pet. at 23. Fig. 2A discloses a single antenna array (passive antenna array 202) and a single beamformer (beamforming and frequency translation 218). Petitioner relies on Fig. 2A to satisfy claim limitation [1a.ii]: “each of the antenna arrays comprising: a plurality of antenna elements.” *See* Pet. at 23-24.

Petitioner doesn’t assert that Fig. 2A discloses other requirements of limitation [1a], including the beamforming limitations. Nor does Petitioner clearly identify how many bi-directional beams the beamformer in Fig. 2A is “configured to produce” (limitation [1a.iii]). But since Fig. 2A represents a single MIMO branch, and based on Petitioner’s treatment of subsequent figures, the beamformer in Fig. 2A is configured to produce a single bi-directional beam. This is why Petitioner does not (and cannot) allege that Fig. 2A discloses the requirement of “a beamformer configured to produce *n different bi-directional beams* using the plurality of antenna elements” as recited in limitation [1a.iii].

2. Trigui Fig. 6

According to Petitioner, “Trigui’s Figure 6 effectively uses two copies of Fig. 2” and illustrates two MIMO branches. Pet. at 27. Thus, according to Petitioner, “Figure 6 teaches two bi-directional beams.” *Id.* Figure 6 discloses two antenna

subarrays (passive antenna sub-array 202) and two beamformers (beamforming and frequency translation 218).

Petitioner relies on Figure 6 as allegedly disclosing one of the “each” of the antenna arrays claimed by limitation [1a] (“each of the antenna arrays comprising: a plurality of antenna elements; and a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements.”). Specifically, Petitioner contends that Fig. 6 teaches one array with two bi-directional beams and therefore presents a theory based on $n=2$.

3. Trigui Fig. 10

According to Petitioner: “Figure 6 shows a single antenna array with two beams. Trigui teaches that Figure 6 is replicated twice to produce, for example, Figure 10. Thus, Figure 10 shows two antenna arrays that each produce two beams[.]” Pet. at 28. Thus, according to Petitioner, Figure 10 teaches four bi-directional beams. This is because, according to Petitioner, Figure 10 is two copies of Figure 6 (which teaches two bi-directional beams), and Figure 6 is two copies of Figure 2A (which teaches one bi-directional beam). Figure 10 discloses four antenna subarrays (passive antenna sub-array 202) and four beamformers (beamforming and frequency translation 218).

Petitioner relies on Figure 10 as allegedly disclosing the “m antenna arrays” claimed by limitation [1a] (“m antenna arrays . . . each of the antenna arrays

comprising . . .”). Specifically, Petitioner contends that Fig. 10 discloses two antenna arrays ($m=2$), and that each antenna array produces two beams ($n=2$).

C. Under Petition’s Theory, Each Beamformer in Trigui’s Figures Produces a Single Bi-directional Beam

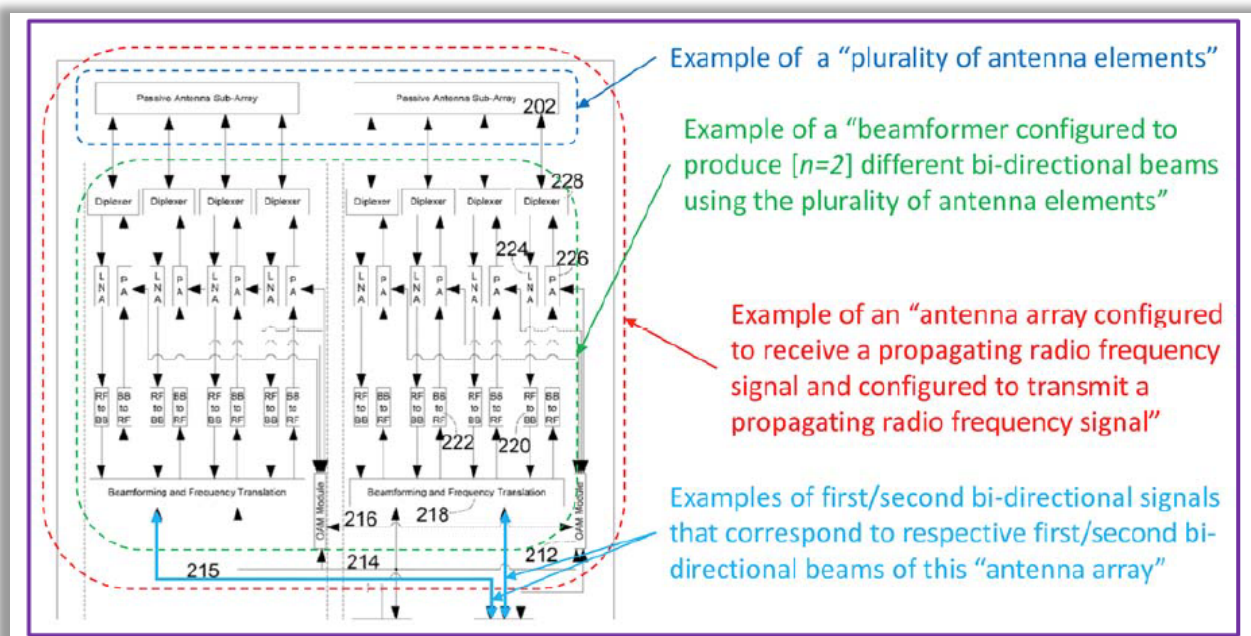
The Petition’s theory based on Trigui’s Figs. 2A, 6, and 10 fails to satisfy claimed arrangement of claim [1a], which requires that each antenna array includes a “beamformer configured to produce n different bi-directional *beams* using the plurality of antenna elements” of the array (claim limitation [1a.iii]).

The Petition argues that “beamformer” maps to “beamforming module 218” taught in Trigui. This is apparent from the Petition’s discussion of Trigui’s Figures 2A and 6. *See* Pet. at 26 (“Accordingly, a POSA would understand that Trigui discloses a “beamformer” for forming bi-direction[al] beams that includes beamforming module 218 in Figure 2A.”); *id.* at 27 (“A POSA would thus understand that Trigui’s ‘beamforming’ module (beamforming module 218 alone or in combination with other circuitry) teaches a ‘*beamformer configured to produce*’ multiple ‘*different bi-directional beams using the plurality of antenna elements.*”).

Then, when it comes to Figure 6, the Petition presents a mapping for “antenna array” that includes two beamformers 218, each configured to produce only a single bi-directional beam. Pet. 27 (“FIG. 6 illustrates two MIMO branches. Each MIMO

transceiver branch has *one beam for transmit and receive*. Ex-1004, [0077]. Thus, Figure 6 has two beams for transmit and receive.”).

The Petition points to Figure 6 as allegedly meeting a single antenna array. Pet. at 27-28. It provides the following annotated version of Figure 6, contending that “each of the ‘sub-arrays’ creates a bi-directional beam such that the array in Figure 6 generates 2 different bi-directional beams ($n=2$)”:



Pet. at 27 (Petitioner annotating Trigui Figure 6).

The Petition argues that each beamformer 218 in the system is configured to produce precisely “one beam,” such that each “antenna array” (the entirety of Figure 6) is configured to produce “two beams for transmit and receive,” i.e., two bi-directional beams. Pet. at 27 (citing Trigui at ¶ [0077]) Indeed, under Petition’s

theory, each of the two “beamformers” mapped by the Petition (the two blocks labeled “beamforming and frequency translation 218” that the Petition labels the “beamforming module 218”) is each configured to produce a single bi-directional beam. Pet. at 27-28. That is how and why Petitioner asserts that “Figure 6 teaches two bi-directional beams.” *Id.* at 27.

This one-beam-per-beamformer relationship also applies to the Petition’s theories based on Trigui Figure 10, which is Figure 6 “replicated twice” to depict two antenna arrays and four beamformers (two beamformers per array, and one beam per beamformer). Pet. at 30-32 (“Trigui’s Figure 10 discloses a system that includes two antenna arrays that each generate two beams (*i.e.*, $n=2$ for both antenna arrays).”).

Petitioner’s annotated version of Figure 10 (on page 29 of the Petition) clearly discloses *four* beamformers 218 and only ***one*** beam per beamformer. Pet. at 29. The Petition argues that this shows “a beamformer configured to produce n different bi-directional beams (where $n=2$ beams) using the plurality of antenna elements (*each sub-array in each array produces a different beam*).” Pet. at 29-30. Under the Petition’s theory that “each sub-array in each array produces a different beam,” each beamformer 218 in Figure 10 is configured to produce only one bi-directional beam.

D. The Petition's One-Beam-Per-Beamformer Theory Fails to Meet Limitation [1a]—Which Requires Each Antenna Array to Include “a Beamformer Configured to Produce N Different Bi-directional Beams Using the Plurality of Antenna Elements”

Trigui's Figures 2A, 6, and 10, as well as Petitioner's theories based on them, can be summarized as follows:

- Fig 2A: Discloses one beamformer. According to Petitioner, Fig. produces one bi-directional beam (one per beamformer).
- Fig 6: Discloses two beamformers. According to Petitioner, produces two bi-directional beams (one per beamformer).
- Fig 10: Discloses four beamformers. According to Petitioner, produces four bi-directional beams (one per beamformer).

Notably, Petitioner's treatment of Fig. 2A as producing one bi-directional beam is necessary to sustain its mapping of $n=2$ for Figs. 6 and 10. This is because Petitioner and Trigui treat Fig. 6 as two copies of Fig. 2A.³

³ Petitioner might have argued (but did not attempt to do so) that the beamformer in Fig. 2A is configured to produce multiple bi-directional beams, e.g., 3 bi-directional beams. But in that case, when it comes to Fig. 6, each sub-array would be configured to produce 3 bi-directional beams, and each “array” would implicate 6 different bi-directional beams (wherein $n=6$). The Petition presented no such theory, nor attempted to explain how it would meet the subsequent transceiver limitations that would be materially different in the scenario of $n=6$. For example, the Petition would

Under the Petition's theory, Trigui Figure 6 as mapped by the Petition clearly contains two beamformers (the blocks labeled beamforming and frequency translation 218 in the Petition's annotated Figures of Trigui), with each beamformer 218 configured to produce only "**one beam.**" Pet. at 27 ("A POSA would thus understand that Trigui's 'beamforming' module (beamforming module 218 alone or in combination with other circuitry) teaches a '*beamformer*'"). Likewise, under the Petition's theory of Figure 10, it discloses four beamformers 218, one per sub-array, and each beamformer 218 is configured to produce only one beam. Pet. 29 (annotated Figure 10 showing four beamformers 218 and four sub-arrays each configured to produce a single bi-directional beam).

This mapping violates the claim requirement that each beamformer be configured to produce *n* different bi-directional **beams**. Claim limitation [1a] recites that **each** of the *m* antenna arrays includes "a plurality of antenna elements; and *a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements.*" Trigui Figure 6 (which Petitioner maps to one antenna array) expressly discloses two distinct beamformers 218, each separately

need new and different obviousness / motivation to combine theories for limitations [1b]-[1c] that are not provided. Instead, the Petition relies exclusively on the theory based on Trigui [0077] that each sub-array and each beamforming module 218 produces only a single bi-directional beam.

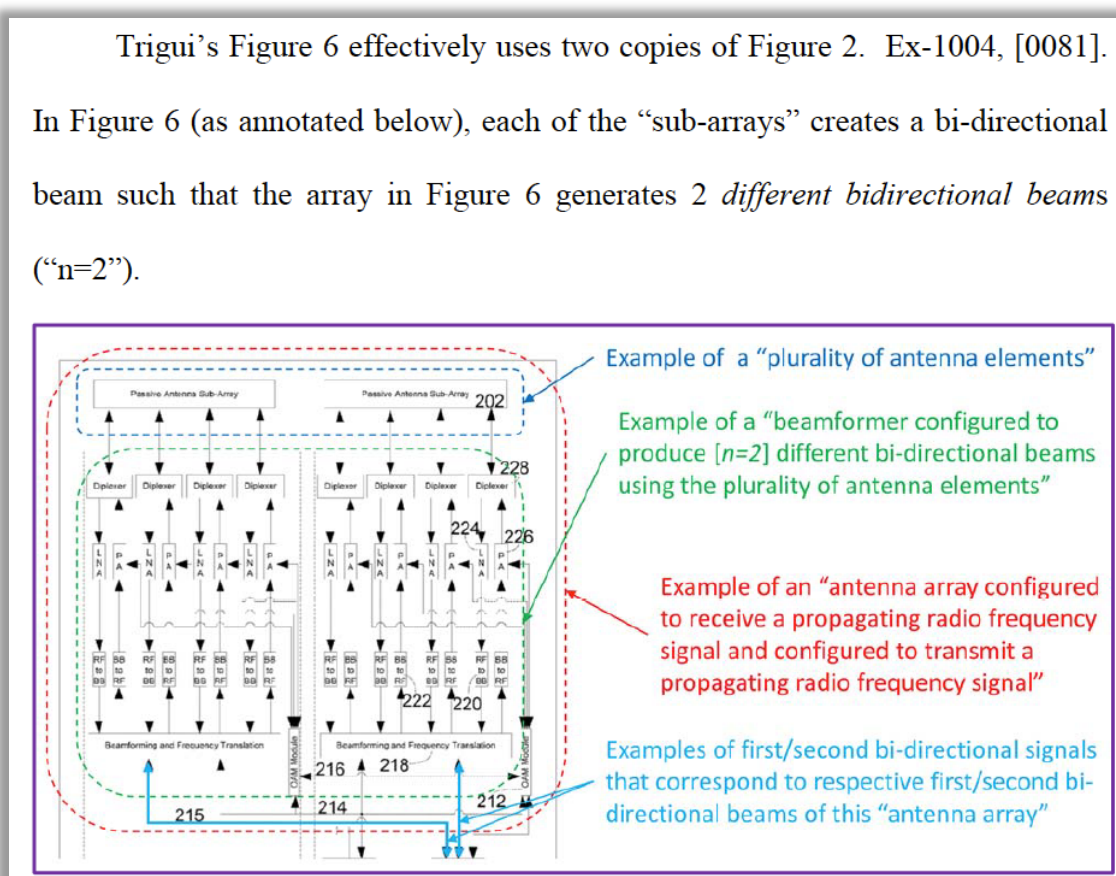
configured to produce only one bi-directional beam. The Petition's theory of Figure 6 does **not** disclose or suggest "a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements" of the array.

The Petition fails to adequately explain this defect, which alone warrants denial of institution. At most, the Petition's annotations appear to artificially box-draw the two beamformers in Figure 6, together with the two MIMO transceiver chains. And the annotations may attempt to imply that the two beamformers and related circuitry somehow constitute just one beamformer configured to produce two different bi-directional beams. *See* Pet. at 27. But any such argument (to the extent preserved) is conclusory and unsupported. It is also inconsistent with the Petition's argument that a POSA would understand each "beamforming module 218" to map to the claimed "beamformer." Petitioner relied on this characterization, for example, in discussing Figure 2A and limitation [1a]. Pet. at 26-27.

At bottom, there is no evidence or explanation in the Petition or otherwise that Figure 6 of Trigui depicts only one beamformer. Both the Petition and Trigui are clear throughout that each "beamforming and frequency module 218" is itself one beamformer, such that the Petition's annotated Figure 6 discloses two beamformers (two blocks labeled beamformer 218) and the annotated Figure 10 discloses four beamformers (four blocks labeled beamformer 218). Indeed, the Petition argues that "beamformer" maps to "beamforming module 218" taught in Trigui. Pet. at 26

(“Accordingly, a POSA would understand that Trigui discloses a “beamformer” for forming bi-direction beams that includes beamforming module 218 in Figure 2A.”); *id.* at 27 (“A POSA would thus understand that Trigui’s ‘beamforming’ module (beamforming module 218 alone or in combination with other circuitry) teaches a ‘beamformer configured to produce’ multiple ‘different bi-directional beams using the plurality of antenna elements.’”).

The Petition’s mapping of Trigui Figure 6 suffers from additional and related flaws. For example, the Petition’s annotations (reproduced again below) maps two separate antenna sub-arrays 202 as the alleged “plurality of antenna elements”:



Pet. at 27 (Petitioner's argument and annotations).

But the Petition fails to explain how each beamformer 218 uses “the plurality of antenna elements” of the “array” as mapped in the Petition. Limitation [1a] first recites a “plurality of antenna elements,” which under Petitioner's theory would be all the antenna elements of both sub-arrays in Figure 6. The limitation then recites “beamformer configured to produce n different bi-directional beams *using the plurality of antenna elements.*” The term “*the plurality of antenna elements*” takes antecedent basis from the earlier “a plurality of antenna elements,” so must be referring to the same thing. It cannot be a different plurality of elements.

The Petition argues that Figure 6 discloses “a beamformer configured to produce n different bi-directional beams (where n=2 beams) using the plurality of antenna elements (*each sub-array in each array produces a different beam*).” Pet. at 29-30. But, because “[e]ach sub-array in each array produces a different beam,” the first beamformer 218 has no connection to the second sub-array 202 and the second beamformer 218 has no connection to the first sub-array 202. The Petition fails to explain or allege how this satisfies a “beamformer” produces a plurality of beams *using* the plurality of antenna elements in what the Petition has mapped as the “array.” Half of the antenna elements are never used at all (and cannot be). So there is no sense that any same plurality antenna elements is used to produce multiple bi-

directional beam. At most, one plurality is used to produce one beam, and a separate plurality is used to produce another beam.

To be clear, the Petition does not and cannot assert that a POSITA would have found it obvious to modify Trigui's Figure 6 or Figure 10 so that each of the two sub-arrays only uses a single beamformer to produce two bi-directional beams. This theory is absent from the Petition and the Board cannot consider it. Nor would such a theory succeed, as there is no evidence presented to support it, and it would conflict with the other aspects of the Petition's obviousness theory. For example, if each beamformer 218 were modified to produce two bi-directional beams (rather than only one, as under the Petition's theory), then each sub-array would be configured to produce two bi-directional beams, and each "array" as the Petition has mapped it would be configured to produce four different bi-directional beams ($n=4$). But this would obviously be fatal to the Petition's theories, as they require that $n=2$ wherein the number of n bi-directional beams is two and the number of n MIMO transceivers is also two.

The Petition has presented no theory where $n=4$ or where the number of bi-directional beams is four whereas the number of MIMO transceivers is only two. The Petition thus could not succeed even assuming the Petition had argued that each beamformer 218 could be modified to produce more than one bi-directional beam. Because the Petition is limited to the theory that each beamformer 218 produces a

single bi-directional beam, the Petition fails to present a theory that satisfies the requirement in the challenged claims for each antenna array to comprise a “beamformer configured to produce n different bi-directional *beams* using the plurality of antenna elements” of the array. '511 Patent, cl. 1.

For the foregoing reasons, the Petition’s contention that Trigui “discloses” limitation [1a] of the '511 patent is fatally flawed. Trigui’s figures do not. Nor does the Petition provide any obviousness theory or modification or expert testimony that would remedy the deficiency as to what Trigui discloses.

E. The Petition’s Deficiencies for Claim 1 Apply to All Grounds and All Challenged Claims

As discussed above, Petitioner fails to show that Trigui renders obvious claim 1 of the '511 patent. The same deficiencies apply to all grounds and all challenged claims. For Ground 1, the challenged claims are claims 1-2, 4-6, 9-11, 13-15, and 18-20. *See* Pet. at 17-18. Claims 1, 10, and 19 are independent claims, and Petitioner relies on the same theories for claims 10 and 19 as it does for claim 1. *See* Pet. at 56-58. The remaining challenged claims for Ground 1 (claims 2, 4-6, 9, 11, 13-15, 18, and 20) are dependent claims and likewise rest on at least the same theories.

Ground 2 challenges a subset of the same dependent claims (claims 4-6, 9, 13-15, and 18) based on Trigui in view of Rudrapatna. *See* Pet. at 18. For both grounds, the Petition’s theories for the dependent claims rest only on its theories for the

independent claims to allege that the elements of the independent claims are met. Accordingly, the Petition fails to show that any dependent claim is unpatentable for the same reasons that it fails to show that the independent claims are unpatentable.

VII. INSTITUTION SHOULD BE DENIED UNDER 35 U.S.C. § 314(a)

35 U.S.C. § 314(a) gives the Board discretion to deny institution because of efficiency considerations stemming from parallel proceedings on the same patent. *See NHK Spring Co. v. Intrix-Plex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential, designated May 7, 2019) (“*NHK Spring*”). The PTAB applies the six “*Fintiv* factors” for determining whether discretionary denial due to efficiency considerations relating to parallel proceedings is appropriate. *Apple Inc., v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential, designated May 5, 2020) (“*Fintiv Order*”) at 6; *Apple Inc., v. Fintiv, Inc.*, IPR2020-00019, Paper 15 (PTAB May 13, 2020) (order denying institution) (informative, designated July 13, 2020) (“*Fintiv ID*”) at 7–8.

Here, the *Fintiv* factors weigh strongly against institution.

A. EDC Parallel Proceedings

The Petition identifies the following three related litigations involving the '511 patent (Pet. at 72) that are pending in the Eastern District of Texas:

- XR Communications LLC v. *AT&T Services Inc.*; *AT&T Mobility LLC*; and *AT&T Corp.*; E.D. Tex., No. 2:23-cv-00202-JRG-RSP (“*AT&T case*”).

- *XR Communications LLC v. Verizon Communications, Inc. et al.*, E.D. Tex., Case No. 2:23-cv-00203-JRG-RSP (“*Verizon* case”);
- *XR Communications LLC v. T-Mobile USA, Inc.*, E.D. Tex., Case No. 2:23-cv-00204-JRG-RSP (“*T-Mobile* case”);

All three cases were filed on May 8, 2023. *See AT&T* case, Dkt. 1 (Complaint); *Verizon* case, Dkt. 1 (Complaint); *T-Mobile* case, Dkt. 1 (Complaint). AT&T was served with the complaint on May 12, 2023. *AT&T* case, Dkt. Nos. 5-6 (Proofs of Service). *Verizon* was served with the complaint on May 10, 2023. *Verizon* case, Dkt Nos. 5-6 (Proofs of Service). *T-Mobile* was served with the complaint on May 9, 2023. *T-Mobile* case, Dkt. 5 (Application for Extension of Time, Noting Date of Service of Summons).

On June 13, 2023, all three cases were consolidated for pre-trial purposes, with the *AT&T* case as the “lead” case and the *Verizon* and *T-Mobile* cases as the “member” cases. *See AT&T* case, Dkt. 19 (Consolidation Order).

On September 11, 2024, the Eastern District of Texas held the claim construction hearing for the patents asserted in the three cases, including the '511 patent. The claim construction order is expected shortly.

On September 16, 2024, all three cases were consolidated for pre-trial with a set of three additional cases involving the same parties filed in the same Court within

five months of the initial set of cases. *See AT&T* case, Dkt. 94 (Order of Consolidation). These additional related litigations are:

- *XR Communications LLC v. Verizon Communications, Inc. et al.*, Case 2:23-cv-00470-JRG-RSP (E.D. Tex.);
- *XR Communications LLC v. T-Mobile USA, Inc.*, Case 2:23-cv-00469-JRG-RSP (E.D. Tex.); and
- *XR Communications LLC v. AT&T Services Inc., AT&T Mobility LLC, and AT&T Corp.*, Case 2:23-cv-00468-JRG-RSP.

On September 16, 2024, the Eastern District of Texas entered a consolidated Docket Control Order (DCO) for all the consolidated cases (attached as Ex. 2002). *AT&T* case, Dkt. 95. The DCO provides the following dates applicable to all consolidated cases:

- December 24, 2024: Deadline to substantially complete document production;
- February 14, 2025: Deadline to Complete Fact Discovery and File Motions to Compel Discovery
- February 28, 2025: Opening expert reports;
- March 27, 2025: Rebuttal expert reports;
- April 7, 2025: Deadline to complete expert discovery;

- April 14, 2025 to June 9, 2025: Dispositive motions, *Daubert* motions, pretrial disclosures, and submission of joint pretrial order, joint proposed jury instructions, etc.;
- June 16, 2025: Pretrial conference; and
- July 21, 2025: Jury selection and trial

Meanwhile, this Petition was filed on May 8, 2024. This was nearly a year after Petitioners⁴ were served with a complaint in each of the *AT&T*, *Verizon*, and *T-Mobile* cases. Patent Owner's preliminary response is due on September 18, 2024. The Board's institution decision in this IPR is expected by December 18, 2024. The Board's final written decision is expected a year later, by December 18, 2025.

B. The *Fintiv* Factors weigh strongly against institution.

The facts and circumstances here present a strong case for discretionary denial, including under the Director's June 2022 memorandum on interim procedure for discretionary denial. Here, the district court trial is set to occur *six months* before the FWD deadline. This is because Petitioners delayed in filing the Petition, waiting nearly a year after being served with a complaint on the '511 patent. Further, substantial work on the '511 patent has already been done by the parties and district

⁴ As used herein, "Petitioners" includes the defendants in the related cases: AT&T Services Inc., AT&T Mobility LLC, AT&T Corporation, T-Mobile USA, Inc., and Cellco Partnership d/b/a Verizon Wireless AT&T Services, Inc. Notably, the Petition identifies these defendants as real-parties-in-interest. *See* Pet. at 90.

court, and even more work will be done by the institution deadline. For example, the parties have already completed all claim construction proceedings on the '511 patent. The district court also conducted the claim construction hearing (on September 11, 2024) and expected to issue its order shortly. By the institution deadline, the parties will be in the midst of discovery (with fact discovery to close a couple months later). Further, Petitioners are relying on the same prior art and invalidity grounds at issue in the district court. To date, Petitioners have not provided a *Sotera* stipulation that would ameliorate the risk of wasting resources or inconsistent outcomes under *Fintiv* factor 4.

C. Factor 1 weighs against institution, as there is no stay in the district court now and a stay is unlikely to be granted.

Factor 1 concerns whether the district court granted a stay or evidence exists that one may be granted if a proceeding is instituted. *Fintiv Order* at 6; *Fintiv ID* at 12. This factor weighs against institution.

Petitioners moved for a stay in the district court cases on July 9, 2024. *See AT&T* case, Dkt. 78 (Motion to Stay). But after the Board denied institution of IPR2024-00314 concerning the '369 patent at issue in the district court cases, Petitioners withdrew their motion to stay. The district court granted the withdrawal. And since then, Petitioners' request for director review of the decision denying institution was denied on August 28, 2024.

There is no indication that Petitioners will file another motion to stay after withdrawing the previous one. Indeed, in the motion to withdraw, Petitioners suggested they would not renew their motion to stay unless Director Review was granted for the institution denial of the '369 patent (review was denied).

Nor has the district given any indication that it is inclined to grant a stay. The the district court just recently issued an amended DCO, confirming there are no plans to stay the litigation. In any event, the Eastern District of Texas rarely grants stays based on non-instituted IPRs. Here, at least the asserted '369 and '939 patents will not be subject to any IPRs. In these circumstances, it is highly unlikely that the Eastern District of Texas would grant a stay pending IPR (especially since those IPRs would not apply to at least two of the asserted patents).

Because there is no evidence the EDTex case will be stayed, Factor 1 weighs against institution.

D. Factor 2 weighs against institution, as trial in the district court is scheduled to be completed seven months before the FWD.

Factor 2 relates to proximity of the court's trial date to the Board's projected statutory deadline for a final written decision. *Fintiv Order* at 9; *Fintiv ID* at 12. The statutory deadline for the final written decision (FWD) in this IPR is around December 18, 2025. Meanwhile, trial in the district court case is set to begin on July

21, 2025. This is more than **six** months before the FWD would be due in this IPR proceeding (should it be instituted)

Under Factor 2, this weighs strongly against institution. *See Fintiv Order* at 9 (“If the court’s trial date is earlier than the projected statutory deadline, the Board generally has weighed this fact in favor of exercising authority to deny institution under *NHK*.”). As *NHK Spring* explained, one of the primary objectives of the AIA was “to provide an effective and efficient **alternative**” to parallel litigation. *NHK Spring* at 19–20 (quoting *General Plastic* at 16–17) (emphasis added).

The Petition’s argument regarding Factor 2 is unsupported and speculative. Even assuming (for the sake of argument) that trial was postponed by a couple of months, it would still occur many months before the FWD decision in this IPR. Under the objective facts and circumstances of this case, it is extremely unlikely that trial would be postponed by seven months or more, which is the only way the district court trial would occur later. Not to mention that the case is very unlikely to be stayed, as discussed above, which ensures duplicative work up until trial.

Here, this IPR cannot be an alternative to a trial in the district court set to occur before the FWD deadline. This alone is reason for the Board to exercise its discretion to deny institution. *Fintiv ID* at 13; *Intel Corp. v. VLSI Tech. LLC*, IPR2020-00158, Paper 16 at 9 (May 20, 2020).

E. Factor 3 weighs against institution, as claim construction is complete, and the institution decision is expected close to the end of fact discovery.

Factor 3 relates to investment in the parallel proceeding by the court and the parties. *Fintiv Order* at 9; *Fintiv ID* at 14. Here, the parties and the district court have already (and will continue to) invest substantial effort and resources.

Importantly, this factor is judged from the date of the institution decision, which is expected by December 18, 2024. *See Fintiv Order* at 9 (considering “the amount and type of work already completed in the parallel litigation by the court and the parties *at the time of the institution decision*”) (emphasis added).

Here the parties’ have already invested substantial work by the time of this POPR, including serving infringement and invalidity contentions on the ’511 patent and *concluding the claim construction hearing on the ’511 patent* (which took place on September 11, 2024). The district court’s claim construction order is expected shortly. And the parties’ and district court’s investment are expected to escalate in the next few months before the institution decision, with the deadline to substantially complete document production scheduled to occur and fact discovery scheduled to close a couple months later (in February 2025).

This level of investment is greater than in many cases in which Factor 3 was found to favor discretionary denial. In *Fintiv v. Apple*, for example, the Board noted for Factor 3 that “this factor weighs somewhat in favor of discretionary denial in this

case.” *Fintiv ID* at 14. Here, Factor 3 weighs more heavily against institution because more work is likely to be expended by the time of the institution decision given the schedule of the district court case.

F. Petitioners’ *Sand Revolution* stipulation for Factor 4 is insufficient.

Factor 4 relates to overlap between issues raised in the petition and in the parallel proceeding. *Fintiv Order* at 12; *Fintiv ID* at 13. Here, the same claims and claim construction standard are at issue in both proceedings, and there is substantial overlap in invalidity theories and prior art. Petitioners concede that there is currently complete overlap between invalidity grounds for the challenged claims of the ’511 patent and Petitioners’ invalidity theories for those claims in district court. For example, there is complete overlap between Ground 1 asserting obviousness of challenged claims in view of Trigui and Petitioners’ invalidity theories for those claims based on the same Trigui reference. Despite this, Petitioners only make a limited *Sand Revolution* stipulation that they “will not pursue, in the district court, the same invalidity grounds for the claims challenged here.” Pet. at 71.

This is insufficient because Petitioners have declined to make a *Sotera* stipulation against using the same prior art or invalidity grounds that it could have raised. And substantial risk of overlapping issues and inconsistent outcomes remain. Accordingly, Factor 4 is neutral or weighs slightly against discretionary denial.

G. Factor 5 weighs against institution, as Petitioners are Defendants in the parallel district court cases.

Factor 5 concerns whether the Petitioners and the Defendants in the parallel proceeding are the same parties. *Fintiv Order* at 13; *Fintiv ID* at 15. This factor weighs against institution because real-parties-in-interest AT&T, Verizon, and T-Mobile are defendants in the respective district court cases. *See AT&T case; Verizon case; T-Mobile case.*

H. Factor 6 weighs against institution.

Factor 6 relates to other circumstances that impact the Board's exercise of discretion. *Fintiv Order* at 14; *Fintiv ID* at 15. Here, Factor 6 supports discretionary denial. Having a FWD issue many months after the district court trial is procedurally unfair to Patent Owner. For example, if the claims are confirmed in FWD, Petitioners would be bound by IPR estoppel and not be able to assert any invalidity grounds it raised or could have raised. But completing a district court trial months before the FWD would eliminate that benefit.

Further, Petitioners' arguments on the merits suffer from several weaknesses, as discussed above. The Petition fails to present *any* coherent theory of invalidity based on Trigui that addresses the "very exacting architecture" required by the '511 patent, including claim limitation [1a]. Thus, the Petition is not "particularly strong" and fails to establish a reasonable likelihood of success.

Finally, Petitioners' inconsistent approach to claim construction for the '511 patent also supports discretionary denial under Factor 6. As summarized above, Petitioners proposed narrower claim constructions for four separate terms of the '511 patent. Petitioners have not proposed any constructions in this IPR and only contended that each term carries its plain and ordinary meaning.

VIII. CONCLUSION

The Petition fails to show a reasonable likelihood of unpatentability for the challenged claims of the '511 patent. Further, the *Fintiv* factors strongly support discretionary denial under 35 U.S.C. § 314(a). For either or both reasons, institution should be denied.

Date: September 18, 2024

Respectfully submitted,

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CERTIFICATION REGARDING WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), I certify that there are 8,004 words in the paper excluding the portions exempted under 37 C.F.R. §42.24(a)(1).

Date: September 18, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(1), I certify that the above document was served on September 18, 2024, by filing this document through the Patent Trial and Appeal Case Tracking System as well as delivering a copy via electronic mail upon the following attorneys of record for the Petitioner:

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