

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 B2

Before BARBARA A. PARVIS, JAMES J. MAYBERRY, and
KARA L. SZPONDOWSKI, *Administrative Patent Judges*.

MAYBERRY, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background and Summary*

Ericsson Inc. and Nokia of America Corporation (“Petitioner”), filed a Petition requesting *inter partes* review of claims 1, 2, 4–6, 9–11, 13–15, and 18–20 (“Challenged Claims”) of U.S. Patent No. 8,737,511 B2 (Ex. 1001, the “’511 patent”). Paper 3, 6 (“Pet.”). Patent Owner, XR Communications LLC, filed a Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”).

We have authority under 35 U.S.C. § 314 to determine whether to institute review. 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4(a) (2024) (permitting the Board to institute trial on behalf of the Director). To institute an *inter partes* review, we must determine that the information presented in the Petition shows “a reasonable likelihood that the petitioner would prevail with respect to at least [one] of the claims challenged in the petition.” 35 U.S.C. § 314(a). For the reasons set forth below, upon considering the Petition, Preliminary Response, and evidence of record, we institute an *inter partes* review.

B. *Real Parties-in-Interest*

Petitioner identifies themselves and Telefonaktiebolaget LM Ericsson as real parties-in-interest. Pet. 72. Petitioner “likewise identif[ies] T-Mobile USA, Inc., AT&T Services Inc., AT&T Mobility LLC, AT&T Corporation, and Cellco Partnership d/b/a Verizon Wireless” as real parties-in-interest “[t]o avoid additional issues associated with real parties in interest.” *Id.*

Patent Owner identifies itself, doing business as Vivato Technologies, as the sole real party-in-interest. Paper 4, 2 (Patent Owner Mandatory Notices).

C. Related Matters

The '511 patent is the subject of litigation in the U.S. District Court for the Eastern District of Texas, in cases styled *XR Communications LLC v. Verizon Communications, Inc.*, Case No. 2:23-cv-00203-JRG-RSP; *XR Communications LLC v. T-Mobile USA, Inc.*, Case No. 2:23-cv-00204-JRG-RSP; and *XR Communications LLC v. AT&T Services Inc.; AT&T Mobility LLC; and AT&T Corp.*, Case No. 2:23-cv-00202-JRG-RSP (collectively, the “Litigation”). Pet. 72; Paper 4, 2. These cases have been consolidated. See Ex. 3001.

D. The '511 Patent

The '511 patent, titled “Directed MIMO Communications,” issued May 27, 2014, from an application filed April 13, 2012. Ex. 1001, codes (54), (45), (22). The '511 patent is directed “to multiple-input multiple-output (MIMO) wireless communications and beam forming antennas.” *Id.* at 1:5–7. We reproduce Figure 2 from the '511 patent, below.

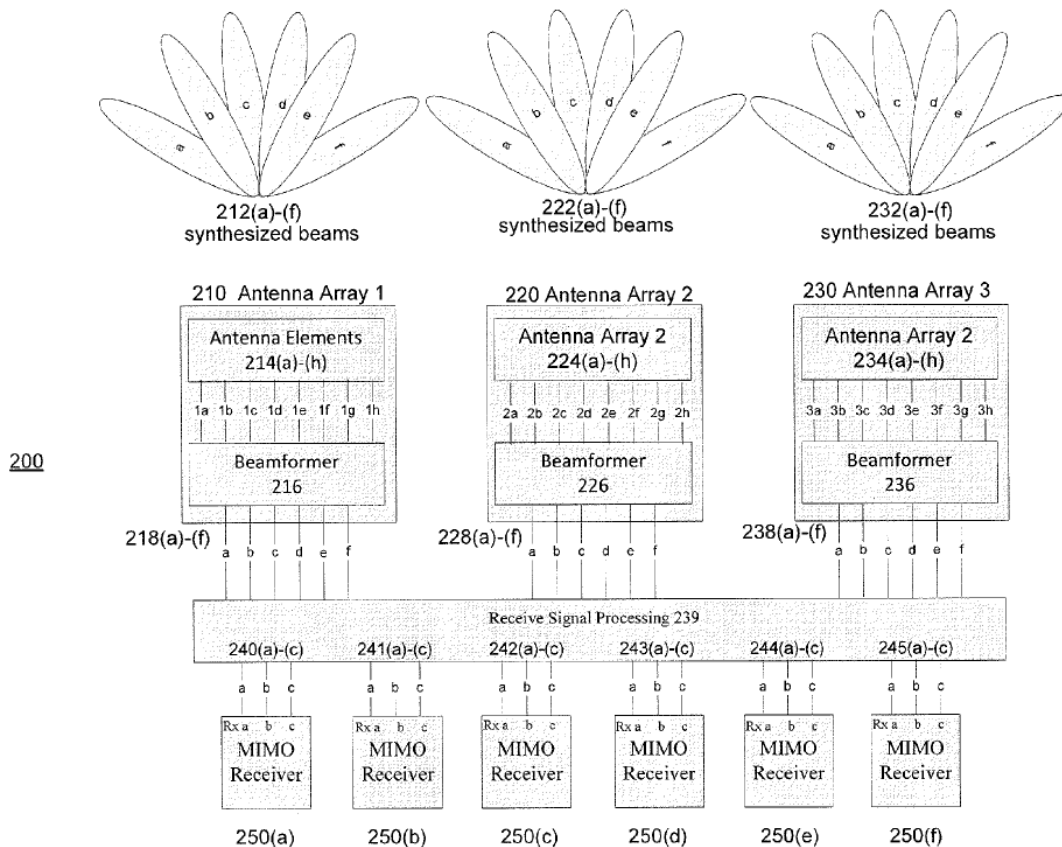


FIG. 2

Figure 2 “depicts an example of block diagram of a receiver for extended communications range and throughput using MIMO and beam forming.” Ex. 1001, 2:38–40. In this example, which depicts only the receive portion of the transceiver, each antenna array produces six independent beams 212(a)-(f), 222(a)-(f), and 232(a)-(f). *Id.* at 4:54–58. Antenna arrays 210, 220 and 230 include antenna elements 214(a)-(h), 224(a)-(h), and 234(a)-(h), and beamformers 216, 226, and 236. *Id.* at 4:58–67.

The beams of each antenna are associated with signals 218(a)-(f), 228(a)-(f), and 238(a)-(f). Ex. 1001, 5:1–2. “MIMO receivers 250(a), 250(b), 250(c), 250(d), 250(e) and 250(f) are connected to beamformers 216, 226, and 236 such that beamformer output 218(a) corresponding to beam

212(a) is connected to MIMO receiver 250(a) at 240(a).” *Id.* at 5:3–6. This configuration is repeated for the other beamformer outputs and MIMO transceivers. *Id.* at 5:6–22.

There are an equal number of MIMO receivers as beams per antenna array. For example, four antennas with three beams each could be connected to three MIMO receivers each with four inputs. Similarly, two antenna arrays with three beams each could be connected to three MIMO receivers with two inputs each. In some implementations, multiple MIMO receivers are implemented on a single circuit card and/or in a single enclosure. In some implementations, one MIMO receiver may be capable of handling multiple receive channels simultaneously.

Id. at 5:28–33.

E. Illustrative Claim

Of the Challenged Claims, claims 1, 10, 19, and 20 are independent claims. We reproduce independent claim 1 below, which is representative of the claimed subject matter.¹

1. [1pre] A system comprising:
 - [1.a.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:
 - [1.a.ii] a plurality of antenna elements; and
 - [1.a.iii] a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and
 - [1b] n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:
 - 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

¹ The bracketed reference numerals correspond to Petitioner’s identifiers for the limitations of independent claim 1, and Patent Owner’s identifiers for portions of limitation [1a]. *See* Pet. 1; Prelim. Resp. 16.

a MIMO transmitter configured to process m different transmit signals, wherein a v -th transmit signal from a z -th MIMO transmitter corresponds to a z -th beam of a v -th antenna array,

[1c] wherein m , n , v , and z are integer number values, wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, wherein $n \geq 2$ and $m \geq 2$, wherein $z=1, \dots, w$, and wherein $n \geq w \geq 2$.

Ex. 1001, 10:23–46. Independent claim 10 recites the same subject matter as claim 1, but in apparatus form. *Id.* at 11:1–25. Claim 19 recites similar subject matter as claim 10, but is directed to a MIMO receiver and omits the recitations directed at the MIMO transmitter. *Id.* at 12:9–22. Similarly, claim 20 recites similar subject matter as claim 10, but is directed to a MIMO transmitter and omits the recitations directed at the MIMO receiver. *Id.* at 12:23–37.

F. Prior Art and Asserted Grounds

Petitioner asserts that the Challenged Claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. § ²	References/Basis
1, 2, 4–6, 9–11, 13–15, 18–20	103(a)	Trigui ³
4–6, 13–15, 18	103(a)	Trigui, Rudrapatna ⁴

Pet. 17–18.

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because the application that matured into the ’511 patent was filed before March 16, 2013, we refer to the pre-AIA version of the statute.

³ U.S. Pat. Pub. 2011/0150050, published June 23, 2011 (Ex. 1004, “Trigui”).

⁴ U.S. Pat. No. 6,801,790 B2, issued Oct. 5, 2004 (Ex. 1005, “Rudrapatna”).

Petitioner relies on the declaration testimony of Dr. Kevin Negus to support its unpatentability contentions. *See* Ex. 1003 (providing the Declaration).

The following subsections provide brief descriptions of the asserted prior art references.

1. *Trigui*

Trigui, titled “Digital Integrated Antenna Array for Enhancing Coverage and Capacity of a Wireless Network,” published June 23, 2011, from an application filed December 23, 2009. Ex. 1004, codes (54), (43), (22). Trigui “relates . . . to using a digital integrated antenna array for enhancing coverage and capacity of a wireless network, and enabling a versatile solution for sharing antenna elements and active electronics between multiple operators servicing the same geographic area.” *Id.* ¶ 2.

We reproduce Trigui’s Figure 2A, below.

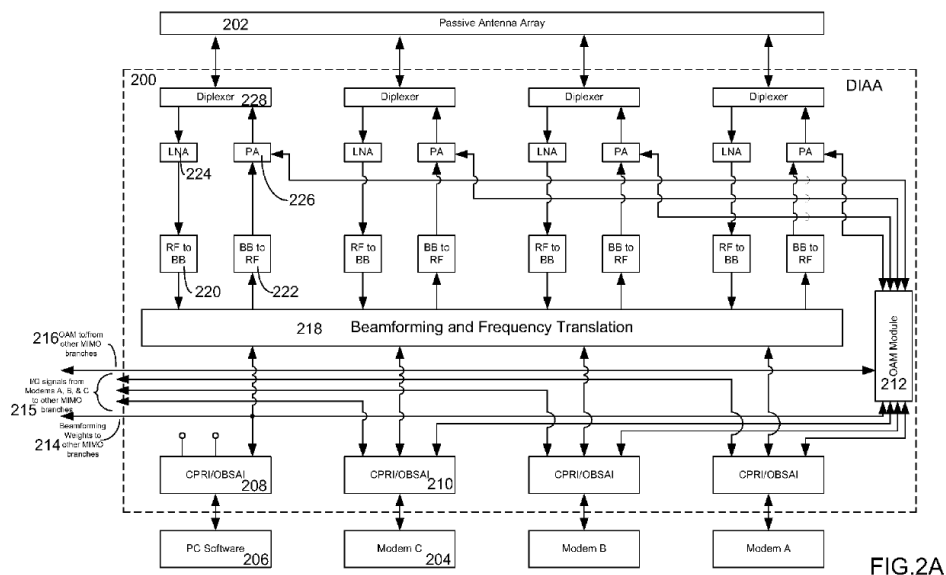


Figure 2A depicts “an exemplary high-level implementation of a single MIMO branch of a digital integrated antenna array [(“DIAA”)] system.” Ex. 1004 ¶ 23. When receiving signals, the signals are passed from passive

array 202 to diplexer 228 then to low-noise amplifiers 224. *Id.* ¶ 46. Circuit 220 converts output signals from amplifiers 224 from radio-frequency signals to baseband signals. *Id.* These signals are fed to beam forming and frequency translation module 218, where beam forming and calibration weights are applied to the signals to convert the signals to modem signals. These modem signals are filtered and extracted, then passing through digital interface cores 208, 210 to modems 204 and interface 206. *Id.* This process is essentially reversed when transmitting signals. *See id.* ¶¶ 36–45; *see also id.* at Fig. 2B (providing additional detail concerning the system of Figure 2A).

“An exemplary implementation of a 2xN MIMO DIAA, essentially including multiples of the hardware of F[igures] 2A and 2B, is illustrated [in] F[igure] 6.” Ex. 1004 ¶ 36. “[E]xemplary implementations of 4xN MIMO DIAAs, essentially including multiples of the hardware of F[igures] 2A and 2B, are illustrated by F[igures] 7–11.” *Id.*; *see* Figs. 6, 10.

2. Rudrapatna

Rudrapatna, titled “Structure for Multiple Antenna Configurations,” issued October 5, 2004, from an application filed January 17, 2001. Ex. 1005, codes (22), (45), (54). Rudrapatna is directed “to multiple antenna System that can operate in either multiple input multiple output (MIMO) mode, a beam forming/steering mode or a diversity mode.” *Id.* at 1:7–10.

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.

Ex. 1005, code (57).

II. ANALYSIS

A. *Legal Standards*

Section 103(a) forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of others.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *see KSR Int’l Co.*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” *Graham*, 383 U.S. at 18.

⁵ The parties do not direct us to any objective evidence of non-obviousness at this stage of the proceeding.

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR Int’l Co.*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To support this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

“[O]bviousness must be determined in light of all the facts, and . . . a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine” teachings from multiple references. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006); *see also PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014) (“The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact.”). As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR Int’l Co.*, 550 U.S. at 421.

For institution, “[t]he ‘reasonable likelihood’ standard is a somewhat flexible standard that allows the Board room to exercise judgment.” Patent Trial and Appeal Board Consolidated Trial Practice Guide 53 (Nov. 2019), *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.* Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Env’t Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner contends that a person having ordinary skill in the art “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.” Pet. 14 (referencing Ex. 1003 ¶¶ 24–25). Petitioner contends, alternatively, that a person having ordinary skill in the art “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.” *Id.* (referencing Ex. 1003 ¶¶ 24–25).

Patent Owner does not dispute Petitioner’s characterization of the level of ordinary skill in the art of the ’511 patent at this stage of the proceeding. Prelim. Resp. 10.

For purposes of this Decision, based on the prior art, the sophistication of the technology at issue, and Dr. Negus’s Declaration testimony, we adopt Petitioner’s unopposed definition of the level of ordinary skill.

C. Claim Construction

We construe each claim “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).” 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’” (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996))).

Petitioner contends “[n]o specific construction of any term is required,” and Petitioner has applied the “ordinary and customary meaning” of the claim terms. Pet. 13–14.

Patent Owner states that, “[f]or purposes of this preliminary response, Patent Owner agrees that no formal claim construction is necessary.” Prelim. Resp. 10. Patent Owner does advise the Board that the parties have provided a Joint Claim Construction Chart, which includes proposed

constructions for the '511 patent, in the parallel litigation. Prelim. Resp. 10–12; *see also* Ex. 2001 (providing the chart).

We agree with Petitioner and Patent Owner that, for the purposes of this Decision, we need not expressly construe any claim terms to resolve the parties' disputes. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Accordingly, we apply the plain and ordinary meaning of the claim terms. To the extent that the scope of any particular claim term requires discussion, however, we provide it in our assessment of the challenges.

D. Ground 1: Claims 1, 2, 4–6, 9–11, 13–15, and 18–20 as unpatentable over Trigui

Petitioner contends that the combination of Trigui and the knowledge of a person having ordinary skill in the art teaches or suggests each limitation of claims 1, 2, 4–6, 9–11, 13–15, and 18–20. Pet. 18, 22–60.

1. Independent Claim 1

We turn to analyzing the scope and content of the prior art, and any differences between the prior art and the claimed invention, on a limitation-by-limitation basis for independent claim 1. To best address Patent Owner's arguments, we parse the subject matter of limitation [1a], directed to “m antenna arrays,” into three sub-limitations.

a) Limitation [1a.i]

Claim 1 recites “[a] system comprising: m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal . . . wherein m . . . [is an] integer number,

... and $m \geq 2$.” Ex. 1001, 10:23–44 (limitations [1a.i], [1c]). Petitioner contends that Trigui’s Figure 6 depicts a single antenna array having two beams, and Figure 10 replicates Figure 6 twice, depicting two antenna arrays, each of which has two beams. Pet. 28; *see id.* at 28–30 (explaining how Trigui’s Figure 10 teaches the “m” antenna arrays, with $m=2$); Ex. 1004 ¶¶ 81 (discussing Figure 6), 81–86 (discussing Figures 7–11); Ex. 1003 ¶¶ 194–198 (discussing Trigui’s Figure 10).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing that Trigui teaches or suggests the subject matter of limitation [1a.i].

Patent Owner does not challenge Petitioner’s contentions with respect to the subject matter of this aspect of limitation [1a] at this stage of the proceeding. Although Patent Owner does not challenge these specific contentions, Patent Owner’s arguments recognize the interrelationship of the recited subject matter of limitation [1a]. We address Patent Owner’s arguments in connection with our analysis of limitation [1a.iii], below.

b) Limitation [1a.ii]

Claim 1 also recites that each of the m antenna arrays comprise “a plurality of antenna elements.” Ex. 1001, 10:28 (limitation [1a.ii]). Petitioner contends that Trigui’s Figure 2A depicts “a DIAA which ‘represents a single MIMO branch of a DIAA system’ and includes a ‘passive antenna array 202.’” Pet. 23 (referencing Ex. 1004 ¶¶ 36, 36; Ex. 1003 ¶¶ 180–181). Petitioner adds that “Trigui . . . explains that the antenna arrays may consist of ‘sub-arrays’ where ‘the antenna elements of each sub-array are combined passively to achieve a predefined pattern,’” and that in this arrangement “the antenna array elements are closely spaced to avoid grating lobes when steering a beam off boresight direction.” *Id.* at 24

(referencing Ex. 1004 ¶ 50; Ex. 1003 ¶ 185). Petitioner contends that, from this description, a person having ordinary skill in the art would have understood that Trigui’s antenna arrays include a plurality of antenna elements as recited in limitation [1a.ii].

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing that Trigui teaches or suggests the subject matter of limitation [1a.ii].

Patent Owner does not challenge Petitioner’s contentions with respect to the subject matter of this aspect of limitation [1a] at this stage of the proceeding. Again, Patent Owner’s arguments recognize the interrelationship of the recited subject matter of limitation [1a], and we address Patent Owner’s arguments in connection with our analysis of limitation [1a.iii], below.

c) Limitation [1a.iii]

Claim 1 also recites that each of the m antenna arrays comprise “a beam former configured to produce n different bi-directional beams using the plurality of antenna elements . . . wherein n . . . [is an] integer . . . [and] wherein $n \geq 2$.” Ex. 1001, 10:29–44 (limitations [1a.iii], [1c]). Petitioner contends that Trigui discloses that the DIAA receives beamforming weights 214. Pet. 25 (referencing Ex. 1004 ¶ 38). Petitioner explains that, during signal transmission, “signals from modems 204 are transmitted to a beam forming and frequency translation module 218, where they are ‘multiplied by the beam forming and calibration weights such that when applied to the passive antenna array 202.’” *Id.* (quoting Ex. 1004 ¶ 44). Petitioner contends that resulting radiation patterns may have one or more subsector patterns, such that the beams are bi-directional. *Id.* (referencing Ex. 1004 ¶ 44; Ex. 1003 ¶¶ 182–183).

Petitioner contends that, when receiving transmissions, the signals are passed from the antenna array to the beamforming and frequency translation module, where the weights are applied to form modem signals. Pet. 25 (referencing Ex. 1004 ¶ 46; Ex. 1003 ¶ 184). Petitioner contends that “the beams are ‘*bi-directional*’ because the same beams are used for transmit and receive because the same weights are applied for transmit and receive.” *Id.* at 26 (referencing Ex. 1004 ¶¶ 55, 77; Ex. 1003 ¶ 186).

Petitioner contends that “[e]ach of Trigui’s arrays can produce multiple beams (*n* different *bi-directional* beams).” Pet. 26; *see id.* (providing an annotated version of Trigui’s Figures 4A and 4B, identifying the multiple beams). Petitioner contends that Trigui’s Figure 6 depicts a system where “each of the ‘sub-arrays’ creates a bi-directional beam such that the array in Figure 6 generates 2 different *bidirectional* beams (*n*=2).” *Id.* at 27; *see id.* (providing an annotated version of Trigui’s Figure 6, and identifying how the beamformers are configured to produce two different bi-directional beams). We reproduce Petitioner’s annotated version of Trigui’s Figure 6, below.

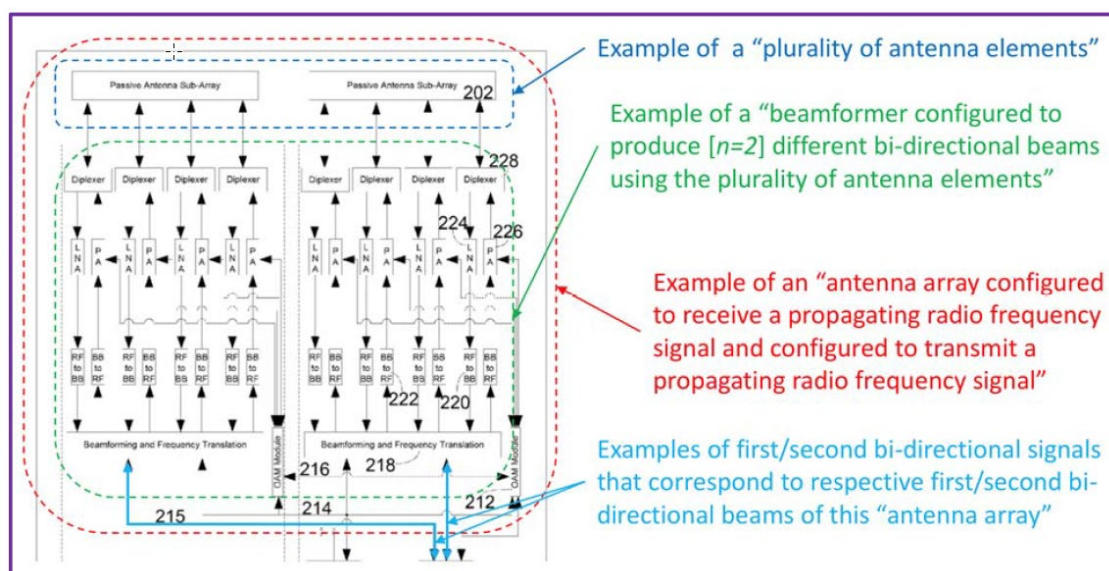


Figure 6 depicts a “digital integrated antenna array system.” Ex. 1004 ¶ 29. The system includes “two MIMO branches configured to provide a 2xN MIMO DIAA system.” *Id.* ¶ 81. Included in Petitioner’s annotation is a dashed green box that Petitioner contends illustrates the beam former. Also, Petitioner annotates the first and second bidirectional signals in blue, one each from the two beamforming and frequency translation modules 218. Pet. 27 (“Each MIMO transceiver branch has one beam for transmit and receive.” Ex-1004, [0077]. Thus, Figure 6 has two beams for transmit and receive.”); *see also* Ex. 1004 ¶¶ 9, 14, 74 (referencing at Pet. 27); Ex. 1003 ¶¶ 188, 193 (referencing at Pet. 27–28).

Patent Owner argues that Petitioner’s theory with respect to Trigui fails to demonstrate that Trigui discloses limitation [1 a.iii]—“a ‘beamformer configured to produce n different bi-directional **beams** using the plurality of antenna elements’ of the array.” Prelim. Resp. 21. Patent Owner argues that Petitioner maps two beamformers 218 depicted in Trigui’s Figure 6, each of which produces a single bi-directional beam. *Id.*; *see id.* at 22 (reproducing Petitioner’s annotated version of Trigui’s Figure 6 and stating that “[t]he Petition argues that each beamformer 218 in the system is configured to produce precisely ‘one beam.’” (quoting Pet. 27)); *id.* at 25 (“Under the Petition’s theory, Trigui Figure 6 as mapped by the Petition clearly contains two beamformers (the blocks labeled beam forming and frequency translation 218 in the Petition’s annotated Figures of Trigui), with each beamformer 218 configured to produce only ‘**one beam.**’” (quoting Pet. 27)).

Patent Owner argues that Petitioner’s mapping does not meet the requirement of claim 1 that “each beamformer be configured to produce n different bi-directional **beams.**” Prelim. Resp. 25. Patent Owner argues that

“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.*’” *Id.*; *see id.* at 26 (“[T]here 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 beam former, such that the Petition’s annotated Figure 6 discloses two beam formers.”).

Patent Owner also argues that the Petition fails to sufficiently explain how each beamformer uses a plurality of antenna elements, for example, all of the antenna elements of both sub-arrays depicted in Trigui’s Figure 6. Prelim. Resp. 28. Patent Owner argues that claim 1 requires that the beamformer be configured to produce n different bi-directional beams using the recited plurality of antenna elements. *Id.* Patent Owner argues that each beamformer depicted in Figure 6 is connected to one of the sub-arrays, but not the other. *Id.*

We have considered Patent Owner’s arguments and determine, on the current record, that Petitioner demonstrates that Trigui teaches or suggests the subject matter of limitation [1a.iii] sufficient for institution. The dispute before us reduces to whether this limitation requires a single beamformer, and only a single beamformer, to satisfy the “a beamformer” recitation, as Patent Owner argues.

Limitation [1a.iii] requires that each of the m antenna arrays comprise “a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements.” Ex. 1001, 10:24–31 (emphasis added). The preamble of claim 1 recites “[a] system *comprising*” and limitation [1.a.1] concludes with the word “*comprising*.” *Id.* at 10:23, 27 (emphasis

added). The Federal Circuit has “explained that the indefinite article ‘a’ means “‘one or more’ in open-ended claims containing the transitional phrase “‘comprising.’”” *Salazar v. AT&T Mobility LLC*, 64 F.4th 1311, 1315 (Fed. Cir. 2023) (quoting *Convolve, Inc. v. Compaq Computer Corp.*, 812 F.3d 1313, 1321 (Fed. Cir. 2016). As such, the plain and ordinary meaning of “a beamformer” encompasses one or more beamformers. Contrary to this meaning of the indefinite article “a,” Patent Owner argues that limitation [1a.iii] is limited to a single beamformer configured to produce the “n” different bi-directional beams, and that Petitioner relies on two beamformers. *See, e.g.*, Prelim. Resp. 25 (“[Petitioner’s] mapping violates the claim requirement that each beamformer be configured to produce n different bi-directional *beams*.”).

“An exception to the general rule,” such that “a” is limited to a single item, as Patent Owner argues here, “only arises where the language of the claims themselves, the specification, or the prosecution history necessitate a departure from the rule.” *Salazar*, 64 F.4th at 1315. Patent Owner has not directed us to any language in the claim, disclosure in the Specification, or disclaimer made during the prosecution of the application that matured into the ’511 patent that would take the scope of limitation [1a.iii] outside the general rule. Accordingly, on the current record, we determine that Petitioner’s reliance on two beamformers to satisfy the recitation of limitation [1a.iii] is sufficient for institution.

Similarly, we determine that Petitioner’s reliance on two beamformers also satisfies the recitation of the limitation requiring the beamformer to use the plurality of antenna elements. As Patent Owner recognizes, Petitioner contends that each of the two beamformers depicted in Figure 6 use one of the two depicted sub-arrays. *See* Pet. 25–28; Prelim. Resp. 27–28. We see

nothing in the language of the claims, nor does Patent Owner direct us to a construction of the limitation, that requires each and every beam former to use each and every antenna element of the plurality of elements. Petitioner contends that the two depicted passive antenna sub-arrays 202 correspond to the plurality of antenna elements and these sub-arrays are used by the beam forming and frequency translation modules 212 to produce two different bi-directional beams, as required by limitation [1a.iii].

We recognize that limitation [1a.i] recites “*each* of the antenna arrays comprising.” Ex. 1001, 10:26–27 (emphasis added). This recitation of “each” is directed to the “m” antenna arrays. As we discuss above in connection with our analysis of limitation [1a.i], Petitioner contends that the embodiment of Trigui’s Figure 10, which represents two versions of Figure 6, depicts the “m” antenna arrays, with “m” equaling 2. And, *each* of the antenna arrays corresponds to the system of Figure 6 under Petitioner’s theory. *See* Pet. 24–30. As we discuss above, limitations [1a.ii] and 1[a.iii] require *each* of the antenna arrays to include a plurality of antenna elements and one or more beamformers. Petitioner has sufficiently demonstrated for institution that Trigui’s Figure 6 depicts this arrangement, and that Trigui’s Figure 10 depicts two such arrangements, so that “m” equals two.

In summary, Patent Owner’s arguments stem from the construction of the indefinite article “a” in the recitation “a beam former.” We determine, on the current record, that we should apply the ordinary meaning of the indefinite article “a” to mean one or more beamformers.⁶

⁶ The parties are reminded that our determinations, including any claim constructions, are preliminary and the parties are encouraged to explore this issue during trial.

Upon review of the information in the Petition and corresponding evidence, and Patent Owner's counter arguments, we determine Petitioner has made a sufficient showing that Trigui teaches or suggests the subject matter of limitation [1a.iii].

d) Limitation [1b]

Claim 1 also recites:

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

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

a MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a z-th beam of a v-th antenna array.

Ex. 1001, 10:32–41 (limitation [1b]). Petitioner states that limitation [1b] “requires: (1) the same number (‘n’) of ‘MIMO transceivers’ as there are ‘beams’ for each array in limitation [1a]; and (2) that each MIMO transceiver be connected to one bi-directional beam from each of the ‘m’ arrays in limitation [1a].” Pet. 30.

Petitioner contends that “Trigui . . . teaches the claimed arrangement of MIMO transceivers connected to beams and arrays.” Pet. 31. Petitioner contends 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).” Pet. 31 (referencing Ex. 1003 ¶¶ 251–253); *see also id.* at 32 (providing an annotated version of Trigui’s Figure 10).

Petitioner recognizes that Trigui’s Figure 10 depicts a single modem, Modem A. *See* Pet. 32 n.4; Ex. 1004, Fig. 10. Petitioner contends that “Trigui teaches (and provides a motivation) to have two ‘modems’ that are

each connected to the two arrays.” Pet. 33; *see also id.* at 33–37 (explain how Trigui’s modem is a MIMO transceiver), 37–41 (explaining modifying the embodiment of Trigui’s Figure 10 to have two modems, and providing reasons for the modification). Primarily, Petitioner relies on Trigui’s teachings that two different wireless operators would share antenna array components, and that each operator would have its own modem. *Id.* at 33 (“Trigui teaches use cases in which two separate wireless network operators would share certain tower components, such as the antenna arrays,¹ but each wireless network operator would have its own baseband unit (i.e., modems A for the first operator and B for the second operator).²” (referencing Ex. 1004 ¶¶ 2, 48, 60–70; Ex. 1003 ¶¶ 226–232)).

Petitioner also contends that “Trigui teaches the ‘interconnection’ limitations that require specific connections between MIMO transceivers and arrays and a relationship between MIMO transceivers and beams.”

Pet. 41. Petitioner contends that “Trigui teaches that each of the two modems (MIMO transceiver) would be connected to one of the two beams from each of the two arrays,” resulting in the interconnection requirements recited in the two “wherein” clauses of limitation [1b]. *Id.* at 41–42.

Petitioner concludes that a person having ordinary skill in the art would have found the interconnection recitations of limitation [1b] obvious. *Id.* at 48–50; *see id.* at 48 (providing an annotated version of Trigui’s Figure 10 (modified to include two modems) and depicting the cross-connection of received signals).

Petitioner contends that a person having ordinary skill in the art would have been motivated to cross-connect the MIMO transceivers and antenna arrays. Pet. 43; *see id.* at 42–43 (explaining direct and cross connection options); 44–48 (providing seven reasons why a person having ordinary skill

in the art would have opted for the cross-connection approach). For example, Petitioner contends that a direct connection approach “does not take full advantage” of sharing antenna arrays. *Id.* at 44 (referencing Ex. 1004 ¶¶ 2, 62–63, 72, 79). As another example, Petitioner contends that cross-connecting minimizes the correlation of signals that reduces the capacity of a MIMO system. *Id.* (referencing Ex. 1006, 473–474; Ex. 1003 ¶¶ 239–240); *see also* Pet. 44–48 (providing other reasons).

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasoning in support of its proposed modifications, we determine Petitioner has made a sufficient showing, on the current record, that Trigui teaches or suggests the subject matter of limitation [1b].

Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

e) Limitation [1c]

Finally, claim 1 recites “wherein m, n, v , and z are integer number values, wherein $i=1, \dots, m, j=1, \dots, n$, and $v=1, \dots, m$, wherein $n \geq 2$ and $m \geq 2$, wherein $z=1, \dots, w$, and wherein $n \geq w \geq 2$.” Ex. 1001, 10:42–46. Petitioner contends that, based on its contentions with respect to limitations [1a] and [1b], “Trigui’s implementation of two independent $2 \times N$ MIMO DIAAs with two independent modems in a two operator system discloses ‘ $m=2$,’ ‘ $n=2$,’ ‘ $i=1,2$,’ ‘ $j=1,2$,’ ‘ $v=1,2$,’ ‘ $z=1,2$,’ and ‘ $w=2$.’” Pet. 50–51 (referencing Ex. 1003 ¶ 270).

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s contentions with respect to limitations [1a] and [1b] and reasoning in support of its proposed modifications, we

determine Petitioner has made a sufficient showing, on the current record, that Trigui teaches or suggests the subject matter of limitation [1c].

Patent Owner does not dispute Petitioner's contentions with respect to this limitation at this stage of the proceeding.

f) Conclusion, claim 1

For the reasons discussed above, we determine, on the current record, that the information presented in the Petition demonstrates a reasonable likelihood that claim 1 is unpatentable under 35 U.S.C. § 103(a) over Trigui.

2. Independent claims 10, 19, and 20

As we discuss above, Petitioner has demonstrated a reasonable likelihood of success in proving that at least claim 1 of the '511 patent is unpatentable, and we institute on all challenges raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 584 U.S. 357, 362 (2018); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition"); 37 C.F.R. § 42.108(a) ("When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim."). We have, however, reviewed Petitioner's contentions with respect to the other Challenged Claims, including independent claims 10, 19, and 20.

Independent claims 10, 19, and 20 recite similar subject matter as claim 1. *Compare* Ex. 1001, 10:23–46 (claim 1), *with id.* at 11:1–25 (claim 10), 12:9–22 (claim 19), 12:23–37 (claim 20). Petitioner relies, for the most part, on its contentions with respect to claim 1 for these independent claims. Pet. 56, 57–60, *cf.* Prelim. Resp. 30 ("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.”). Similarly, Patent Owner relies, at this stage of the proceeding, on its arguments with respect to claim 1 for the other independent claims. Prelim. Resp. 30–31.

For the reasons discussed above in connection with our analysis of independent claim 1, we determine, on the current record, that the information presented in the Petition demonstrates a reasonable likelihood that claims 10, 19, and 20 are unpatentable under 35 U.S.C. § 103(a) over Trigui.

3. Dependent claims 2, 4–6, 9, 11, 13–15, and 18

Dependent claims 2, 4–6, 9, 11, 13–15, and 18 depend directly from either independent claim 1 or independent claim 10. As we stated above in connection with our analysis of independent claims 10, 19, and 20, we institute on all challenges raised in the Petition. We have, however, reviewed Petitioner’s contentions with respect to dependent claims 2, 4–6, 9, 11, 13–15, and 18 and determine, on the current record, that the information presented in the Petition demonstrates a reasonable likelihood that these dependent claims are unpatentable under 35 U.S.C. § 103(a) over Trigui.

Patent Owner does not provide arguments directed specifically to these claims at this stage of the proceeding, other than its arguments directed to Trigui and claim 1. Prelim. Resp. 30–31.

E. Ground 2: Claims 4–6, 13–15, and 18 as unpatentable over Trigui and Rudrapatna

Petitioner contends that dependent claims 4–6, 13–15, and 18 are also unpatentable over the combination of Trigui and Rudrapatna. Petitioner provides contentions directed to the motivation to combine the teachings of Trigui and Rudrapatna (Pet. 64–65), and a claim-by-claim analysis of combined teachings of the references against the subject matter of dependent

claims 4–6, 13–15, and 18 (*id.* at 65–68). Patent Owner does not provide arguments directed specifically to this combination and these claims at this stage of the proceeding, other than its arguments directed to Trigui and claim 1. Prelim. Resp. 30–31.

As we stated above in connection with our analysis of Ground 1, we institute on all challenges raised in the Petition. We have, however, reviewed Petitioner’s contentions with respect to Ground 2, and determine, on the current record, that the information presented in the Petition demonstrates a reasonable likelihood that dependent claims 4–6, 13–15, and 18 are unpatentable under 35 U.S.C. § 103(a) over Trigui and Rudrapatna.

III. DISCRETION UNDER 35 U.S.C. § 314(A) - *FINTIV*

Patent Owner argues that we should exercise our discretion under 35 U.S.C. § 314(a) and not institute trial, given the state of the parallel district court litigation. Prelim. Resp. 31–41. For the reasons stated below, we do not exercise our discretion to deny institution in view of the parallel proceeding.

Institution of an *inter partes* review is discretionary. *See* 35 U.S.C. § 314(a) (authorizing institution of an *inter partes* review under particular circumstances, but not requiring institution under any circumstances); *Cuozzo Speed Techs., LLC v. Lee*, 579 U.S. 261, 273 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”); *SAS Inst. Inc.*, 584 U.S. at 366 (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d at 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

When determining whether to exercise discretion to deny institution in view of a parallel proceeding, we consider the following factors:

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board's exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). “These factors relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Id.*; *see also* “Interim Procedure for Discretionary Denials in AIA Post-grant Proceedings with Parallel District Court Litigation” (June 21, 2022) (“Guidance Memo”).⁷

We address the *Fintiv* factors below and explain our reasons for not exercising discretion to deny institution based on § 314(a).

1. Likelihood of a stay

A district court stay of parallel litigation pending resolution of an *inter partes* review allays concerns about inefficiency and duplication of efforts,

⁷ The Guidance Memo is available under the “Guidance Memorandum” heading on the “Resources and guidance” page for the Patent Trial and Appeal Board, located at <https://www.uspto.gov/patents/ptab/resources>.

which strongly weighs against exercising the authority to deny institution. *Fintiv* at 6. Patent Owner contends “[t]his factor weighs against institution.” Prelim. Resp. 35. Patent Owner argues that the defendants in the litigation filed for a stay of the Litigation, but withdrew the motion after the Board denied institution of an *inter partes* review (IPR) of another patent involved in the Litigation. *Id.* Patent Owner argues that “[t]here is no indication that Petitioners will file another motion to stay after withdrawing the previous one” and, regardless, “the Eastern District of Texas rarely grants stays based on non-instituted IPRs.” *Id.* at 36.

Petitioner contends “[f]actor 1 is neutral because no request for stay has been filed.” Pet. 70.

Because no motion to stay the proceeding is currently pending, we weigh this factor as neutral. We do not speculate as to whether a motion to stay would be renewed and ultimately granted. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (PTAB May 13, 2020) (informative) (“*Fintiv IP*”) (“We decline to infer . . . how the District Court would rule should a stay be requested by the parties in the parallel case here.”); *Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative) (“*Sand Revolution*”) (similar).

2. *Proximity of trial date to projected statutory deadline*

The amended Docket Control Order sets a trial date for July 21, 2025.⁸ Prelim. Resp. 34, 36–37; Ex. 2002. As such, trial is currently scheduled less than five months before the Final Written Decision in this proceeding is due (mid-December, 2025).

We determine that the facts pertaining to this factor weigh against exercising our discretion to deny institution under § 314(a).

3. *Investment in the parallel proceeding*

Patent Owner argues that “the parties’ have already invested substantial work by the time of this” Preliminary Response. Prelim. Resp. 38. Patent Owner argues a claim construction has been conducted and an order is due shortly. *Id.* Patent Owner adds that “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.” *Id.* Patent Owner argues that such an investment in time has been found to favor discretionary denial in other proceedings. *Id.* at 38–39.

Petitioner argues that the Litigation “is in its early stages, and the investment in it has been minimal. The district court will not invest significant resources or issue substantive orders related to the challenged patent prior to an institution decision.” Pet. 70.

⁸ The Guidance Memo provides that the parties may also present the most recent statistics on median time-to-trial for civil actions in the relevant district court. Guidance Memo 8–9. No information has been provided by the parties. We determine, because the three pending cases in the Eastern District of Texas were consolidated, the median-time-to trial information would not be useful to our analysis, because the consolidated proceeding does not reflect the normal course of a litigation.

The parties and court have performed some, but not substantial work. Significantly, the recently-entered Docket Control Order indicates that most efforts from the parties and court will take place after institution. *See* Ex. 2002. For example, fact discovery is ongoing, to be followed by expert discovery, which starts well after this Decision. *See id.* at 7.

Considering the above facts, we find this factor weighs against exercising our discretion to deny institution under § 314(a).

4. *Overlap of issues*

Concerns about the degree of overlap in a requested IPR proceeding and parallel district court litigation may be mitigated where the petitioner agrees not to pursue in the litigation the grounds advanced in the petition. *Sand Revolution*, Paper 24 at 11–12, 12 n.5. Here, Petitioner “stipulates that if the IPR is instituted, it will not pursue, in District Court, the same invalidity grounds for the claims challenged here.” Pet. 71. Patent Owner recognizes that this stipulation is a “*Sand Revolution* stipulation,” which is limited. Prelim. Resp. 39; *cf.* Guidance Memo 7 (discussing the strengths of a *Sotera*-type stipulation).

We determine that this factor somewhat weighs against discretionary denial because Petitioner’s stipulation “mitigates to some degree the concerns of duplicative efforts between the district court and the Board, as well as concerns of potentially conflicting decisions.” *Sand Revolution*, Paper 24 at 11–12.

5. *Identity of parties*

Both Petitioner and Patent Owner are parties to the Litigation. We weigh this factor in favor of discretionary denial. *Cf. Sand Revolution*, Paper 24 at 12–13 (weighing factor in favor of denial when the petitioner and patent owner are parties in the parallel litigation).

6. *Other circumstances, including the merits*

Patent Owner argues that instituting trial would be unfair with the Final Written Decision being issued “many months after the district court trial.” Prelim. Resp. 40. Patent Owner also argues that Petitioner’s positions in the Petition are “not ‘particularly strong’” *Id.* (quoting Pet. 71).

Petitioner argues that “the merits of the petition are particularly strong.” Pet. 71.⁹

Based on the facts presented, we do not discern any other circumstances that impact, for or against, our decision to exercise discretion to deny the Petition.

Accordingly, this factor weighs neutral.

7. *Conclusion*

We have considered the circumstances and facts before us in view of the *Fintiv* factors. Absent a compelling reason to the contrary, we take “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review” when evaluating these factors. *Fintiv*, Paper 11 at 6; Guidance Memo. Having evaluated all of the factors on this record, we determine that the circumstances presented here do not support exercising our discretion under § 314(a) to deny institution of this *inter partes* review. Significant in our determination is that the district court trial is likely to occur less than five months before our Final Written

⁹ Because we determine, based on a holistic approach, that discretionary denial is not warranted, we need not determine if Petitioner’s ground constitutes compelling merits. *Cf. CommScope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 5 (PTAB Feb. 27, 2023) (“In circumstances where, however, the Board’s analysis of *Fintiv* factors 1–5 favors denial of institution, the Board shall then assess compelling merits.”) (precedential).

Decision and that the Litigation is still in its early stages, having recently consolidated cases concerning the '511 patent.

IV. CONCLUSION

For the above reasons, we determine that the information presented in the Petition shows a reasonable likelihood that at least claim 1 of the '511 patent is unpatentable as obvious over Trigui. Because Petitioner demonstrates that at least one claim of the '511 patent meets the threshold for institution, we institute an *inter partes* review of all claims as challenged in the Petition. 37 C.F.R. § 42.108(c); *SAS*, 138 S. Ct. at 1359–60.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 2, 4–6, 9–11, 13–15, and 18–20 of U.S. 8,737,511 B2 is *instituted*; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of trial, which will commence on the entry date of this Decision.

IPR2024-00868
Patent 8,737,511 B2

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