

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
Petitioner,

v.

GENERAL ACCESS SOLUTIONS, LTD.,
Patent Owner.

IPR2023-00978
Patent 7,230,931 B2

Before MELISSA A. HAAPALA, *Vice Chief Administrative Patent Judge*,
and KEN B. BARRETT and TERRENCE W. McMILLIN, *Administrative
Patent Judges*.

BARRETT, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Cellco Partnership d/b/a Verizon Wireless (“Petitioner” or “Verizon”)¹ filed a Petition requesting *inter partes* review of U.S. Patent No. 7,230,931 B2 (“the ’931 patent,” Ex. 1001). Paper 2 (“Pet.”). The Petition challenges the patentability of claims 28 and 29 of the ’931 patent. General Access Solutions, Ltd. (“Patent Owner”)² filed a Preliminary Response to the Petition. Paper 15 (“Prelim. Resp.”). With our authorization, Petitioner filed a Reply (Paper 17, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 19, “PO Sur-reply”).

An *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). Having considered the arguments and evidence presented by Petitioner and Patent Owner, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing on at least one of the challenged claims of the ’931 patent. Accordingly, we institute an *inter partes* review as to all the challenged claims of the ’931 patent on all the grounds of unpatentability set forth in the Petition.

¹ Petitioner identifies Cellco Partnership d/b/a Verizon Wireless, Verizon Communications Inc., and Verizon Corporate Resources Group LLC as the real parties-in-interest. Pet. 3–4.

² Patent Owner identifies General Access Solutions, Ltd. as the real party-in-interest. Paper 5, 1.

B. Related Proceedings

One or both parties identify, as matters involving or related to the '931 patent, *General Access Solutions, Ltd. v. Cellco Partnership d/b/a Verizon Wireless et al.*, No. 2-22-cv-00394 (E.D. Tex.) (currently pending), *General Access Solutions, Ltd. v. Virgin Mobile USA, L.P. et al.*, No. 2-20-cv-00007 (E.D. Tex.) (no longer pending), and *General Access Solutions, Ltd. v. Sprint Corp. et al.*, No. 2-16-cv-00465 (E.D. Tex.) (no longer pending). Pet. 4–5; Paper 5, 1.

Additionally, the parties note that the '931 patent was the subject of a prior *inter partes* review before the Patent Trial and Appeal Board in *Sprint Spectrum LP v. General Access Solutions, Ltd.*, IPR2017-01889. Pet. 4–5; Prelim. Resp. 1. That *inter partes* review was the subject of a decision by the United States Court of Appeals for the Federal Circuit. *Sprint Spectrum L.P. v. General Access Sols., Ltd.*, 812 F. App'x 999 (Fed. Cir. 2020) (non-precedential).

*C. The '931 Patent*³

The '931 patent describes a burst packet transmission media access system using selectively adaptable beam forming in a fixed wireless access network. Ex. 1001, 3:28–31. The fixed wireless network may comprise a plurality of transceiver base stations that transmit forward channel (downlink or downstream) broadband signals to subscriber premises and receive reverse channel (uplink or upstream) broadband signals from subscriber

³ Patent Owner's citations to the '931 patent omit the exhibit number. See Prelim. Resp. 6 n.2 ("Citations exclusively to page and line numbers are to U.S. Patent No. 7,230,931 ('the '931 Patent')."). To ensure clarity of the record, Patent Owner shall, in all future papers, include the exhibit number for all exhibits, including the '931 patent.

premises. *Id.* at Fig. 1, 11:57–64. Each of the transceiver base stations may cover a cell site that is divided into a plurality of sectors. *Id.* at Fig. 2, 12:25–27. Pre-programmed sets of directed beam patterns are used to cover a cell in an angular fashion, which is referred to as “beam scanning.” *Id.* at 28:1–3. The base station establishes a set of beams to cover the cell and based on physical location in the sector, a specific beam is used to communicate with one or more subscribers that lie in that sector. *Id.* at 28:9–12.

Figure 14 of the '931 patent is reproduced below:

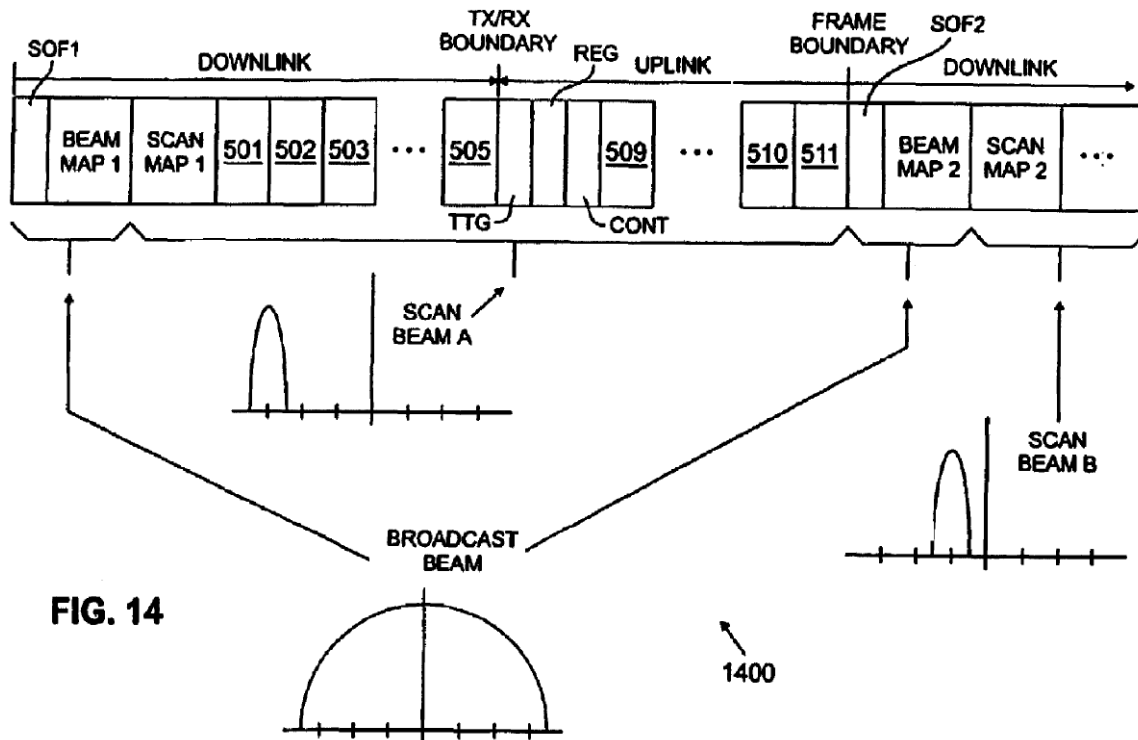


Figure 14 illustrates the use of broadcast beams and scanning beams in exemplary time division duplex (TDD) signal 1400. *Id.* at 29:3–5. TDD signal 1400 comprises a first TDD frame having a downlink portion comprising a first start-of-frame field (SOF1), a first beam map field (Beam Map 1), and a first scan map field (Scan Map 1). *Id.* at 29:6–10. “The remainder of the downlink portion comprises preamble field 501,

management field 502, and N modulation groups, including exemplary modulation groups 503 and 505.” *Id.* at 29:10–13. “[A] modulation group is a group of downlink slots transmitted to one or more subscribers using a common scheme of one or more of: 1) modulation format, 2) FEC [(forward error correction)] codes, and 3) physical beam forming.” *Id.* at 19:31–35. The first TDD frame is followed by a second TDD frame, which comprises a second start-of-frame field (SOF2), a second beam map field (Beam Map 2), and a second scan map field (Scan Map 2). *Id.* at 29:21–25. A spread spectrum Broadcast Beam is used to transmit start-of-frame fields SOF1, SOF2 and beam map fields Beam Map 1, Beam Map 2 in each TDD frame. *Id.* at 29:26–30. Distinct scan beams (Scan Beam A and Scan Beam B) are used to transmit the scan map fields (Scan Map 1 and Scan Map 2) and the remainder of the uplink and downlink portions of each TDD frame. *Id.* at 29:30–33.

Broadcast Beam Maps 1, 2 provide data indicating which scanning beam (or beams) are used at which time for the frame and also transmit a synchronization field so that all subscribers can maintain synchronization. *Id.* at 29:34–36, 29:47–50. Scanning Beam Maps A, B provide the uplink and downlink map, which state at which time in the frame, using the scanning beam described in the associated Broadcast Beam Map, the downlink modulation groups and specific uplink slots are allocated for the frame using the specific scanning beam. *Id.* at 29:38–43.

D. Illustrative Claim

Challenged claim 28 depends directly from now-canceled independent claim 1. Challenged claim 29 depends directly from now-canceled independent claim 19. Dependent claim 28 is illustrative and is reproduced below along with the limitations of underlying independent claim 1.

1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station, wherein said transmit path circuitry

transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.

28. The transceiver as set forth in claim 1 wherein said transmit path circuitry transmits, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices within an other of said sectors using an other of said directed scanning beam signals.

Ex. 1001, 30:31–52, 33:4–9. Dependent claim 29 recites a method of communicating that includes the step of “transmitting” the second download data traffic in the manner substantially similar to that recited in claim 28. *Id.* at 32:21–22, 34:1–6.

E. Evidence

Petitioner relies on the following references:

Name	Reference	Exhibit(s)
Vornefeld	U. Vornefeld, et al., <i>SDMA Techniques for Wireless ATM</i> , IEEE COMMUNICATIONS MAGAZINE (Nov. 1999)	1004
Atsuta	US 6,160,800, issued Dec. 12, 2000	1005
Goldburg	US 6,154,661, issued Nov. 28, 2000	1006
Youssefmir	US 6,795,409 B1, issued Sept. 21, 2004	1007
Tangemann	M. Tangemann, <i>Influence of the User Mobility on the Spatial Multiplex Gain of an Adaptive SDMA System</i> , WIRELESS NETWORKS – CATCHING THE MOBILE FUTURE, PROCEEDINGS OF THE 5TH IEEE INTERNATIONAL SYMPOSIUM ON PERSONAL, INDOOR AND MOBILE RADIO COMMUNICATIONS (1994)	1008

Petitioner also relies on the declaration of Dr. Kevin C. Almeroth (Ex. 1002) in support of its arguments. The parties also rely on other exhibits as discussed below.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. § ⁴	Reference(s)/Basis
28, 29	103(a)	Vornefeld, Atsuta
28, 29	103(a)	Vornefeld, Goldburg
28, 29	103(a)	Youssefmir, Atsuta
28, 29	103(a)	Vornefeld, Atsuta, Tangemann
28, 29	103(a)	Vornefeld, Goldburg, Tangemann

⁴ The '931 patent was filed before the effective date of the Leahy Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), and we apply the pre-AIA version of 35 U.S.C. § 103.

II. PROCEDURAL POSTURE

All of the claims of the '931 patent have been before the Board in a previous *inter partes* review, specifically IPR2017-01889 (the “prior IPR”). *See* Ex. 1009, 2 (IPR2017-01889, Paper 43 (Final Written Decision dated March 7, 2019)). The petitioner in that prior IPR was Sprint Spectrum L.P. (“Sprint” or “the prior petitioner”). *Id.* The prior IPR was related to a parallel district court case in which Patent Owner had sued Sprint in 2016 for patent infringement. Paper 11, 7 (Patent Owner’s representation in its motion for additional discovery).

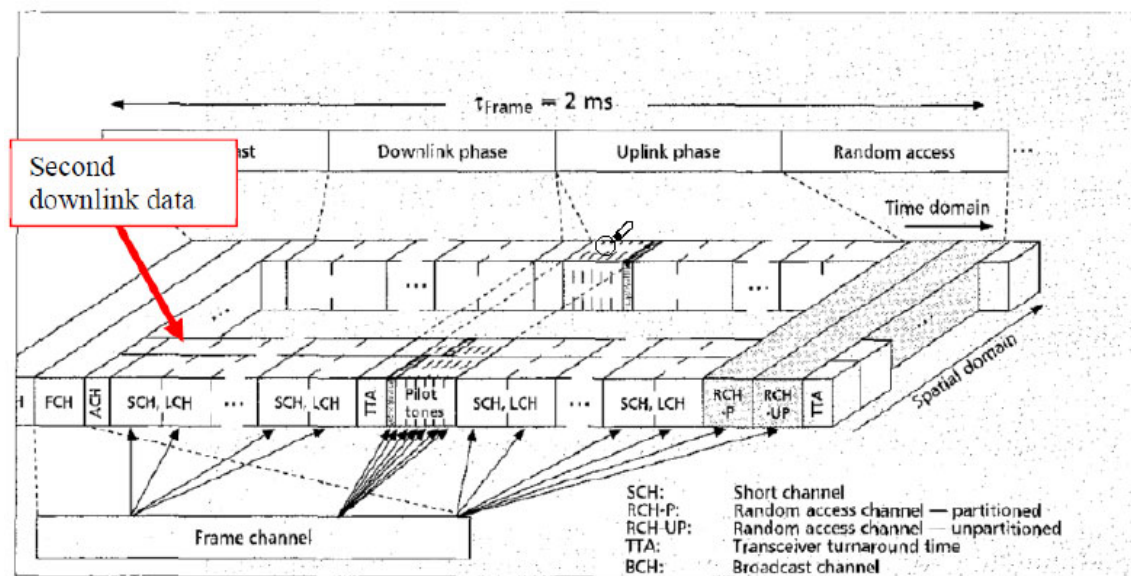
In the prior IPR, Patent Owner, in its response to the petition and again at oral argument, conceded that Vornefeld anticipates the independent claims of the '931 patent. *See* Ex. 1009, 7 (IPR2017-01889, Paper 43 (the 2019 Final Written Decision citing and parenthetically quoting Patent Owner’s Response and the hearing transcript)). In light of this concession of unpatentability, the Board entered adverse judgment against Patent Owner as to independent claims 1, 10, and 19. *Id.* The Board went on to determine that prior petitioner Sprint had not met its burden to prove the unpatentability of the remaining challenged claims, including the two presently before us. *Id.* at 7–32; *see id.* at 22–24, 30–31 (discussing dependent claims 28 and 29).

We will now discuss in detail the disposition of the prior petitioner’s challenges to dependent claims 28 and 29.⁵ The prior petitioner asserted that dependent claims 28 and 29 were anticipated by Vornefeld or would have

⁵ As discussed below, Sprint appealed the 2019 Final Written Decision and the Federal Circuit issued a decision remanding the case to the Board for further analysis of certain claims not at issue in this current IPR. *See Sprint Spectrum L.P.*, 812 F. App’x 999.

been obvious over Vornefeld and Andersson⁶. Ex. 1009, 15. Independent claim 1, for example, calls for circuitry where first downlink data is transmitted in the download portion of a TDD frame to devices in one sector using a directed scanning beam signal. *See* Ex. 1001, 30:48–52. Claim 28 depends directly from independent claim 1 and adds the requirement of second downlink data being transmitted in the same downlink portion as the first downlink data but being transmitted to devices in another sector and using another directed scanning beam signal. *See id.* at 33:4–9.

As the Board explained, the prior petitioner argued that “Figure 3 of Vornefeld clearly shows ‘second downlink data traffic’ being transmitted in the downlink portion of the frame using a different directed scanning beam signal,” and the prior petitioner provided an annotated version of Figure 3, which we have reproduced below. Ex. 1009, 22 (the 2019 Final Written Decision setting out the contentions).



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.

⁶ U.S. Patent No. 6,470,177 B1, issued Oct. 22, 2002.

Id. Figure 3, as annotated by the prior petitioner, illustrates the prior petitioner's assertions that Vornefeld discloses second downlink data in its spatially extended medium access control (MAC) protocol. *Id.* (citing page 35 of the prior petition). As shown in the annotated figure, the prior petitioner identified the second row as containing the "second download data" of dependent claim 28. The prior petitioner further asserted that the figure "shows a single frame with multiple channels being transmitted in parallel in the spatial domain and that each channel represents a different directive scanning beam." *Id.* at 23 (citing page 15 of the prior petitioner's reply).

The Board was not persuaded by the prior petitioner's arguments, stating that:

Petitioner has not met its burden to establish claim 28 is anticipated by, or would have been obvious over, Vornefeld. Claim 28 requires the transmit circuitry to transmit second downlink data traffic in the same (said) downlink portion of the same (said) TDD frame recited in claim 1. The block that Petitioner relies on for the second downlink data traffic is depicted as a different (spatially separated) TDD frame that is simultaneously transmitted with the other frames. *See* Pet. 35; *see also* Ex 1004, 54 (describing concurrent transmission of MAC PDUs in the spatial domain). We agree with Patent Owner that Petitioner does not establish Vornefeld discloses using different beams in the same TDD frame (i.e., second downlink data traffic, transmitted in "said downlink portion of said TDD frame") to transmit to devices within a different sector.

Id. at 23. The Board further stated that the prior petitioner relied on the same analysis in its challenge to dependent claim 29 and that the prior petitioner did not rely on the secondary reference, Andersson, for the recited features. *Id.* at 24. The Board thus concluded that the prior petitioner had

not met its burden to demonstrate the unpatentability of either dependent claim 28 or dependent claim 29. *Id.*; *see also id.* at 30–31 (determining that the prior petitioner also failed to make an adequate showing for another ground (based on Newman, Ahy, and Andersson) because the analysis did not address the specific limitations recited in claims 28 and 29).

Sprint appealed the Board’s decision. The Federal Circuit reviewed the Board’s findings concerning dependent claims 28 and 29, and affirmed the Board’s decision regarding those claims. *See Sprint Spectrum L.P.*, 812 F. App’x at 1006–07. In identifying the pertinent finding under review, the Court stated: “The Board rejected Sprint’s view, finding instead that Figure 3 of Vornefeld discloses *multiple* spatially separated frames that are simultaneously transmitted in parallel—not a *single* frame with ‘second downlink data traffic,’ as required by claims 28 and 29.” *Id.* at 1006. The Court discussed Vornefeld’s Figure 3 and related disclosures, and concluded that, “[b]ecause the Board’s understanding of Figure 3 of Vornefeld is reasonable in view of these disclosures, it is supported by substantial evidence,” and “[w]e therefore affirm the Board’s determination as to claims 28 and 29.” *Id.* at 1007.

Independent claims 1, 10, and 19 were not on appeal because Patent Owner had conceded the unpatentability of those claims. *Id.* at 1000–01. As to the remaining claims on appeal, the Court determined that the Board’s construction of “a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals” of claims 2, 11, and 20 was not the broadest reasonable interpretation (the standard applicable at that time). *Id.* at 1005. For that reason, the Court vacated the Board’s unpatentability determinations as to claims 2, 11, 20, and the claims that depend therefrom, and remanded the

case for analysis under the proper construction. *Id.* The subject claim phrase is not in the challenged claims now before us.

In a Final Written Decision on Remand, the Board determined that the prior petitioner had demonstrated by a preponderance of the evidence that claims 2–9, 11–18, and 20–27 are unpatentable either as anticipated by Vornefeld (including claims 2 and 20, which depend directly from independent claims 1 and 19) or as being obvious over Vornefeld in combination with one or more other references. Ex. 1010, 26 (IPR2017-01889, Paper 61 (Final Written Decision dated January 29, 2021)). The Board stated that “[t]he Federal Circuit affirmed our Decision as to claims 28–29, and thus, those claims are not before the Board on remand.” *Id.* at 3. Independent claims 1, 10, 19, having been the subject of adverse judgment, also were not before the Board on remand. *Id.* at 13 n.5. Subsequently, claims 1–27 were canceled. Ex. 1001, *Inter Partes* Review Certificate (issued Nov. 15, 2021) (located at the end of the challenged patent).

According to Petitioner, Patent Owner—about eleven months after the conclusion of the district court litigation between the prior petitioner, Sprint, and Patent Owner—sued current Petitioner Verizon, alleging infringement of the claims of the challenged patent. *See* Paper 13, 1 (Petitioner’s representations in its opposition to Patent Owner’s motion for additional discovery). Subsequently, the Petition in the current IPR was filed. *See* Pet. 4 (indicating that the related Verizon litigation was ongoing as of the filing of the Petition).

III. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 314(a)—*FINTIV*

Patent Owner argues that, in view of the parallel litigation in Texas, the Board should discretionarily deny institution of an *inter partes* review under 35 U.S.C. § 314(a) pursuant to *Fintiv*. Prelim. Resp. 57–60; *see Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) (setting out six nonexclusive factors that the Board may consider in determining whether to deny institution because of a parallel district court proceeding).

Petitioner filed, in this *inter partes* review, a stipulation under *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential as to § II.A). Specifically,

[Petitioner] Verizon hereby stipulates that if the Patent Trial and Appeal Board (“PTAB”) institutes an IPR in response to Verizon’s petition against General Access Solutions’ U.S. Patent No. 7,230,931 (IPR2023-00978), then Verizon will not pursue in this litigation the grounds raised in that petition for IPR or any other grounds that could have reasonably been raised before the PTAB in that proceeding.

Ex. 1020; *see also* Pet. Reply 1 (Petitioner confirming that it is submitting a *Sotera* stipulation to moot Patent Owner’s *Fintiv* arguments).

Our analysis under *Fintiv* is guided by the USPTO Director’s Memorandum issued on June 21, 2022, titled “Interim Procedure for Discretionary Denials in AIA Post Grant Proceedings with Parallel District Court Litigation” (“Director’s Memorandum”), *available at* https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf. The Director’s Memorandum explains that, when a petitioner makes a *Sotera*-type stipulation, “it mitigates concerns of potentially conflicting decisions and duplicative efforts between the district court and the PTAB”

and “[w]ith such a stipulation, if an IPR or PGR is instituted, the grounds the PTAB resolves will differ from those present in the parallel district court litigation.” Director’s Memorandum 7 (citing *Sotera*, Paper 12 at 18–19). Pursuant to the Director’s Memorandum, we “will not discretionarily deny institution of an IPR or PGR in view of parallel district court litigation where a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition.” *Id.*

Accordingly, because Petitioner has offered a stipulation like that in *Sotera*, we do not discretionarily deny institution under *Fintiv*.

IV. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 314(A)— *GENERAL PLASTICS*

Patent Owner argues that, in view of the prior IPR, the Board should discretionarily deny institution of an *inter partes* review under 35 U.S.C. § 314(a) pursuant to *General Plastic Industries Co. Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (precedential) (“*General Plastic*”). Prelim. Resp. 53–57. For the reasons that follow, we disagree.

In *General Plastic*, the Board identified the following nonexclusive factors to consider when deciding whether to exercise discretion under § 314(a) to deny institution based on a follow-on petition:

- 1) whether the same petitioner previously filed a petition directed to the same claims of the same patent;
- 2) whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it;
- 3) whether at the time of filing of the second petition the petitioner already received the patent owner’s preliminary

response to the first petition or received the Board's decision on whether to institute review in the first petition;

- 4) the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition;
- 5) whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent;
- 6) the finite resources of the Board; and
- 7) the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

General Plastic, Paper 19 at 9–10.

As to the first factor, although the two challenged dependent claims are a subset of the claims challenged previously, the current Petitioner, Verizon, is not the same as the prior petitioner, Sprint. However, “our application of the *General Plastic* factors is not limited solely to instances when multiple petitions are filed by the same petitioner.” *Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, Paper 11, 9 (PTAB Apr. 2, 2019) (precedential) (“*Valve*”). “Rather, when different petitioners challenge the same patent, we consider any relationship between those petitioners when weighing the *General Plastic* factors.” *Id.*

Patent Owner argues that prior petitioner Sprint and current Petitioner Verizon share the same desire to invalidate dependent claims 28 and 29 and use the same outside counsel, but does not argue that there is a direct relationship between the two petitioners. *See* Prelim. Resp. 53–56. Rather, Patent Owner argues that the petitioners are indirectly related through their common suppliers of allegedly infringing base stations, Samsung and Ericsson. *See id.* at 54–55; *see also* Pet. Reply 4 (Petitioner arguing that

“[Patent Owner] again focuses on the wrong issue by alleging that Ericsson and Samsung should be deemed to have a substantial relationship with Sprint and Verizon, rather than establishing a substantial relationship between Verizon and Sprint. Nor could it establish such a relationship where Verizon is a competitor of Sprint that was sued well after the Sprint IPR concluded.” (citation and internal quotations omitted)). Specifically, Patent Owner argues that Samsung and Ericsson are indemnitors of both petitioners, Prelim. Resp. 53, and “[t]hese common suppliers and indemnitors should be found to be unidentified real parties in interest or privies of the Petitioners here and in the Sprint IPR,” *id.* at 55.

Patent Owner’s argument that *both* suppliers are indemnitors of *both* petitioners is unsupported. *See id.* at 55–56. Patent Owner cites a finding, made in an apparently unrelated district court litigation, that Ericsson was obligated to indemnify Verizon. *See id.* at 55 (citing *Uniloc 2017 LLC v. Verizon Commc’ns Inc.*, No. 2:18-CV-00513-JRG, 2019 WL 1773118, at *3 (E.D. Tex. Apr. 23, 2019)).⁷ Patent Owner also cites Exhibit 2014 for the proposition that Sprint identified Samsung as an indemnitor. *Id.*⁸ Even if an

⁷ The pertinent finding by the District Court refers to Ericsson’s indemnification as a supplier of devices alleged to infringe a different patent owned by a different patent owner. *See Uniloc 2017 LLC*, 2019 WL 1773118, at *3 (stating, in a case brought by Uniloc 2017, that “Ericsson is obligated to indemnify Verizon for any damages resulting from a finding that Ericsson’s base stations infringe *the ’676 patent*” (emphasis added)). We do not reach the issue of whether Ericsson actually is an indemnitor of Verizon regarding accused devices pertinent to the patent challenged in this IPR.

⁸ The cited exhibit is Sprint’s initial disclosures submitted in the earlier district court litigation and stating that Samsung, among others, *might* be an indemnitor. Ex. 2014, 3 (“Based on Sprint’s investigation to date and information reasonably available to Sprint at this time, Alcatel-Lucent USA,

indemnity relationship alone would be sufficient to establish a supplier as a real party-in-interest or privy, Patent Owner, in the Preliminary Response, does not direct our attention to any evidence from which we could find that either supplier is an indemnitor to both petitioners. Thus, Patent Owner is left with the allegation that the two petitioners have a pertinent relationship with each other because their common suppliers are RPIs or privies of both petitioners. We determine, on the record in this case, that the alleged supplier-customer relationships are inadequate to establish the suppliers as RPIs or privies of either petitioner and therefore inadequate to establish, by extension, a substantial relationship between the two petitioners as argued by Patent Owner. *See, e.g., WesternGeco LLC v. ION Geophysical Corp.*, 889 F.3d 1308, 1321 (Fed. Cir. 2018) (“a contractual and fairly standard customer-manufacturer relationship regarding the accused product” does not necessarily establish privity).

Patent Owner also argues that, even if not real parties-in-interest, Samsung and Ericsson have a substantial interest with both petitioners. Prelim. Resp. 55. Specifically, Patent Owner argues:

At a minimum, Patent Owner believes discovery would reveal that Ericsson and/or Samsung were apprised of, afforded an opportunity to provide input into, and helped provide funding for, both the prior IPR and this Petition. As indemnitors with financial responsibility for Sprint and Verizon’s infringement, Samsung and Ericsson clearly have a substantial interest in the outcome of these proceedings. Those

Inc., Huawei Technologies USA, Nokia Solutions and Network *and/or* Samsung Telecommunication America, LLC *may be required to indemnify* Sprint with regarding to the accused products.” (emphasis added)). We do not reach the issue of whether Samsung actually is or was an indemnitor of Sprint.

overlapping interests, combined with their roles in both Petitions, weighs heavily in favor of discretionary denial.

Id. at 56. Notably, this argument contains no citation to supporting evidence and is based on Patent Owner’s belief that discovery *might* reveal evidence to support the assertions. Thus, Patent Owner’s argument—which is that the non-party *suppliers* have a substantial relationship to the IPRs—is mere speculation and does not provide evidence from which we could find that the two petitioners have a legally significant relationship within the meaning of *Valve*.

We also do not find to be persuasive Patent Owner’s argument that there is a substantial relationship between the two petitioners because, “[i]n addition to sharing the same desire to invalidate Claims 28 and 29, Sprint and Verizon also share . . . the same outside counsel.” Prelim. Resp. 53. Petitioner asserts, and Patent Owner does not dispute, that “Verizon is a competitor of Sprint that was sued well after the Sprint IPR concluded.” Pet. Reply 4. It is not surprising that defendants in separate infringement lawsuits brought by Patent Owner would challenge the same claims of a commonly asserted patent and would use the same counsel. *See Sony Mobile Commc’ns. AB v. Ancora Tech., Inc.*, IPR2021-00663, Paper 17 at 10 (PTAB June 10, 2021) (non-precedential) (“A common desire to challenge the validity of the asserted patent without more is insufficient to establish that Petitioner Sony has a significant relationship with the other prior petitioners.”); *cf. AMX, LLC v. Chrimar Sys.*, IPR2016-00569, Paper 18 at 6 (PTAB May 19, 2016) (non-precedential) (“We are not persuaded . . . that common representation adds anything beyond speculation that something useful will be uncovered regarding additional real parties in interest in these

proceedings. There are reasons apart from control by one party for different parties to retain the same counsel.”).

Patent Owner’s allegations appear to be mere speculation. Thus, we determine that Patent Owner has not demonstrated that there is a legally significant relationship between the two petitioners that might warrant denying a follow-on petition by a different petitioner. As such, *General Plastic* factor 1 weighs against denying institution.

“Once resolution of factor 1 indicates that Petitioner had not previously filed a petition against the same patent, factors 2–5 bear little relevance unless there is evidence in the record of extenuating circumstances such as a showing that there was a previous petitioner who challenged the same patent and that the previous petitioner and the current petitioner planned the staggered petitions.” *Alcatel-Lucent USA Inc. v. Oyster Optics, LLC*, IPR2017-02146, Paper 12 at 12 (PTAB Feb. 28, 2018) (non-precedential). For example, for factor 2, Patent Owner argues that the prior petitioner and the alleged indemnitors “knew or should have known of [current Petitioner’s] ‘new’ art at the time of their original petition,” Prelim. Resp. 56, but does not assert that, at the time of filing of the first petition in 2017, the current Petitioner knew or should have known of the art it would later assert in the Petition filed in 2023, *General Plastic*, Paper 19 at 9.

Patent Owner lumps together factors 3–5 under the label “timing,” and impliedly bases its arguments on the unpersuasive assertion of a significant relationship between the two petitioners. *See* Prelim. Resp. 56–57 (quoting findings from a “significant relationship” case and arguing that “[t]he same is true here”). Patent Owner argues that “Petitioner had the benefit of reviewing not only the original petition and Patent Owner’s preliminary response, but also the Board and the Federal Circuit’s decisions

before filing its petition,” and that “[t]his Petition is plainly crafted as an effort to overcome the specific deficiencies identified by the Board and the Federal Circuit.” *Id.* at 57. Under the facts of this case, we determine that the concerns underlying factor 3 are not implicated significantly. The Board, in *General Plastic*, explains:

Our intent in formulating the factors was to take undue inequities and prejudices to Patent Owner into account. Thus, factor 3 is directed to Petitioner’s potential benefit from receiving and having the opportunity to study Patent Owner’s Preliminary Response, as well as our institution decisions on the first-filed petitions, prior to its filing of follow-on petitions. . . . [W]e are concerned here by the shifts in the prior art asserted and the related arguments in follow-on petitions. Multiple, staggered petitions challenging the same patent and same claims raise the potential for abuse. The absence of any restrictions on follow-on petitions would allow petitioners the opportunity to strategically stage their prior art and arguments in multiple petitions, using our decisions as a roadmap, until a ground is found that results in the grant of review. All other factors aside, this is unfair to patent owners and is an inefficient use of the *inter partes* review process and other post-grant review processes.

General Plastic, Paper 19 at 17–18 (citation and footnote omitted). In this case, it is not the same petitioner refining arguments by filing multiple, staggered petitions. Rather, current Petitioner filed this Petition after the prior IPR and litigation against the prior petitioner concluded and after Patent Owner sued Petitioner in a separate action for alleged infringement of the only two claims out of twenty-nine that survived the prior IPR. *See* Ex. 1016, 2 (Patent Owner’s infringement contentions). Patent Owner does not persuasively argue that declining to discretionarily deny institution in this case would result in undue inequities and prejudices to Patent Owner. *See* Prelim. Resp. 57 (Patent Owner simply arguing that Petitioner’s efforts

to overcome deficiencies of the prior petitioner’s challenge “is precisely this sort of redo that these factors are intended to prevent”).

Patent Owner does not present specific arguments regarding factors 4 and 5, which pertain to the timing of the filing of the current Petition relative to when Petitioner learned of its asserted prior art and relative to the filing of the first petition. *See* Prelim. Resp. 56–57.

We determine that *General Plastic* factors 2–5 weigh against denying institution. And, even if factor 3 weighed in favor of discretionary denial, it would not change our ultimate decision to not exercise that discretion.

As to factors 6 and 7, Patent Owner argues:

With deference and respect, the Board’s finite resources should not be expended re-reviewing strikingly similar challenges by related parties to claims previously upheld by both the Board and the Federal Circuit. Furthermore, if this IPR is instituted, a decision would almost certainly not come until after the conclusion of trial.

Id. at 57. In the prior IPR, the Board and the Federal Circuit merely determined that the prior petitioner, who relied on Figure 3 of Vornefeld, had not met its burden of proving that Vornefeld disclosed the limitations of dependent claims 28 and 29. *See* Ex. 1009, 22–24 (the 2019 Final Written Decision in the prior IPR); *Sprint Spectrum L.P.*, 812 F. App’x at 1006–07. The Petition, relying on other references for those limitations, does not ask us to re-review whether Vornefeld’s Figure 3 discloses the subject matter of the challenged claims. Additionally, “the Board’s mission to improve patent quality and restore confidence in the presumption of validity that comes with issued patents outweighs the impact on Board resources needed to evaluate the merits of a petition.” *Code200 v. Bright Data, Ltd.*, IPR2022-00861,

Paper 18 at 6 (Office of the Director of the USPTO Aug. 23, 2022)
(precedential) (internal quotations omitted).

Patent Owner’s arguments fail to meaningfully address factor 7, which pertains to the Board’s ability to issue a final written decision prior to the one-year statutory deadline, not whether a decision will issue prior to a trial in the district court, as implied by Patent Owner. We do not foresee an issue with meeting the statutory deadline in this case.

For these reasons, the circumstances in this case do not warrant denying the Petition under § 314(a) and *General Plastic*.

V. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 325(d)

Patent Owner argues that we should exercise discretion under 35 U.S.C. § 325(d) to deny the Petition, applying the Board’s precedential decision in *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”) and *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (Dec. 15, 2017) (precedential as to § III.C.5, first paragraph). Prelim. Resp. 46–53; PO Sur-reply 1–5. For the reasons below, we do not exercise discretion to deny institution under § 325(d).

Section 325(d) provides that, in determining whether to institute an *inter partes* review, “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). The Board uses a two-part framework in determining whether to exercise its discretion under § 325(d), specifically:

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially

the same arguments previously were presented to the Office;
and
(2) if either condition of [the] first part of the framework is
satisfied, whether the petitioner has demonstrated that the
Office erred in a manner material to the patentability of
challenged claims.

Advanced Bionics, Paper 6 at 8.

Patent Owner argues that we should discretionarily deny the Petition because “[t]he Board and the Federal Circuit have already conducted *inter partes* review of Claims 28 and 29 of the ’931 Patent based on the Vornefeld reference and confirmed the patentability of the claims,” and, “while Verizon now cites additional prior art references, those new references add nothing of significance to Vornefeld and the other prior art references previously considered by the Board and the Federal Circuit.” Prelim. Resp. 46. Patent Owner further asserts that “the similarities between the art asserted in the [prior] IPR versus the art [Petitioner] relies on here starts and really ends with Vornefeld.” *Id.* at 49. As to Petitioner’s secondary references, Patent Owner argues that “Atsuta simply does not speak to the issues addressed by the invention claimed in Claims 28 and 29,” and “Goldburg is no better.” *Id.* at 50. Patent Owner argues “Verizon has offered the Board no basis to revisit its prior determination that Vornefeld does not render Claims 28 and 29 obvious.” *Id.* at 51; *see* PO Sur-reply 2 (“[Petitioner] once again fails to identify any error in the Board’s—and the Federal Circuit’s—prior decisions that Vornefeld does not anticipate or render obvious Claims 28 and 29.”). According to Patent Owner, “[t]he bottom line is that Verizon’s Petition merely seeks a re-do of Vornefeld.” PO Sur-reply 2.

We disagree with Patent Owner’s implied characterization of Atsuta and Goldberg as merely nominal in the current Petition’s challenges and the associated framing of the issue as whether Petitioner has shown a reason for the Board to “revisit its prior determination that Vornefeld does not render Claims 28 and 29 obvious.” Prelim. Resp. 51. In the prior IPR, the Board, and by extension the Federal Circuit on appeal, merely assessed whether the prior petitioner had met its burden to demonstrate that Vornefeld alone taught the limitations of claims 28 and 29. Ex. 1009, 22–24⁹; *Sprint Spectrum L.P.*, 812 F. App’x at 1006–07. The Board and the Federal Circuit were not examining claims 28 and 29 for allowability over all the art of record, but rather were evaluating whether the prior petitioner had proven its articulated contention to be correct, specifically whether the petitioner had proven that Vornefeld’s Figure 3 “shows ‘second downlink data traffic’ being transmitted in the downlink portion of the frame using a different directed scanning beam signal.” Ex. 1009, 22 (the Board setting out the prior petitioner’s contentions); *see also Sprint Spectrum L.P.*, 812 F. App’x at 1006 (the Federal Circuit describing the prior petitioner’s allegation of error: “Sprint insists that the only reasonable understanding of Vornefeld’s Figure 3 is that it discloses a single frame covering a fixed unit of time”). Neither the Board nor the Federal Circuit considered the issue of whether another reference, as alleged by the current Petitioner, teaches or suggests the limitations added by dependent claims 28 and 29. Contrary to Patent Owner’s argument, Prelim. Resp. 51, Petitioner is not asking the Board to

⁹ Challenges in the prior IPR involved the combination of Vornefeld and Andersson and the combination of Newman, Ahy, and Andersson, but the prior petitioner relied solely on Vornefeld for the limitations of claims 28 and 29. *See* Ex. 1009, 24, 30–31.

revisit its prior determinations regarding Vornefeld. *See, e.g.*, Pet. Reply 2 (“[Petitioner] does not allege an error under *Becton* because the Board did not err—it found claims 1 and 19 unpatentable over Vornefeld, as [Patent Owner] conceded. . . . [Petitioner] simply accepts the undisputed findings concerning Vornefeld’s application to the cancelled independent claims.”).

Although Vornefeld is art previously presented to the Office, Petitioner’s respective challenges rely heavily on Atsuta and Goldberg for teachings pertaining to the limitation added by dependent claims 28 and 29, the only challenged claims in this case. Patent Owner does not assert that Atsuta was previously presented to the Office. Patent Owner implies that Goldberg was previously presented to the Board in the prior IPR, arguing that “[prior petitioner] Sprint specifically relied on Goldberg as part of its expert declaration in the prior IPR to show the state of the art.” Prelim. Resp. 50. Petitioner replies that, “[w]hile [Patent Owner] offers that Goldberg was cited (for background) in a declaration in the Sprint IPR . . . , [Patent Owner] fails to acknowledge that Goldberg was *not* (i) an exhibit in the Sprint IPR, (ii) mentioned or applied in the Sprint Petition, or (iii) addressed in the final written decision.” Pet. Reply 3 (citing Exs. 1009, 1014). Patent Owner does not dispute Petitioner’s representations. *See* PO Sur-reply 3 (arguing that Petitioner “quibbles over whether Goldberg was a formal exhibit before the Board in the prior Sprint IPR,” but not asserting that Petitioner is incorrect). We find that Goldberg was not previously presented to the Board.

Patent Owner argues that “the newly cited references plainly do not disclose the requirements previously found to be missing from Vornefeld” and therefore “that art should be treated as cumulative of the references previously considered by the Board and the Federal Circuit.” Prelim.

Resp. 50–51; *see also* PO Sur-reply 2–3 (Patent Owner arguing that Goldberg, Atsuta, Tangemann “add nothing over Vornefeld, and the claimed disclosures of Verizon’s newly-cited prior art are duplicative of prior art cited in and incorporated by reference^[10] into the specification of the ’931 Patent”). Patent Owner’s argument that Atsuta and Goldberg are cumulative because they teach nothing beyond the art considered previously is based, at least in part, on Patent Owner’s narrow view of the claims as requiring simultaneous transmission of signals. *See, e.g.*, Prelim. Resp. 40–41. For reasons discussed below in the Claim Construction section, we do not agree with Patent Owner’s implied claim construction at this stage of the proceeding. Also, for the reasons discussed below, we determine that Petitioner has demonstrated a reasonable likelihood in prevailing in its contentions that Atsuta contains critical teachings not in Vornefeld. Thus, we do not agree that Atsuta is cumulative of art previously presented to the Office.

Patent Owner argues that there is overlap between the petitioner’s arguments and those made in the previous petition. Prelim. Resp. 50; *see also* PO Sur-reply 5 (referring to “the Board’s and the Federal Circuit’s prior consideration of the same or substantially the same prior art and arguments in the Sprint IPR”). Patent Owner then refers to Petitioner’s reliance on the same primary reference (Vornefeld) as the prior petitioner and asserts that Goldberg was used to show the state of the art in the prior IPR. Prelim.

¹⁰ Patent Owner argues that purportedly cumulative prior art documents incorporated by reference in the ’931 patent were “before the Board and the Federal Circuit when they rejected the Sprint IPR,” but does not indicate that such documents were exhibits in the record or were considered by the Board or the court in the prior IPR. Prelim. Resp. 32.

Resp. 50. Patent Owner, however, does not explain adequately how any of the current Petitioner's arguments regarding the secondary references' teachings are the same or substantially the same as *arguments* made during the prior IPR, instead arguing that "the newly cited references plainly do not disclose the requirements previously found to be missing from Vornefeld" and that they therefore are cumulative *references*. *Id.*

For the reasons discussed below in the discussion of Petitioner's challenge based on the combination of Vornefeld and Atsuta (Ground 1), we determine that, on the present record, at least Atsuta and Petitioner's arguments associated therewith are stronger than, and not substantially the same as, the references or arguments previously before the Board in the prior IPR. Therefore, we determine that neither condition of the first part of the *Advanced Bionic* framework is met and we, thus, do not need to reach the second part of the framework. Accordingly, although we have considered Patent Owner's request for exercise of discretion to deny institution under 35 U.S.C. § 325(d), on the record before us, we conclude that denial of institution on that basis is not warranted.

VI. ANALYSIS OF PETITIONER'S CHALLENGES

A. Principles of Law

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter 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 skill in the art; and (4), if present, any objective evidence of obviousness or non-obviousness.¹¹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. The Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey–Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)).

Petitioner contends that:

A person of ordinary skill in the art (“POSA”) at the time of the purported invention would have a bachelor’s degree in computer science, electrical or computer engineering, or a related field, and at least 2 years of work or research experience in digital communications systems, such as wireless communications systems and networks, or equivalent, or a Master’s degree in electrical engineering, computer engineering, computer science or similar field. Ex. 1002, ¶42.

¹¹ The parties have not directed our attention to any objective evidence of obviousness or non-obviousness. *Cf.* Pet. 83 (“There are no secondary considerations known to Petitioner that affect this strong case of obviousness.”)

Additional education could compensate for less practical experience and vice versa. *Id.*

Pet. 12. Patent Owner does not address the level of ordinary skill in the art.

Petitioner's definition is consistent with the level of ordinary skill reflected in the prior art references of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (recognizing that the prior art itself may reflect an appropriate level of skill in the art). For purposes of this decision, we apply Petitioner's definition of the person of ordinary skill in the art.

C. Claim Construction

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). In applying that standard, claim terms generally are 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*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner asserts that Patent Owner advances, in related district court litigation, an implied proposed construction of “sector” as “simply ‘a portion of the cell site.’” Pet. 13–14 (citing Ex. 1016, Ex. A at 35 (infringement contentions)). Petitioner states that, “[t]o the extent a construction is necessary, Petitioner relies on Patent Owner's implicit construction in the Related Litigation.” *Id.* Petitioner also contends that “this Petition

demonstrates that the Challenged Claims are obvious over the prior art under any reasonable construction of ‘sector,’ including a narrower construction, such as a section of the cell site defined by the transmission area of a corresponding antenna array.” *Id.* at 14; *see also, e.g., id.* at 18–19 (Petitioner offering contentions “[u]nder Patent Owner’s definition of ‘sector’” and under this narrower construction).

Patent Owner does not offer any proposed explicit claim constructions, stating that “[n]o claim construction is necessary to deny institution because [Patent Owner’s] arguments for denial do not hinge on any disputed issues of claim interpretation.” Prelim. Resp. 23–24. Patent Owner further argues that “none of the deficiencies in [Petitioner’s] asserted prior art . . . turn on the precise definition of the term ‘sector’ or require that it be viewed as a portion of the cell smaller than the coverage area of an antenna.” *Id.* at 46.

On this record and for purposes of this decision, we determine that no claim terms require express construction.

Simultaneous and Overlapping Multiple Beamformed Signals

Although we see no need to provide any explicit claim construction at this time, we note that Patent Owner’s arguments in opposition to Petitioner’s challenges indicate that there may be a claim construction dispute in need of resolution. Specifically, Patent Owner argues that the first downlink data traffic transmitted to one sector and the second downlink data transmitted to another sector must be transmitted simultaneously. *See, e.g.,* Prelim. Resp. 15 (“Claims 28 and 29 are directed to the simultaneous transmission of multiple beamformed signals, in a single frame, to wireless devices located in different sectors.”). Patent Owner argues, for example, that “Claims 28 and 29 of the ’931 Patent require that multiple beamformed

signals be transmitted *at precisely the same time*, and does so by putting them in the same portion of the same TDD frame,” and, according to Patent Owner, “[Petitioner’s secondary reference] Atsuta teaches the opposite—dividing transmissions into different time slots so that *they never overlap in time*.” *Id.* at 34. Patent Owner further argues that “Atsuta’s sequential transmissions in different time slots are not in the same portion of the same TDD frame, as required by Claims 28 and 29.” *Id.*; *see also id.* at 21–22 (“Whereas the object of Claims 28 and 29 is to allow for multiple simultaneous beamformed transmissions (which it achieves by putting them all in the same downlink portion of the same TDD frame), Atsuta teaches that transmissions must be made sequentially, or one at a time, so they never overlap in time.”). As discussed below, Petitioner contends that the subject signals of Atsuta, although in different timeslots, are all in the same downlink portion of the same TDD frame. *See* Pet. 31–32.

Claim 28, including the pertinent limitation of the underlying independent claim 1, recites circuitry “associated with a beam forming network,” where the circuitry transmits first downlink data traffic “in a downlink portion of said TDD frame” and transmits second downlink data traffic “in said downlink portion of said TDD frame.” Ex. 1001, 30:38–39, 30:48–49, 33:4–6. Claim 29 is a method claim reciting similar subject matter. We note that the term “portion” in claim 28 refers to the “downlink portion” of a TDD frame, as distinct from the uplink portion. *See, e.g.*, Ex. 1001, 14:45–63 (the Specification describing an exemplary TDD frame having a downlink portion and an uplink portion). Thus, we understand that the two pieces of downlink data traffic merely must be in the same downlink portion of a given TDD frame. *See* Prelim. Resp. 15–16 (Patent Owner asserting that the parties agree that “said downlink portion” for the second

data traffic is referring to the same downlink portion for the first data traffic).

Patent Owner does not explain adequately the basis for its implied claim construction, which we understand to limit the challenged claims to the simultaneous transmission of signals, i.e., overlapping signals in the same timeslot. On the present record, we decline to read the challenged claims as requiring simultaneous transmission to different sectors.

Similarly, it appears that Patent Owner may be implicitly construing “downlink portion” to be a specific subdivision of the downlink portion of the frame. As mentioned, the challenged claims call for two pieces of downlink data to be transmitted in the same “downlink portion” of the TDD frame, with that “portion” being distinguished from the uplink portion of the same TDD frame. *See* Ex. 1001, 33:4–6; *see also id.* at 14:45–63 (describing downlink portion). Patent Owner argues that Atsuta discloses a single uplink frame divided into three different “portions.” Prelim. Resp. 29–30. Even if Patent Owner is correct that Atsuta’s frame is an uplink (rather than a downlink) frame, it seems that the entirety of that frame would be considered the uplink portion of the frame and that each of the subdivisions within that frame is not a “portion” as that term is used in the ’931 patent.

The parties should address these issues, focusing primarily on the intrinsic evidence, in their future respective briefs authorized in the Scheduling Order.

D. The Alleged Obviousness of Claims 28 and 29 over Vornefeld and Atsuta (Ground 1)

Petitioner contends that dependent claims 28 and 29 of the ’931 patent would have been obvious over Vornefeld and Atsuta. *See, e.g.,* Pet. 15–21

(addressing the limitations of independent claim 1), 23–38 (addressing dependent claim 28). Petitioner contends that Vornefeld discloses the subject matter of the underlying independent claims and that “Atsuta teaches including multiple sector beam transmissions in a single TDD frame as recited in the Challenged Claims [28 and 29].” *See id.* at 2–3.

Patent Owner argues that Atsuta does not teach the limitations of dependent claims 28 and 29 and that a person of ordinary skill in the art would not combine the references. Prelim. Resp. 25–37.

For reasons discussed below, we determine that Petitioner has shown a reasonable likelihood that it would prevail in establishing the unpatentability of dependent claims 28 and 29 as obvious over Vornefeld and Atsuta.

1. Vornefeld (Ex. 1004)

Vornefeld describes space-division multiple access (SDMA) techniques in the context of the HIPERLAN/2 system, which provides wireless network broadband services with guaranteed quality of service. Ex. 1004, 52. The system deploys a smart array antenna with several antenna systems that provides the ability to set up multiple antenna beams, which can be directed adaptively to the mobile terminal (MT) locations and allows different users to be served on the same frequency channel at the same time. *Id.* Depending on the number of antenna elements and the applied beamforming algorithm, array antennas are able to simultaneously direct several beams conveying individual user signals to different positions. *Id.* at Fig. 2, 53. The system uses a medium access control (MAC) protocol to coordinate the access of MTs to the shared radio channel. *Id.* at 54.

Figure 3 of Vornefeld is reproduced below:

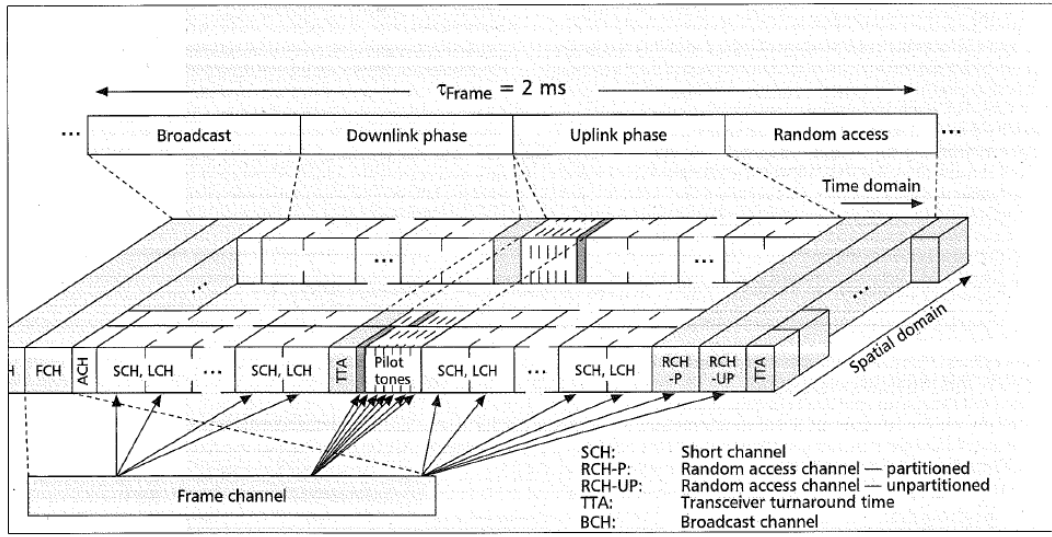


Figure 3 illustrates the basic MAC frame structure of the spatially extended MAC protocol. *Id.* at Fig. 3. MAC frame starts with broadcast channel (BCH), followed by frame channel (FCH), then a downlink phase, an uplink phase, and random access channels (partitioned, RCH-P, and unpartitioned, RCH-UP). *Id.* at 54. BCH conveys signaling information concerning the whole radio cell in the downlink direction and announces the location of the FCH and RCH within the actual MAC frame. *Id.* FCH is broadcast in the downlink direction and transmits information about the structure of the MAC frame for the uplink and downlink phases; it contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive. *Id.* Short Channel (SCH) conveys data link control information and Long Channel (LCH) serves to transmit user data bidirectionally on the uplink and downlink. *Id.* RCH-P and RCH-UP are contention channels. *Id.*

2. Atsuta (Ex. 1005)

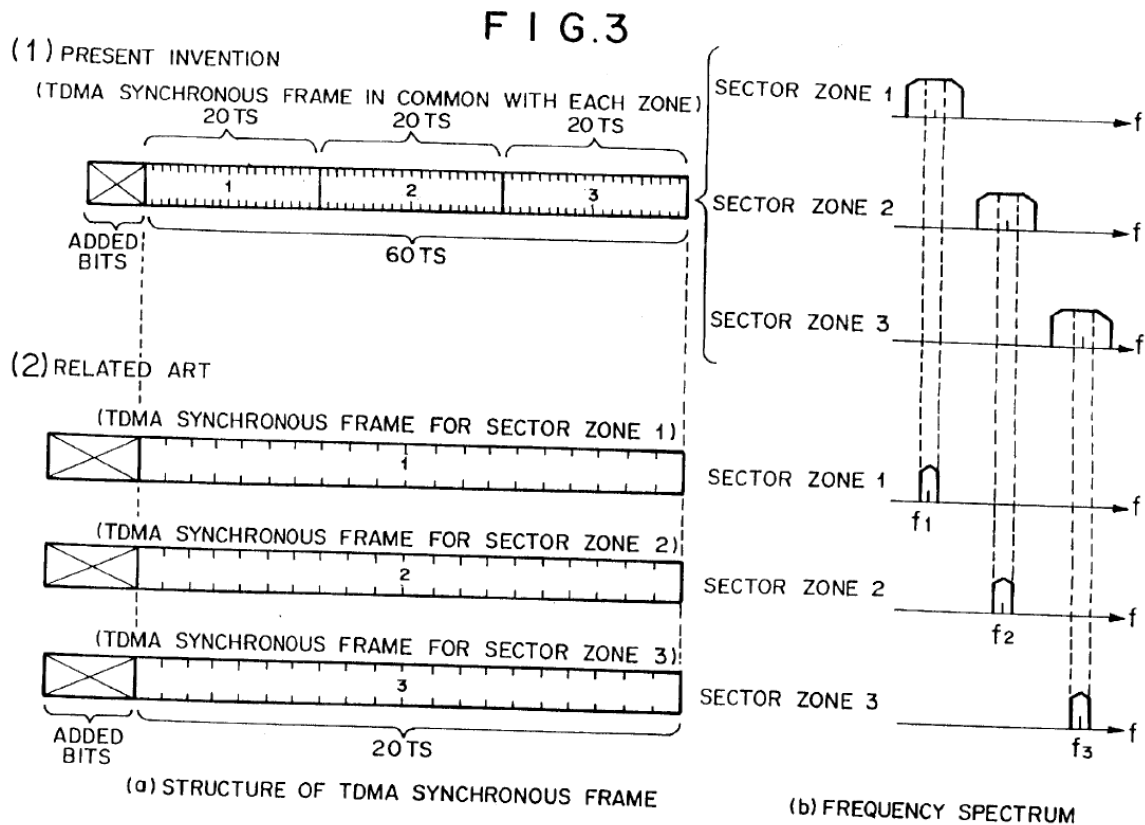
Atsuta “relates to a TDMA [(Time Division Multiple Access] Communicating Method and a TDMA receiving apparatus, in particular, to a

TDMA communicating method of a base station that communicates with a plurality of zones that use different radio frequencies and a TDMA receiving apparatus thereof.” Ex. 1005, 1:7–11. Atsuta explains that, conventionally, a base station corresponding to a TDMA communicating method uses a fan-shaped beam antenna for sectoring a service area, and, “in the conventional sector zone type TDMA communicating method, independent frames are formed for respective divided zones with different radio frequencies.” *Id.* at 1:13–15, 1:53–55. In contrast, Atsuta provides:

a time division multiple access (TDMA) communicating method for performing time division multiple access for one-point-to-many-point communication between a base station and a plurality of subscriber stations with radio frequencies corresponding to zones. A subscriber station is adapted for transmitting TDMA signals with time slots of a common TDMA synchronous frame in such a manner that the TDMA signals of the subscriber stations do not overlap.

Id. at 2:64–3:5.

Atsuta's Figures 3(a) and 3(b) are reproduced below.



Figures 3(a) and 3(b) are schematic diagrams which compare TDMA synchronous frame structures (Figure 3(a) on the left) and frequency spectrums of the TDMA communication method (Figure 3(b) on the right) according to Atsuta's disclosure (the upper portions labeled "(1) PRESENT INVENTION") and the conventional TDMA communicating method (the lower portions labeled "(2) RELATED ART"). *See id.* at 5:21–25. According to Atsuta, in the conventional method, "each of three fan-shaped divided zone[s] has an independent TDMA synchronous frame," and each of those frames has a data region of 20 time slots (TS) assigned to subscriber stations in each fan-shaped divided zone. *Id.* at 5:25–30. Atsuta explains that:

On the other hand, according to the present invention [as shown in the upper portions of Figures 3(a) and 3(b)], 20 TS of each fan-shaped divided zone are assigned to each fan-shaped

divided zone in such a manner that time slots of individual fan-shaped divided zones do not overlap. Thus, the resultant TDMA synchronous frame has 60 TS corresponding to the subscriber station in all the fan-shaped divided zones and is common in all the fan-shaped divided zones.

Id. at 5:36–43. According to Atsuta, “a common TDMA synchronous frame for transmitting signals of individual fan-shaped divided zones can be used.”

Id. at 5:57–59.

Atsuta’s Figure 4 is reproduced below.

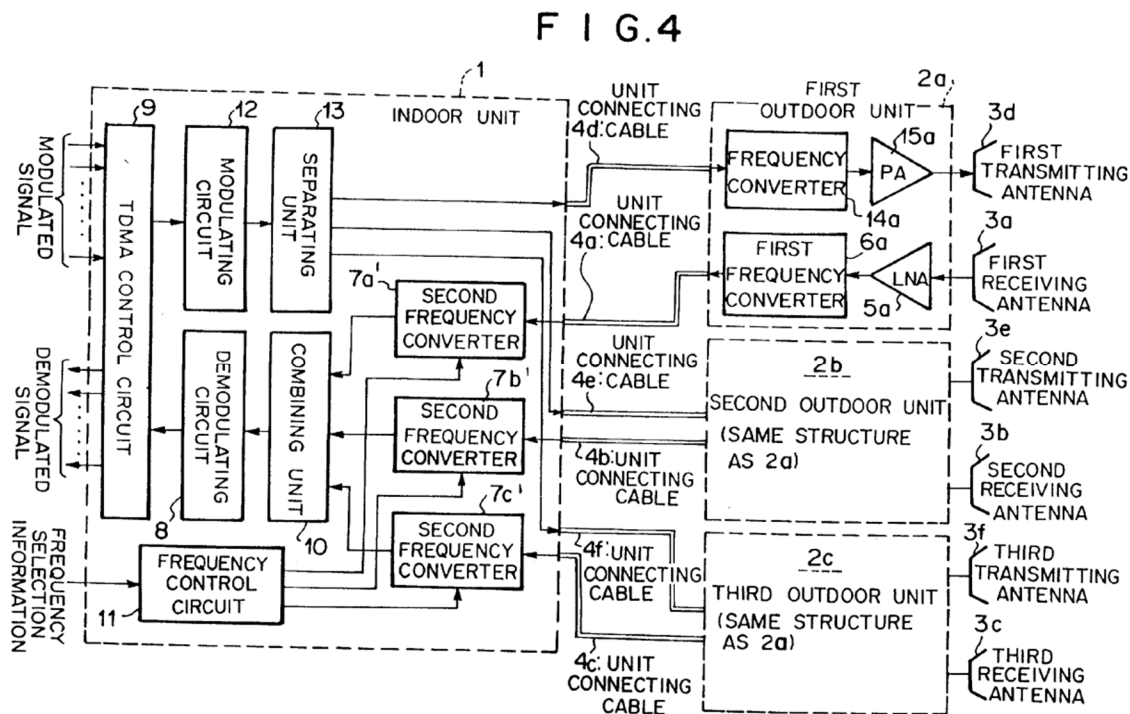


Figure 4 is “a block diagram showing the entire transmitting and receiving portions including the receiving apparatus . . . and a transmitting apparatus.”

Id. at 4:34–36.

[T]he TDMA control circuit 9 shown in FIG. 4 obtains information signals of subscriber stations of three fan-shaped divided zones from a demodulated signal sent from a demodulating circuit 8. In addition, the TDMA control circuit 9 shown in FIG. 4 receives a plurality of modulated signals to be transmitted to the subscriber stations, arranges these signals into one signal sequence as a predetermined

synchronous frame in the TDMA method, and outputs the resultant signal sequence to a modulating circuit 12.

* * *

Reference numerals 3d, 3e, and 3f are first to third transmission antennas that radiate the transmission frequency signals to three directional space or fan-shaped directional space. In FIG.4, the transmitting antennas 3d, 3e, and 3f are paired with receiving antennas 3a, 3b, and 3c, respectively. However, when an omnidirectional antenna is used, one transmitting/receiving antenna may be used.

Id. at 6:32–58.

3. *The Alleged Obviousness of Claim 28 over Vornefeld and Atsuta*

Claim 28 depends directly from independent claim 1 and thus includes all the limitations of that underlying independent claim. Although Patent Owner, during the prior IPR, conceded that Vornefeld anticipates claim 1¹², we first briefly discuss Petitioner’s contentions regarding the limitations of claim 1 as context for the discussion of the parties’ arguments concerning dependent claim 28.

- a. *[Claim 1] For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:*

Petitioner contends that Vornefeld discloses a “cellular mobile communications system” having base stations with “multiple antenna beams that can be electronically directed to the mobile terminal (MT) locations.”

¹² See IPR2017-01889, Paper 42, 56:19–57:9 (Patent Owner, during oral argument, conceding that Vornefeld “knocks out our independent claims”).

Pet. 16 (citing Ex. 1004, 52, Fig. 2). Petitioner further contends that “Vornefeld’s ‘radio subsystem operates . . . on a time-division duplex (TDD) channel,’” that “[t]he TDD channel uses ‘the same frequency for up- and downlink,’” and that “Vornefeld shows a base station communicating with a plurality of mobile terminals (MTs).” *Id.* (citing Ex. 1002 ¶ 73; Ex. 1004, 52–53, Fig. 2) (alteration in original).

b. transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said first base station,

Petitioner contends that Vornefeld teaches the transmit path circuitry recited in this claim element. Pet. 17–19. Petitioner asserts that Vornefeld discloses downlink beamforming, and further asserts:

Vornefeld’s Fig. 2 . . . shows a base station having three ULAs [uniform linear arrays] which cover the cell site (e.g., each ULA covers a 120° sector of the cell site). Ex. 1002, ¶76; Ex. 1004, 52. “A beamforming algorithm computes a weight matrix for each time slot that adjusts the phases at the antenna elements to steer the main beam pointing direction toward the estimated DoA [direction of arrival] of the desired MT.” Ex. 1004, 53. Also, “[d]epending on the number of antenna elements and the applied algorithm, array antennas are able to simultaneously direct several beams to different positions conveying individual user signals (Fig. 2).” Ex. 1004, 53. Vornefeld’s Fig. 2 depicts several MTs within an exemplary 120° sector covered by the ULA, with a directed scanning beam signal transmitted to each of the MTs using transmit path circuitry associated with the ULA (*i.e.*, the claimed “signals transmitted using a beam pattern directed within a sector”).

Id. at 18 (third alteration in original).

Petitioner contends that, under what it asserts to be Patent Owner’s proposed construction of “section,” that “the MTs are each within a different

‘geographic portion of a cell site,’” and “[a]s such, Vornefeld’s base station comprises transmit path circuitry capable of transmitting to substantially only wireless access devices (MTs) within a different one of a plurality of sectors.” *Id.* at 18–19 (citing Ex. 1002 ¶ 76). Petitioner also contends that “Vornefeld also discloses this element under a narrower construction of ‘sector’—such as a section of the cell site defined by the transmission area of a corresponding antenna array—as each of the three ULAs transmits to substantially only MTs within a 120° sector corresponding to an antenna array.” *Id.* at 19.

c. wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

Petitioner contends that Vornefeld teaches that “[e]ach MAC frame [transmitted to the MTs] ‘starts with two broadcast channels, the broadcast channel (BCH) and the frame channel (FCH), followed by a downlink phase, an uplink phase, and the random access channels (partitioned, RCH-P, and unpartitioned, RCH-UP).’” Pet. 19 (citing Ex. 1002 ¶ 77; Ex. 1004, 54). Petitioner asserts that, “[i]n Vornefeld, the BCH ‘conveys signaling information concerning *the whole radio cell* in the downlink direction . . . [and] every frame starts with a BCH.’” *Id.* (citing Ex. 1004, 54, Fig. 3 (first alteration in original)). Petitioner contends that, “[t]hus, a broadcast beam signal is transmitted at the start of a TDD frame to wireless access devices within more than one of said sectors (‘the whole radio cell’),” and that “the broadcast beam signal includes a start of frame field.” *Id.* at 19–20 (citing Ex. 1004, 54–55).

- d. [wherein said transmit path circuitry] subsequently transmits, in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.*

Petitioner contends that “[a]s shown [in Vornefeld’s Figure 3], each frame includes a ‘downlink phase,’ which can include long channel (LCH) portions that serve to transmit user data (e.g., the payload) on the up- and downlink.” Pet. 20–21 (citing Ex. 1004, 54, Fig. 3). Petitioner further contends that “[t]he LCHs dedicated to a single terminal are grouped together,” and that “Vornefeld describes performing downlink transmission by forming ‘directive beams’ which enable the base station to send information to several locations within a sector.” *Id.* at 21 (citing Ex. 1002 ¶¶ 79–80; Ex. 1004, 54–55, Fig. 3).

- e. [Claim 28] The transceiver as set forth in claim 1 wherein said transmit path circuitry transmits, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices within an other of said sectors using an other of said directed scanning beam signals.*

Dependent claim 28 calls for circuitry that transmits second downlink data “in said downlink portion of said TDD frame [of independent claim 1]” and to substantially only devices in a sector different than the sector recited in independent claim 1 and using a different directed scanning beam signal. Petitioner turns to Atsuta in addressing these features. Pet. 23–38.

Petitioner contends that “[l]ike Vornefeld, Atsuta is directed to TDMA frame-based communication between a base station and subscribers,” and that “Atsuta describes a base station that transmits downlink data to subscribers in different sectors within a single TDMA frame.” *Id.* at 24 (citing Ex. 1002 ¶ 88; Ex. 1005, 2:64–3:8, 6:24–61); *see*

also id. at 30 (“Atsuta describes transmitting downlink data to multiple subscribers in different sectors within a single frame to allow for simplified hardware.” (citing Ex. 1002 ¶ 101; Ex. 1005, 6:31–55)), 32–33 (similar). Petitioner asserts that “Figure 3 of Atsuta illustrates a TDMA frame comprising 60 time slots (‘TS’), wherein every 20 TS is assigned to a subscriber in a different zone: first 20 TS to sector zone 1, second 20 TS to sector zone 2, last 20 TS to sector zone 3.” *Id.* at 24. Petitioner further contends that Atsuta’s sector zones are “sectors” within the meaning of the ’931 patent and that “[e]ach of Atsuta’s ‘sector zone[s]’ is a ‘fan-shaped’ subsection of the total service area, and each zone is assigned its own antenna array.” *Id.* at 25 (second alteration in original). Petitioner contends that, in the proposed modification, the circuitry of either Vornefeld or Atsuta could be used. *Id.* at 31 (citing Ex. 1002 ¶ 104); *see also id.* (Petitioner’s annotated version of Atsuta’s circuitry of Figure 4 along with the assertion that “[t]he highlighted apparatus is used to transmit downlink data from the base station to subscribers” (citing Ex. 1005, 6:35–64)).

Petitioner further contends:

Regarding “transmit[ing], in said downlink portion of said TDD frame,” Atsuta describes a “single synchronous frame,” within which there are sequential downlink signals transmitted from the base station to subscriber stations in different zones. Ex. 1005, 6:35–64. A [person of ordinary skill in the art] would have understood that the frames described by Atsuta are TDD frames inasmuch as Atsuta refers to transmitting data in both the downlink and uplink direction in the context of “sharing a TDMA synchronous frame.” Ex. 1002, ¶105; Ex. 1005, 5:65–6:12. Moreover, Vornefeld already teaches TDD frames and the ’931 Patent admits that the same were well known at the time. Ex. 1004, 53; Ex. 1001, 6:32–8:31. At the very least, because the frames in Atsuta are comprised of different timeslots reserved for downlink

transmission (Ex. 1005, 6:35–58) a [person of ordinary skill in the art] would understand that they are compatible with a TDD frame. Ex. 1002, ¶105.

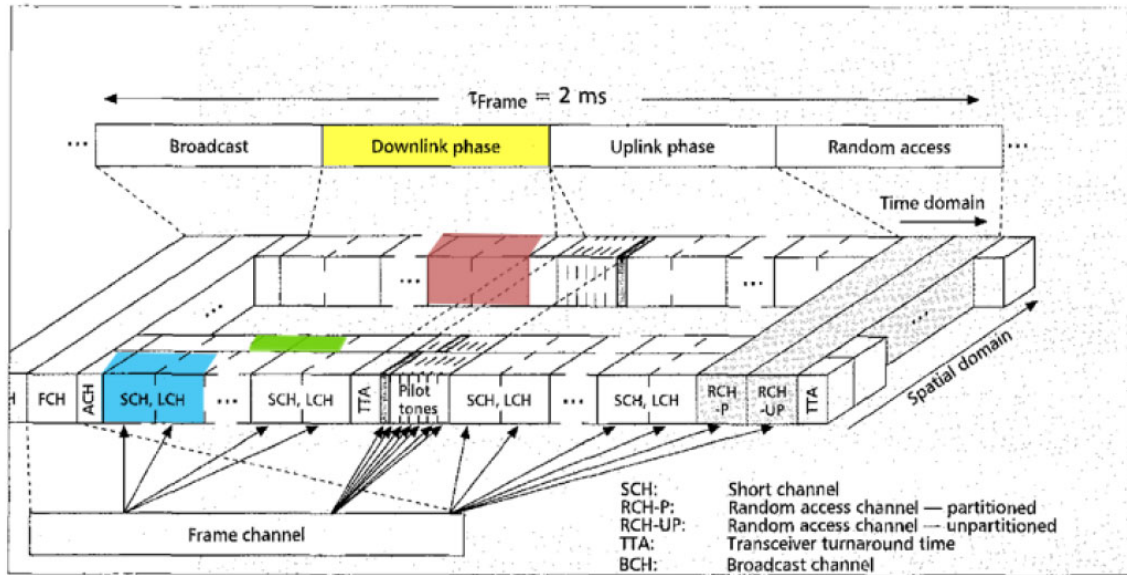
Id. at 31–32. According to Petitioner, “[b]y transmitting to subscribers in different sectors within a single frame, Atsuta distinguishes itself from the ‘conventional’ system that uses separate frames.” *Id.* at 33 (citing Ex. 1005, 5:25–30).

Petitioner contends, “regarding transmitting to ‘substantially only wireless access devices within an[]other of said sector using a second directed scanning beam signal,’ Vornefeld describes using different antenna arrays (with different beams) for different sectors such that a second beam signal assigned to the different sector transmits to substantially only subscribers in a second sector,” and that, “[i]n addition to there being different arrays for different sectors, the beams from one array are directed towards specific subscribers at their specific location.” *Id.* at 34 (citing Ex. 1002 ¶ 107; Ex. 1004, 52–53, 55) (first alteration in original).

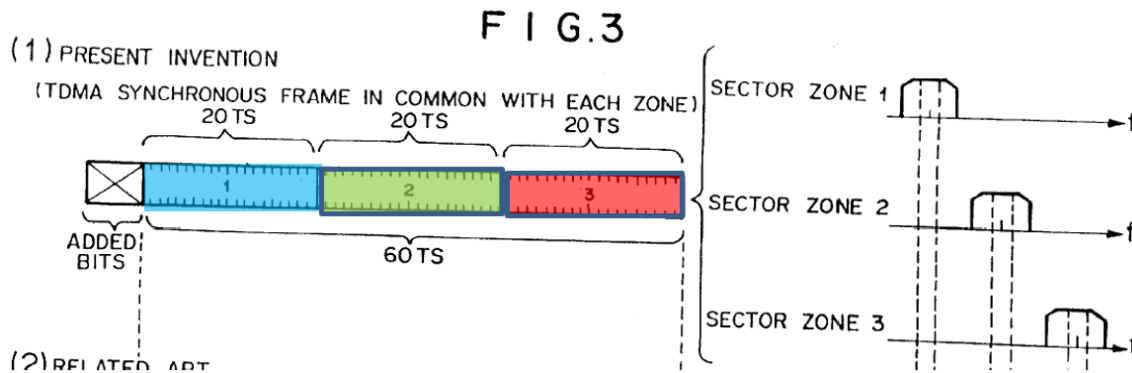
According to Petitioner, “[t]his is the nature of beam forming, where an array targeting a particular sector can target the beam at a specific subscriber in that sector[; t]hus, Vornefeld transmits towards ‘substantially only wireless devices’ within that sector by, at least, using different arrays in different sectors for the first and second transmission and, under Patent Owner’s implied construction, aiming beams to different regions (regardless of the use of separate antenna arrays).” *Id.* at 34–35 (citing Ex. 1002 ¶ 106; Ex. 1004, 53, Fig. 2). Petitioner contends that “Atsuta also describes directional antennas using beams to transmit to specific subscribers in specific sectors in which they are located,” and that a person of ordinary skill in the art “would have understood that such ‘directional’ transmission

would be transmitted to ‘substantially only wireless access devices’ in the desired sector, as the same is the intent of a ‘fan-shaped beams’ directed to a sector.” *Id.* at 35 (citing Ex. 1002 ¶ 107; Ex. 1004, 52; Ex. 1005, 1:12–18, 6:24–64, Fig. 4). For similar reasons, Petitioner contends that Atsuta teaches the use of another directed scanning beam signal for a given sector and that “[m]oreover, Vornefeld already describes using multiple beam signals to transmit to different sectors.” *See id.* at 35–36 (citing Ex. 1004, 55; Ex. 1005, 1:12–18, 6:24–64, Fig. 4; Ex. 1002 ¶ 107).

For the proposed combination, Petitioner contends that a person of ordinary skill in the art “would have readily understood how to incorporate Atsuta’s technique of transmitting to different subscribers (in different sectors) within a single TDD frame into Vornefeld’s system.” *Id.* at 36 (citing Ex. 1002 ¶ 108). Petitioner asserts that “the combination would use one known frame structure in place of another—specifically, Atsuta’s design that includes transmissions to multiple sectors in one frame.” *Id.* at 38 (citing Ex. 1002 ¶¶ 109–111). Petitioner provides annotated versions of Vornefeld’s Figure 3 and Atsuta’s Figure 3, reproduced below, to explain its proposed combination.



■ Figure 3. The basic frame structure of the spatially extended MAC protocol.



Above are Petitioner's annotated version of Vornefeld's Figure 3 (upper figure, which illustrates the basic MAC frame structure of the spatially extended MAC protocol) and an annotated and cropped version of Atsuta's Figure 3 (lower figure, which depicts schematic diagrams comparing TDMA synchronous frame structures and frequency spectrums of the TDMA communication method). *Id.* at 36–37; Ex. 1005, 5:21–25; Ex. 1006, Fig 3 (title). Petitioner asserts that:

The equivalent downlink data in Atsuta Fig. 3 and Vornefeld Fig. 3 are highlighted [above]. In Vornefeld's Fig. 3, each row is a transmission to a different portion of the cell site (as indicated on the 'spatial domain' axis). Thus, the blue, green,

and red downlink data in Vornefeld Fig. 3 show downlink data transmitted to subscribers in different sectors, and the same blue, green, and red downlink data are shown in Atsuta Fig. 3 all within a single frame.

Pet. 36–37. Petitioner contends that, “[b]ecause Vornefeld recognized the need to split up transmissions on the time axis, implementing Atsuta’s teachings of transmitting in sequential timeslots, where timeslots for different sectors are included within a single frame, would have been an obvious variation.” *Id.* at 38 (citing Ex. 1002 ¶ 113).

Petitioner asserts that “Atsuta addresses the issue that, in a conventional sectorized TDMA method, such as the one described in Vornefeld, if transmissions to different sectors occurs in separate TDMA frames, separate demodulating circuits and TDMA control circuits are typically used for each sector.” *Id.* at 25 (citing Ex. 1002 ¶ 90; Ex. 1005, 2:22–57, 5:21–30). According to Petitioner, “[b]y transmitting to multiple different users (in different sectors) in the same TDD frame, Atsuta allows the TDMA communication to run on a ‘simpl[ified]’ structure that only requires a single demodulating circuit and TDMA control circuit, thus reducing the ‘size and power consumption’ of the system,” and that “[s]pecifically, Atsuta’s system provides a ‘common’/‘shared’ functional circuit for the various antenna arrays.” *Id.* at 25–26 (citing Ex. 1005, 2:60–3:8, 2:60–63, 3:23–27, 3:58–60) (alteration in original).

Petitioner contends that a skilled artisan would have been motivated to combine the relevant teachings of Vornefeld and Atsuta, asserting that:

A POSA would have had a reason to combine Vornefeld and Atsuta because they are both directed to the same field of endeavor and attempt to solve the same issues—e.g., efficient broadcasting between a base station and subscribers using TDMA frame-structured transmissions. Ex. 1002, ¶91.

Vornefeld recognizes that certain sets of subscribers are not suited for concurrent transmission due to signal interference constraints. Ex. 1004, 56. Vornefeld's solution to multiple access involves splitting up transmissions on the time axis. Ex. 1004, 55. Similarly, Atsuta describes splitting on the time axis by assigning different timeslots within a single downlink frame to subscribers in different sectors, thus mitigating interference between subscribers and simplifying the signal processing structure at the base station. Ex. 1005, 6:24-58.

Vornefeld acknowledges that computational complexity is a common concern. Ex. 1004, 53, 57. Atsuta's design reduces the required number of functional circuits in order to simplify the overall design (i.e., reduce complexity). Ex. 1002, ¶¶92-93. Because Vornefeld recognized the need to split up transmissions on the time axis, and Atsuta teaches a form of that technique with the benefit of using simpler hardware to transmit to different subscribers and sectors in a single frame, a POSA would have found the use of Atsuta's single-frame structure (and simplified hardware design) with Vornefeld's system to be an obvious design choice. *See SDI Technologies, Inc., v. Bose Corp.*, IPR2013-00350, Paper 36 at 26 (Nov. 7, 2014) ("known elements would have been an obvious matter of design choice"); Ex. 1002, ¶¶95.

Pet. 26–27. Petitioner further contends that "the combination of broadcasting to multiple sectors within a single TDD frame represents no more than the predictable use of prior art elements according to their established functions," and, "[s]pecifically, Atsuta's single-frame structure would be used with Vornefeld's system, which already uses frames." *Id.* at 28 (citations and internal quotations omitted). Petitioner additionally contends that "[g]iven the fit between these technologies, this combination would not result in a difference in function or give unexpected results" and that a person of ordinary skill in the art would have a reasonable expectation of success in combining the teachings. *Id.* at 27–29 (citations and internal quotations omitted).

Patent Owner argues that “Atsuta makes clear that it does not teach the additional limitations added by Claims 28 and 29 and found to be missing from Vornefeld.” Prelim. Resp. 25–26 (emphasizing “same portion of the same frame”). Patent Owner asserts that “[b]eamforming and organization of the downlink transmissions are at the heart of the ’931 Patent,” *id.* at 26, and argues that “Atsuta has nothing to do with the coordination of beamformed downlink transmissions and instead addresses the organization of conventional uplink transmissions,” *id.* at 28. According to Patent Owner, “[c]laims 28 and 29 of the ’931 Patent require that multiple beamformed signals be transmitted ***at precisely the same time***, and does so by putting them in the same portion of the same TDD frame,” and that they must be transmitted simultaneously. *Id.* at 34; *see, e.g., id.* at 15 (“Claims 28 and 29 are directed to the *simultaneous* transmission of multiple beamformed signals, in a single frame, to wireless devices located in different sectors.” (emphasis added)). Patent Owner further argues that “Atsuta teaches the opposite—dividing transmissions into different time slots so that they ***never overlap in time***,” and teaches away from the claimed invention. *Id.* at 33–34; *see also id.* at 21 (“To the extent [Atsuta] is relevant at all, it teaches away from Claims 28 and 29”), 28 (“Atsuta teaches the opposite of what is required by Claims 28 and 29 of the ’931 Patent”).

We, on the present record, do not agree with Patent Owner’s arguments. As discussed above in the Claim Construction section, Patent Owner has not explained adequately why the challenged claims require *simultaneous* transmission to different sectors, and we decline to construe the claims as limited in that manner. Also, Patent Owner’s assertions that Atsuta lacks teachings pertaining to beamforming and downlink frames are based almost exclusively on unsupported and conclusory attorney argument,

which is not evidence. *See, e.g.*, Prelim. Resp. 30 n.7 (Patent Owner’s critical proposition, made without citation to evidence, that: “[Petitioner] erroneously refers to these as ‘downlink’ timeslots. But Atsuta is actually directed to uplink transmissions (and the receipt of uplink transmissions by the base station).”); *see, e.g., Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009) (“[U]nsworn attorney argument . . . is not evidence and cannot rebut . . . other admitted evidence . . .”). Patent Owner does not directly address, for example, Atsuta’s disclosures in column 6 that are asserted by Petitioner to teach downlink transmissions. *See, e.g.*, Pet. 30 (citing Ex. 1005, 6:31–55). Additionally, Dr. Almeroth testifies, for example, that Atsuta discloses TDD frames “with timeslots assigned to downlink data to subscribers in different sectors,” that Atsuta “describes . . . transmitting downlink data to users in different sectors using directional antenna arrays,” and that a person of ordinary skill in the art “would have readily understood how to incorporate Atsuta’s technique of transmitting to users in different sectors within a single downlink TDD frame into Vornefeld’s [beamforming] system.” Ex. 1002 ¶¶ 105–106 (footnote omitted), 108. At this stage of the proceeding, that testimony is unrebutted.

Patent Owner further argues that “[a] person of ordinary skill would not seek to combine Atsuta with Vornefeld because such a combination would thwart the very purpose of Vornefeld.” Prelim. Resp. 36. According to Patent Owner, Vornefeld, like the claimed invention, “seek[s] to allow for simultaneous transmission of multiple beamformed signals,” and “Atsuta, on the other hand, consistently teaches that signals should be transmitted sequentially in time, with each signal assigned a different portion of a TDD frame so they ‘do not overlap.’” *Id.* at 36–37. Patent Owner argues that “[a] person of skill in the art seeking to develop a TDD communications protocol

allowing for the *simultaneous* transmission of multiple downlink beamformed signals would not turn to a patent teaching the *sequential* transmission of signals so they never overlap in time.” *Id.* at 37.

We, on the present record, do not agree with this argument. Patent Owner provides little more than the assertion that the two references are different, but, even if all of Patent Owner’s characterizations are correct, Patent Owner does not explain adequately why the “simultaneous” aspect is vital to the purpose of Vornefeld such that the use of Atsuta’s methodology would thwart that purpose in a manner that would prevent a person of ordinary skill in the art from “turn[ing] to a patent teaching the sequential transmission of signals,” as argued by Patent Owner. *Id.* (emphasis omitted). Petitioner, *inter alia*, contends, with the supporting and presently un rebutted testimony of Dr. Almeroth, that applying Atsuta’s design to Vornefeld’s system would reduce the complexity of the overall design thus motivating a person of ordinary skill in the art to make the proposed combination. *See* Pet. 26–27 (citing Ex. 1002 ¶¶ 91–93); *see also* Ex. 1002 ¶ 91 (“A POSA would have been motivated to combine Vornefeld and Atsuta because Atsuta provides a solution to a transmission interference problem recognized by Vornefeld, while providing the additional benefit of simplified hardware requirements.”).

f. Conclusion as to Dependent Claim 28

Having considered the parties’ arguments and evidence, we determine that Petitioner has articulated sufficient reasons, for purposes of this Decision, why one of ordinary skill in the art would have modified Vornefeld’s system to use Atsuta’s single-frame structure, and that Petitioner has demonstrated sufficiently, for purposes of this Decision, that the proposed combination yields a transceiver having all of the elements of

dependent claim 28, including those of the underlying independent claim 1. Accordingly, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in its challenge to dependent claim 28 as being obvious over Vornefeld and Atsuta, and we institute an *inter partes* review on that basis.

4. The Alleged Obviousness of Claim 29 over Vornefeld and Atsuta

Dependent claim 29 recites “a method of communicating” between base stations and wireless access devices that is substantively similar to the recitations of dependent claim 28. *See* Ex. 1001, 32:16–34 (underlying independent claim 19), 34:1–6. For claim 29, Petitioner relies on its contentions regarding claim 28 with an additional discussion of the requirement that “the broadcast beam signal compris[es] a start of frame field capable of synchronizing receivers in said wireless access devices.” Pet. 21–23, 38–39; Ex. 1001, 32:28–30. Patent Owner does not make any additional arguments for claim 29 beyond those addressed above. *See* Prelim. Resp. 25 (addressing claims 28 and 29 together).

Having considered Petitioner’s contentions and evidence in light of Patent Owner’s arguments, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in its challenge to dependent claim 29 as being obvious over Vornefeld and Atsuta.

E. The Alleged Obviousness of Claims 28 and 29 over Vornefeld and Goldberg (Ground 2)

Petitioner contends that dependent claims 28 and 29 of the ’931 patent would have been obvious over Vornefeld and Goldberg. *See* Pet. 39–48. Petitioner, as it did in Ground 1, contends, with support from Dr. Almeroth, that Vornefeld discloses the subject matter of the underlying independent

claims and further contends that “Goldburg describes transmitting to subscribers in different ‘regions’ within a single TDD frame,” and, “[b]y applying Goldburg’s technique to Vornefeld, each subscriber is assigned a separate region, and for each a region a weight vector is calculated based on the location of the subscriber relative to the base station.” *Id.* at 38–40 (citing Ex. 1006, 7:56–60, 12:11–24, 20:8–39; Ex. 1002 ¶ 117). Petitioner further contends, *inter alia*, that “[t]his technique [of Goldburg] enhances beamforming, such as that described in Vornefeld, by adjusting phase and amplitude to target individual subscribers and not interfere with nearby subscribers.” *Id.* at 40 (citing Ex. 1002 ¶ 119).

Patent Owner’s arguments against this ground are somewhat similar to those made for the Atsuta ground. For example, although Patent Owner concedes that “Goldburg does touch on smart antenna techniques . . . similar to those used to create beamformed signals,” Patent Owner asserts—again relying heavily on attorney argument—that “Goldburg does not in any way address how such transmissions should be organized in a TDD network.” Prelim. Resp. 22; *see also id.* at 38 (“Goldburg provides no disclosure of TDD or any particular TDD frame structure.”). Patent Owner argues, “[j]ust like Atsuta, Goldburg fails to teach the transmission of multiple beamformed downlink transmissions in the same portion of the same TDD frame.” *Id.* at 39. And, similar to that discussed above, Patent Owner argues that one would not combine the references’ teachings because adding Goldburg would thwart the “simultaneous” transmission objective of Vornefeld and because the two references are very different. *See id.* at 40–42.

For the reasons discussed above, Petitioner has shown a reasonable likelihood that at least one claim of the ’931 patent is unpatentable under at least one ground, the Vornefeld-Atsuta ground. Having decided to institute

as to at least one challenged claim, we institute on both challenged claims and on all asserted grounds. The parties may address further during trial the disputed issues pertaining to this Vornefeld-Goldburg ground.

F. The Alleged Obviousness of Claims 28 and 29 over Youssefmir and Atsuta (Ground 3), over Vornefeld, Atsuta, and Tangemann (Ground 4), and over Vornefeld, Goldburg, and Tangemann (Ground 5)

Ground 3 is similar to Ground 1, with Youssefmir replacing Vornefeld as the primary reference. *See* Pet. 51 (“Youssefmir does not explicitly state that the different downlink slots D1, D2 would be allocated to user terminals in different sectors; however, as discussed above, such a frame design was already taught by Atsuta.”); *id.* at 52 (“A POSA would have been motivated to combine Youssefmir and Atsuta for at least the reasons discussed above with respect to the combination of Vornefeld and Atsuta.”). Patent Owner, as with the other grounds, makes assertions on highly technical and fact intensive issues almost exclusively based on attorney argument and premised on the challenged claims being limited to simultaneous transmission of signals. *See, e.g.,* Prelim. Resp. 45 (“[I]mportantly, there is no disclosure in Youssefmir of beamformed signals being sent in the same portion of the same TDD frame. To the contrary, like the other newly asserted prior art references advanced by Verizon, Youssefmir expressly teaches transmitting to each wireless device sequentially, one by one.”); *id.* at 42–44 (Patent Owner characterizing Youssefmir as utilizing a “round robin polling” approach that was rejected by the ’931 patent, and arguing that “[b]ecause Youssefmir employs sequential polling of wireless devices, it does not satisfy the ‘broadcast beam signal’ limitations of independent Claims 1 and 19”). These arguments are best addressed after the development of a full record during the trial.

Grounds 4 and 5 are similar to Grounds 1 and 2 with the addition of Tangemann. *See* Pet. 75–82. We understand Petitioner to offer these grounds 4 and 5 in the alternative to address a purported claim construction of “sector” by Patent Owner in the related district court litigation. *See id.* at 75. Patent Owner does not present separate arguments for Grounds 4 and 5, but rather asserts that “none of the deficiencies in [Petitioner] Verizon’s asserted prior art discussed above turn on the precise definition of the term ‘sector’ or require that it be viewed as a portion of the cell smaller than the coverage area of an antenna,” and that “Verizon thus cannot show a reasonable likelihood that it would prevail on Grounds 4 and 5 for the very same reasons as Grounds 1 and 2.” Prelim. Resp. 46.

For the reasons discussed above, Petitioner has shown a reasonable likelihood that at least one claim of the ’931 patent is unpatentable under at least one ground. Having decided to institute as to at least one challenged claim, we institute on both challenged claims and on all asserted grounds. The parties may address further during trial the disputed issues pertaining to Ground 3–5.

VII. CONCLUSION

Petitioner has demonstrated a reasonable likelihood of prevailing in showing the unpatentability of both challenged claims 28 and 29 as being obvious over Vornefeld and Atsuta. Accordingly, we institute an *inter partes* review on both challenged claims on all asserted grounds. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); 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.”). At this stage of the proceeding,

we have not made a final determination with respect to the construction of any claim term or with respect to the patentability of any of the challenged claims.

VIII. ORDER

For the foregoing reasons, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 28 and 29 of the '931 patent is instituted with respect to all grounds of unpatentability set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '931 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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Patent 7,230,931 B2

PETITIONER:

Justin Oliver
Stephen Yam
VENABLE LLP
joliver@venable.com
syam@venable.com

PATENT OWNER:

Sarah Spires
SKIERMONT DERBY LLP
sspires@skiermontderby.com