

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JAPAN RADIO CO., LTD., DENSO CORPORATION, and
U-BLOX AG
Petitioner,

v.

BROADCOM CORPORATION,
Patent Owner.

IPR2019-00816
Patent 8,902,104 B2

Before JAMES A. TARTAL, MICHAEL L. WOODS, and
RICHARD H. MARSCHALL, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

INTRODUCTION

Japan Radio Co., Ltd., Denso Corporation, and u-blox AG (collectively, “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting institution of an *inter partes* review of claims 1, 2, 5–13, 15, and 16 of U.S. Patent No. 8,902,104 B2 (Ex. 1001, “the ’104 patent”). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of claims 1, 2, 5–13, 15, and 16 of the ’104 patent on all presented challenges. Paper 8. After institution, Patent Owner did not file a Response. Instead, Patent Owner filed a Contingent Motion to Amend and Request for Preliminary Guidance (Paper 11, “MTA”), and Petitioner filed an Opposition (Paper 12, “Pet. Opp. MTA”). We then issued our Preliminary Guidance (Paper 13, “PG”), which indicated, based on the record at that time, that Petitioner demonstrated a reasonable likelihood that the proposed substitute claims were unpatentable. *Id.* at 5.

Subsequent to the Preliminary Guidance, Patent Owner filed a Revised Motion to Amend (Paper 15, “RMTA”), Petitioner filed an Opposition (Paper 19, Pet. Opp. RMTA), Patent Owner filed a Reply (Paper 24, “PO Reply”), and Petitioner filed a Sur-reply (Paper 30, “Pet. Sur-reply”). An oral hearing in this proceeding was held on July 1, 2020, and a transcript of the hearing is included in the record (Paper 33, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5–13, 15, and 16 of the ’104 patent are unpatentable. We also deny Patent Owner’s Revised Motion

to Amend because Petitioner has shown by a preponderance of the evidence that the proposed substitute claims are unpatentable.

BACKGROUND

A. Real Parties in Interest

Petitioner states that its real parties in interest are Japan Radio Co., Ltd., DENSO CORPORATION, DENSO INTERNATIONAL AMERICA, Inc., DENSO Manufacturing Tennessee, Inc., DENSO Wireless Systems America, Inc., u-blox AG, u-blox America, Inc., and u-blox San Diego, Inc. Pet. 1. Patent Owner states that it is the sole real party in interest for Patent Owner. Paper 7, 2.

B. Related Proceedings

The parties identify the following proceedings that may affect, or could be affected by, a decision in this proceeding because they involve assertions of the '104 patent by Broadcom: *Broadcom Corp. v. Toyota Motor Corp.*, No. 2-18-cv-00190-JRG (E.D. Tex. 2018); *Certain Infotainment Systems, Components Thereof, and Automobiles Containing the Same*, Inv. No. 337-TA-1119 (U.S.I.T.C.) (instituted May 7, 2018). Paper 7, 2; Pet. 2. The parties also identify IPR2019-00737 as a related proceeding, which challenges the '104 patent on different grounds. Pet. 2; *see also* Paper 7, 2. We issue the Final Written Decision in IPR2019-00737 concurrently with this Decision.

C. The '104 Patent (Ex. 1001)

The '104 patent issued on December 2, 2014, from an application filed July 2, 2012. Ex. 1001, codes (22), (45). The '104 patent claims priority through a series of three continuation applications to an application filed on March 18, 2005. *Id.* at code (63). The '104 patent relates to

“satellite positioning systems and, more particularly, to a method and apparatus for combining measurements and determining clock offsets between different satellite positioning systems.” *Id.* at 1:22–25. The different satellite position systems include the Global Positioning System (“GPS”), Europe’s GALILEO system, and Russia’s GLONASS system. *See id.* at 1:34–37.

Figure 1 of the ’104 patent is reproduced below.

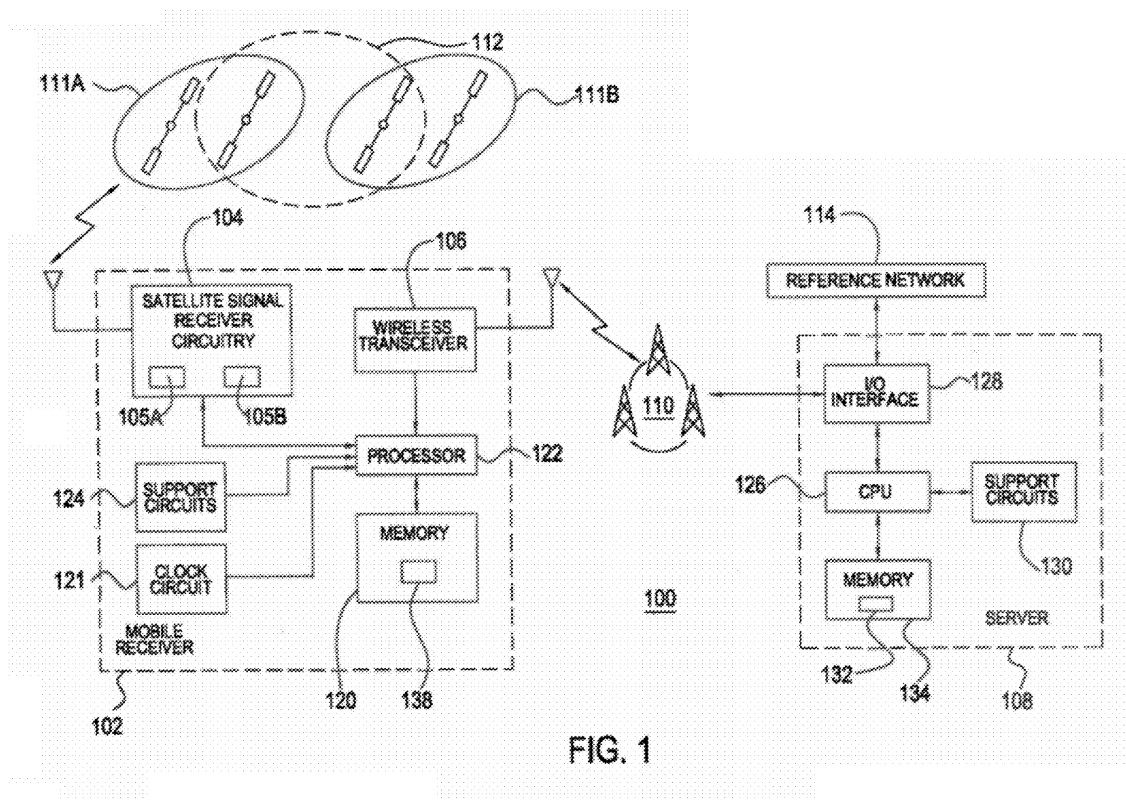


Figure 1 is “a block diagram depicting an exemplary embodiment of a position location system.” Ex. 1001, 3:25–26. Figure 1 depicts mobile receiver 102 in communication with server 108 via wireless communication network 110. *Id.* at 3:49–52. Mobile receiver 102 obtains satellite measurement data with respect to satellites 112, which are selected from first satellite navigation system 111A and second navigation system 111B. *Id.* at

3:57–63. First satellite navigation system 111A may, for example, be a GPS-based system, while second navigation system 111B may be a GALILEO system or GLONASS system. *Id.*

GPS receivers measure time delays called “pseudoranges” in an effort to determine the location of the receiver, where “[a] set of four pseudoranges together with knowledge of absolute times of transmission of the GPS signals and satellite positions in relation to these absolute times is sufficient to solve for the position of the GPS receiver.” Ex. 1001, 1:47–58. “The absolute times of transmission (or reception) are needed in order to determine the positions of the GPS satellites at the times of transmission and hence to compute the position of the GPS receiver.” *Id.* at 1:59–62.

According to the ’104 patent, GALILEO and GLONASS systems employ similar methods to determine the position of a receiver. *Id.* at 2:39–42. The ’104 patent notes that it is sometimes desirable for receivers to process signals from multiple satellite systems at the same time when a preferred satellite system lacks adequate signal strength. *Id.* at 2:42–46. Combining measurements from different satellite systems introduces complications because the satellite systems typically use different time references. *Id.* at 2:46–58.

The ’104 patent seeks to satisfy the need for a method and device that combines measurements from multiple satellite systems while compensating for the time differences between the systems. Ex. 1001, 2:59–62. In one embodiment, shown in a series of method steps in Figure 2’s “flow diagram,” the process begins by measuring pseudoranges from two different satellite systems. *Id.* at 5:36–44, Fig. 2 (steps 204, 206). Next, the system obtains “a difference in time references between the first and second satellite

navigation systems.” *Id.* at 5:52–54, Fig. 2 (step 208). Finally, the “first and second pseudoranges are combined using the time reference difference,” and a new position is computed using the combined pseudoranges. *Id.* at 5:55–62, Fig. 2 (steps 209, 210).

D. Illustrative Claim

Petitioner challenges claims 1, 2, 5–13, 15, and 16. Pet. 1. Of those claims, claims 1 and 12 are independent. Ex. 1001, 9:24–10:50. Claim 1 is reproduced below.

1. A method for determining a position of a mobile receiver, comprising:
 - measuring a first pseudorange from the mobile receiver to a first satellite of a first satellite navigation system;
 - measuring a second pseudorange from the mobile receiver to a second satellite of a second satellite navigation system;
 - determining a difference between a first time reference of the first satellite navigation system and a second time reference of the second satellite navigation system; and
 - combining the first pseudorange and the second pseudorange using the difference to generate combined first and second pseudoranges.

Id. at 9:24–36.¹

E. Asserted Grounds

Petitioner challenges claims 1, 2, 5–13, 15, and 16 on five grounds.

Pet. 7. Petitioner challenges:

Claims	35 U.S.C. §	Reference(s)/Basis
1, 2, 6–13, 16	102(b)	Beser ²
5, 15	103(a)	Beser, GLONASS ICD ³
1, 2, 6, 7, 11–13	102(b)	Lennen ⁴
8–10, 16	103(a)	Lennen, Kaplan ⁵
5, 15	103(a)	Lennen, GLONASS ICD

Petitioner also relies on the Declaration of Dr. Stephen Heppe.

Ex. 1003 (“Heppe Declaration”).⁶

We briefly address the prior art status of the references Petitioner relies upon. As to Beser, Petitioner contends that it was published in a

¹ Petitioner also challenges Patent Owner’s proposed substitute claims as part of Petitioner’s Opposition to Patent Owner’s Revised Motion to Amend. We will address those proposed amendments and challenges separately below.

² Beser, Jacques, Ph.D, Integrated GPS/GLONASS User Equipment, Advisory Group for Aerospace Res. & Dev., Lecture Series 207 (Ex. 1004) (“Beser”).

³ The Global Navigation Satellite System GLONASS Interface Control Document, Coordination Scientific Information Center (Version 4.0) (Ex. 1006) (“GLONASS ICD”).

⁴ U.S. Patent No. 5,923,287, issued July 13, 1999 (Ex. 1005) (“Lennen”).

⁵ Kaplan, Elliott D., Understanding GPS Principles and Applications, Artech House Mobile Communications Series (1996) (Ex. 1007) (“Kaplan”).

⁶ Petitioner also submits other declarations from Dr. Stephen Heppe in connection with Patent Owner’s Motion to Amend and Revised Motion to Amend. Exs. 1024, 1029.

lecture series titled “System Implications and Innovative Applications of Satellite Navigation” in June 1996. Pet. 5–6 (citing Ex. 1004, 1; Ex. 1010; Ex. 1011). Petitioner also contends that Beser was publicly accessible in 2001 via the file history of U.S. Patent No. 6,229,479. *Id.* (citing Ex. 1012). We are persuaded that Petitioner has proven by a preponderance of the evidence that Beser is prior art to the ’104 patent under 35 U.S.C. § 102(b). We address this issue further, with reference to Patent Owner’s arguments in connection with its Revised Motion to Amend.

As to GLONASS ICD, Petitioner asserts that it was published in 1998. Pet. 6 (citing Ex. 1006, 1; Ex. 1013, 27). Petitioner also points to two additional references that describe the publication and availability of GLONASS ICD in 1998 and 2003. *See id.* at 6–7 (citing Ex. 1006, 45; Ex. 1013, 27; Ex. 1015, 10-18, 10-30; Ex. 1016). We are persuaded that Petitioner has proven by a preponderance of the evidence that GLONASS ICD is prior art to the ’104 patent under 35 U.S.C. § 102(b).

As to Kaplan, Petitioner asserts that it was published in 1996, relying on its copyright date and Library of Congress catalog listing. Pet. 7 (citing Ex. 1007; Ex. 1017). We are persuaded that Petitioner has proven by a preponderance of the evidence that Kaplan is prior art to the ’104 patent under 35 U.S.C. § 102(b).

ANALYSIS

A. Legal Standards

To prevail in its challenges, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2018). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is

unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. See *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burdens of proof in an *inter partes* review).

Petitioner relies on both anticipation and obviousness in its challenges to the claims of the ’104 patent. To anticipate a claim under 35 U.S.C. § 102, “a single prior art reference must expressly or inherently disclose each claim limitation.” *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008). “A prior art reference anticipates a patent’s claim under § 102(b) if it ‘discloses each and every element of the claimed invention arranged or combined in the same way as in the claim.’” *Monsanto Tech. LLC v. E.I. DuPont de Nemours & Co.*, 878 F.3d 1336, 1342–43 (Fed. Cir. 2018) (quoting *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1341 (Fed. Cir. 2016)).

As to obviousness, a claim is unpatentable as obvious 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) where in evidence, so-called

secondary considerations. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art” at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

Petitioner contends that a person having ordinary skill in the art “would have had a Bachelor’s Degree in an Engineering discipline such as Electrical, Aeronautical or Mechanical Engineering, or a Bachelor’s Degree in Computer Science or equivalent degree, plus at least two years of relevant experience with GNSS or similar systems.” Pet. 12 (citing Ex. 1003 at ¶ 46). Patent Owner did not file a Response or dispute Petitioner’s proposal at any point in this proceeding.

We adopt Petitioner’s asserted level of ordinary skill because it is consistent with the prior art of record.

C. Claim Construction

In *inter partes* reviews, we interpret claims in the same manner used in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) (setting forth claim

construction approach in district court cases). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1313–14. Although extrinsic evidence, when available, may also be useful when construing claim terms under this standard, extrinsic evidence is generally “less reliable” than the intrinsic record. *See id.* at 1318–19. Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Claim 1 requires “combining the first pseudorange and the second pseudorange using the difference to generate combined first and second pseudoranges.” Ex. 1001, 9:34–36. Claim 12 includes a nearly identical limitation, but uses the word “combine” rather than “combining.” *Id.* at 10:25–27. Petitioner contends that we should construe these limitations to mean “accounting for the difference in time references between the two satellite navigation systems and using the difference to generate pseudoranges that can be used together.” Pet. 13. Petitioner relies on two passages from the specification to support its construction. *Id.* at 14–16. The first passage describes the “combining” step 209 of the method shown in Figure 2:

At step 209, the first and second pseudoranges are combined using the time reference difference obtained at step 208. That is, a process is performed that allows the first and second pseudoranges measured with respect to different satellite navigation systems to be used together to compute position and/or time.

Ex. 1001, 5:55–60. The second passage provides further guidance regarding the combining step:

The pseudorange measurements are “combined” by accounting for the difference in time references between, the two satellite navigation systems. In other words, a process is performed that allows the pseudorange measurements to be used together, despite the measurements being made with respect to two different satellite navigation systems.

Id. at 8:59–65. Petitioner argues that its proposed construction properly tracks the language of the specification because these are the only descriptions of the combining step in the ’104 patent. Pet. 16.⁷

Petitioner’s proposed construction finds support in the claim language. For example, the claim language refers to “combining . . . using the difference,” which refers to the “difference between” the time references of the first and second satellite systems referred to earlier in the claims. *See* Ex. 1001, 9:31–33, 10:21–23. Accordingly, the portion of Petitioner’s proposed construction that refers to “the difference in time references between the two satellite navigation systems and using the difference” finds support in other portions of the claims referring to determining a difference. *See id.* The additional portion of Petitioner’s construction requiring “using the difference to generate pseudoranges that can be used together” also finds

⁷ Petitioner also addresses an alleged proposed construction from Patent Owner in the related ITC proceeding. *See* Pet. 16–18. Patent Owner has not submitted a Response, or otherwise advocated for that construction in this forum. In addition, neither party has submitted any documents from the ITC proceeding, including a record of Patent Owner’s claim construction argument or any claim construction determination made by the ITC. Under these circumstances, we need not address Patent Owner’s alleged proposal in the ITC.

support in the claim language, which refers to “generat[ing]” pseudoranges. In addition, the “accounting for” and “used together” language in Petitioner’s proposed construction, which we interpret as an effort to construe what the claim means when it says to “combine” pseudoranges, finds direct support in the portions of the specification discussing the combining step. *See id.* at 5:55–60, 8:59–65.

Based on the foregoing, we adopt Petitioner’s proposed construction of the “combining”/“combine” limitations in claims 1 and 12 to mean “accounting for the difference in time references between the two satellite navigation systems and using the difference to generate pseudoranges that can be used together.”

D. Challenge Under 35 U.S.C. § 102 Based on Beser

Petitioner challenges claims 1, 2, 6–13, and 16 under 35 U.S.C. § 102(b) as anticipated by the Beser. Pet. 18–42. For these challenges, Petitioner cites to Beser and the Heppe Declaration. *Id.*

1. Beser (Ex. 1004)

Beser relates to “[i]ntegrated GPS/GLONASS receivers” that offer “better availability, performance and integrity than GPS-only receivers.” Ex. 1004, 3-1.⁸ Beser describes the “R-100 series” and “more compact” “GNSS-200” receivers as models to discuss integrated receiver components and functions. *Id.* “Air, sea and ground results are presented” for both the R-100 series and GNSS-200 receivers. *Id.*

Beser’s Figure 4-1 is reproduced below.

⁸ We cite to the native page numbering used in Beser, rather than the pagination added when Beser was filed as an exhibit.

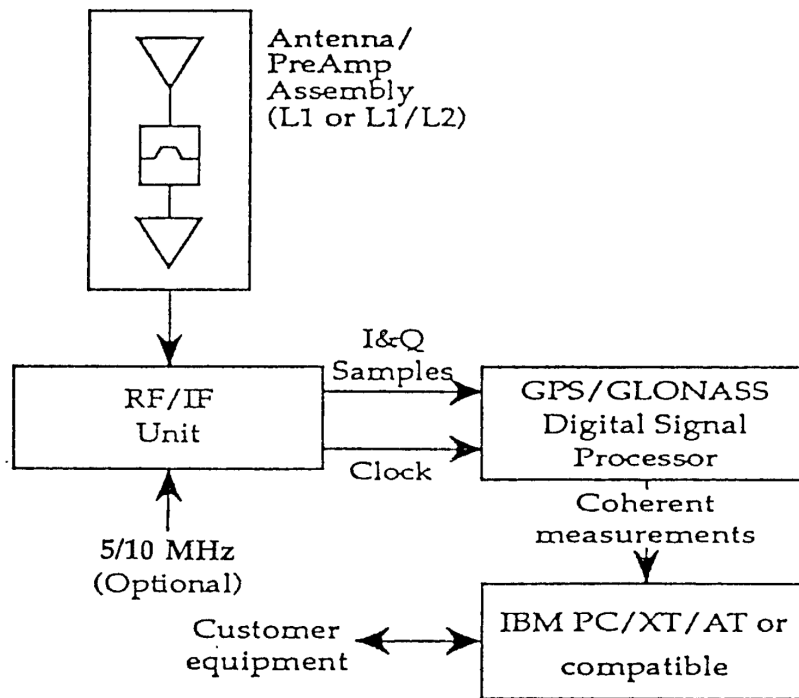


FIGURE 4-1. R-100 INTEGRATED GPS/GLONASS RECEIVER ARCHITECTURE.

Figure 4-1 above depicts the R-100 receiver architecture, including an “Antenna/PreAmp Assembly,” “RF/IF Unit,” “GPS/GLONASS Digital Signal Processor,” and an IBM PC. *Id.* at 3-12. Beser also includes figures showing a schematic of the R-100 L1/L2 RF/IF Unit and the GNSS-200 architecture. *Id.* at 3-14 (Figure 4-2), 3-18 (Figure 5-2).

Beser notes that “[t]he major software issue relating to dual GLONASS/GPS operations has to do with timing” due to “the relation between the GPS and GLONASS time references,” which must “be known for acceptable position accuracies to be achieved.” Ex. 1004, 3-8. To address this issue, Beser discloses measuring the pseudoranges from the GPS and GLONASS satellite systems and determining the “GPS-to-GLONASS time difference” relationship ahead of time. *Id.* at 3-8 to 3-9. Beser then discloses a series of equations so that “this issue can be handled with limited effort.” *Id.* at 3-10.

2. Discussion of Independent Claim 1

Petitioner asserts that Beser discloses all of the limitations of claim 1. Pet. 14–23. Petitioner provides analysis of each limitation in claim 1, with citations to Beser that correspond to each of the claim limitations. *Id.* Petitioner also cites to the relevant declarant testimony. *Id.* (citing various portions of Ex. 1003).

Claim 1’s preamble states: “A method for determining a position of a mobile receiver.” Petitioner asserts that Beser discloses the requirements of the preamble, to the extent it limits the claim, because it discloses tracking the receiver while undergoing dynamic maneuvers, which suggests mobile operation. Pet. 20 (citing Ex. 1004, 3-14). Petitioner also argues that Beser further indicates mobile operation by describing “both the ‘position process’ and the ‘velocity process’ for computing position” and other variables indicated mobile operation of the receiver. *Id.* (citing Ex. 1003 ¶ 98).

The first two steps of claim 1 require “measuring a first pseudorange” and “measuring a second pseudorange” measured from the receiver to satellites in the first and second navigation systems, respectively. Petitioner contends that Beser discloses equations for measuring a first pseudorange from a first satellite system (e.g., GLONASS), and a second pseudorange from a second satellite system (e.g., GPS). Pet. 21–22 (citing Ex. 1003 ¶¶ 99–102; Ex. 1004, 3-8 to 3-10, 3-14, 3-15, 3-21, Figs. 4-1, 6-5, 6-6). Petitioner points to specific equations Beser discloses for measuring the pseudoranges. *Id.*

The next limitation in claim 1 requires “determining a difference between a first time reference of the first satellite navigation system and a second time reference of the second satellite navigation system.” Petitioner

contends that Beser discloses this limitation because it describes the need to determine the “two receiver clock offsets” in order to determine a position based on a combination of GPS and GLONASS measurements, and then discloses how to determine the “GPS-to-GLONASS time difference relationship.” Pet. 23 (citing Ex. 1003 ¶¶ 103–106; Ex. 1004, 3-9, 3-10). Petitioner contends that Beser refers to the time difference “as $t_{\text{GLN}} - t_{\text{GPS}}$ in the expression ‘ $\text{PR}_{\text{GLN}} + c(t_{\text{GLN}} - t_{\text{GPS}})$.’” *Id.* (quoting Ex. 1004, 3-10). According to Petitioner, one of ordinary skill in the art “would have understood that the difference in system time references ($t_{\text{GLN}} - t_{\text{GPS}}$) is also the difference in *offsets* from the receiver’s local clock to the two time references (*i.e.*, since the receiver’s local clock has a single value or ‘state’ at any instant of time, $t_{\text{GLN}} - t_{\text{GPS}} = \delta t_{\text{R}_{\text{GPS}}} - \delta t_{\text{R}_{\text{GLN}}}$).” *Id.* (citing Ex. 1003 ¶ 104). Petitioner contends that these offsets can then be used to “‘software correct’ the measurements of one system into the time reference of the other system.” *Id.* at 23–24 (citing Ex. 1003 ¶¶ 104–105; Ex. 1004, 3-9, 3-10, 3-15, § 4.3). Petitioner also contends that Beser discloses an alternative method, where the receivers receive the time difference or offset, which also involves “determining a difference” between the time references as claimed. *Id.* at 24–25 (citing Ex. 1003 ¶ 106; Ex. 1004, 3-10).

As to the “combining” step we construed above, Petitioner argues that both of Beser’s pseudoranges are measured to satellites of the first and second navigation systems and the measurements are software correctable “to the time base of the other system” using, for example, the time difference determined in the previous step. *See* Pet. 25–26 (citing Ex. 1003 ¶¶ 107–109; Ex. 1004, 3-9, 3-10). Petitioner also points to Beser’s statement that this process provides a “solution based on a combination of GPS and

GLONASS measurements.” *Id.* at 26 (quoting Ex. 1004, 3-9 (citing Ex. 1003 ¶ 108)). Petitioner also contends that Beser discloses combining the first and second pseudoranges “using the claimed ‘difference’ to generate combined first and second pseudoranges (*i.e.*, the set of measurements which are used to compute the navigation solution),” when Beser employs a “software correcting” procedure “where the time difference is known ahead of time.” *Id.* at 26–27 (citing Ex. 1003 ¶ 109; Ex. 1004, 3-9).

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Beser discloses all of the limitations of claim 1. In circumstances such as this where Patent Owner has chosen not to address or dispute Petitioner’s arguments and evidence, we view Patent Owner’s arguments as waived. *See In re NuVasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016) (“Although the Board did not make findings as to whether any of the other claim limitations (such as fusion apertures or anti-migration teeth) are disclosed in the prior art, it did not have to: NuVasive did not present arguments about those limitations to the Board. . . . The Board, having found the only disputed limitations together in one reference, was not required to address undisputed matters.”); Paper 9, 6–7 (emphasizing that “any arguments for patentability not raised in the response may be deemed waived”).

Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Beser discloses all of the limitations of claim 1, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 18–27; Ex. 1003 ¶¶ 98–109.

3. *Remaining Claims*

We have also reviewed Petitioner’s challenge of claims 2, 6–13, and 16. Petitioner provides analysis of each limitation in claims 2, 6–13, and 16, with citations to Beser that correspond to each of the claim limitations. Pet. 27–42. Petitioner also cites to the relevant declarant testimony of Dr. Heppe. *Id.* (citing Ex. 1003 ¶¶ 110–146). Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Beser discloses all of the limitations of claims 2, 6–13, and 16.

We are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Beser discloses all of the limitations of claims 2, 6–13, and 16, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 27–42; Ex. 1003 ¶¶ 110–146.

E. Challenge Under 35 U.S.C. § 103 Based on Beser, GLONASS ICD, in light of the Knowledge of a Person of Ordinary Skill in the Art

Petitioner challenges claims 5 and 15 under 35 U.S.C. § 103 based on Beser, GLONASS ICD, and in light of the knowledge of a person of ordinary skill in the art. Pet. 42–46. For these challenges, Petitioner cites to the asserted references and the Heppe Declaration. *Id.*

1. GLONASS ICD (Ex. 1006)

GLONASS ICD relates to an interface control document that “specifies parameters of [the] interface between [the] GLONASS space

segment and user equipment.” Ex. 1006, 6.⁹ GLONASS ICD discloses the “content and a format of the GLONASS navigation message.” *Id.* at 17. More specifically, the GLONASS navigation message within the navigation signal provides “users with requisite data for positioning, timing and planning observations.” *Id.* The message includes “non-immediate information” such as “data on GLONASS time” such as a “GLONASS time scale correction.” *Id.* at 26. GLONASS ICD includes a value corresponding to the “correction to GPS time relative to GPS time or [the] difference between these time scales T_{GPS} and T_{GL} .” *Id.*

2. Discussion of Dependent Claims 5 and 15

Claim 5 depends from claim 1 and further requires “receiving the difference between the first time reference and the second time reference from the first satellite navigation system.” Ex. 1001, 9:47–49. Claim 15 depends from claim 12 and further requires “wherein the satellite receiver circuitry is further configured to receive the difference between the first time reference and the second time reference from the first satellite navigation system.” *Id.* at 10:36–39. Both claims therefore require receiving the time difference from a satellite navigation system.

Petitioner alleges that Beser alone discloses, “the relation between the two references can be measured and communicated to users” from an external source. Pet. 44 (citing Ex. 1004, 3-10). Petitioner acknowledges that Beser “does not explicitly disclose receiving the difference between the first time reference and the second time reference specifically from a

⁹ We cite to the native page numbering used in GLONASS ICD, rather than the pagination added when GLONASS ICD was filed as an exhibit.

satellite message” as required by claims 5 and 15. *Id.* Petitioner argues that, “[n]onetheless, a POSITA would have known, from published standards defining satellite navigation messages (such as the GLONASS ICD), that receiving that time difference from a satellite navigation message would have been the most natural source, and obvious to try at the least.” *Id.* (citing Ex. 1003 ¶ 150). Petitioner also argues that the “results would have been predictable because the GLONASS ICD describes how to use this information.” *Id.* Petitioner relies on the following passage from GLONASS ICD as an express disclosure of including the time difference (e.g., $T_{GPS} - T_{GL}$) in the GLONASS navigation message:

Word τ_{GPS} is correction to GPS time relative to GPS time or [the] difference between these time scales T_{GPS} and T_{GL} as indicated in the following equation:

$$T_{GPS} - T_{GL} = \Delta T + \tau_{GPS}, \text{ where}$$

ΔT is integer part, and τ_{GPS} is fractional part of the difference between the system time scales expressed in seconds. The integer part ΔT is determined from GPS navigation message in user receiver.

Pet. 45 (quoting Ex. 1006, 26). Petitioner contends that the time difference would have been included in the GLONASS navigation message already being received and decoded by the receiver Beser discloses. *Id.* (citing Ex. 1003 ¶ 153).

As to the motivation to combine of Beser and GLONASS ICD, Petitioner argues that one of ordinary skill in the art “would also have been motivated by the desire to: a) avoid having to compute the time difference; b) avoid having to smooth the time difference over time to eliminate measurement noise; and c) save computing resources.” Pet. 46 (citing Ex. 1003 ¶ 154). Petitioner also contends that Beser expressly describes the

motivation to combine by noting that “using ‘ground stations and data links’ increase[s] complexity and cost,” and using a satellite to send the information avoids that complexity and cost. *Id.* (citing Ex. 1003 ¶ 155; Ex. 1004, 3-1, 3-2); *see also id.* (relying on same arguments for claim 15 as claim 5).

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Beser and GLONASS ICD disclose all of the limitations of claims 5 and 15 and that one of ordinary skill in the art would have been motivated to make the proposed combination. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Beser and GLONASS ICD disclose all of the limitations of claims 5 and 15 and that one of ordinary skill in the art would have been motivated to combine the references for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 42–46; Ex. 1003 ¶¶ 147–158.

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.”

Arctic Cat Inc. v. Bombardier Recreational Prods. Inc., 876 F.3d 1350, 1361 (Fed. Cir. 2017). Above, based on the full record before us, we provide our factual findings regarding (1) the level of ordinary skill in the art, (2) the scope and content of the prior art, (3) any differences between the claimed

subject matter and the prior art, and (4) objective evidence of nonobviousness.

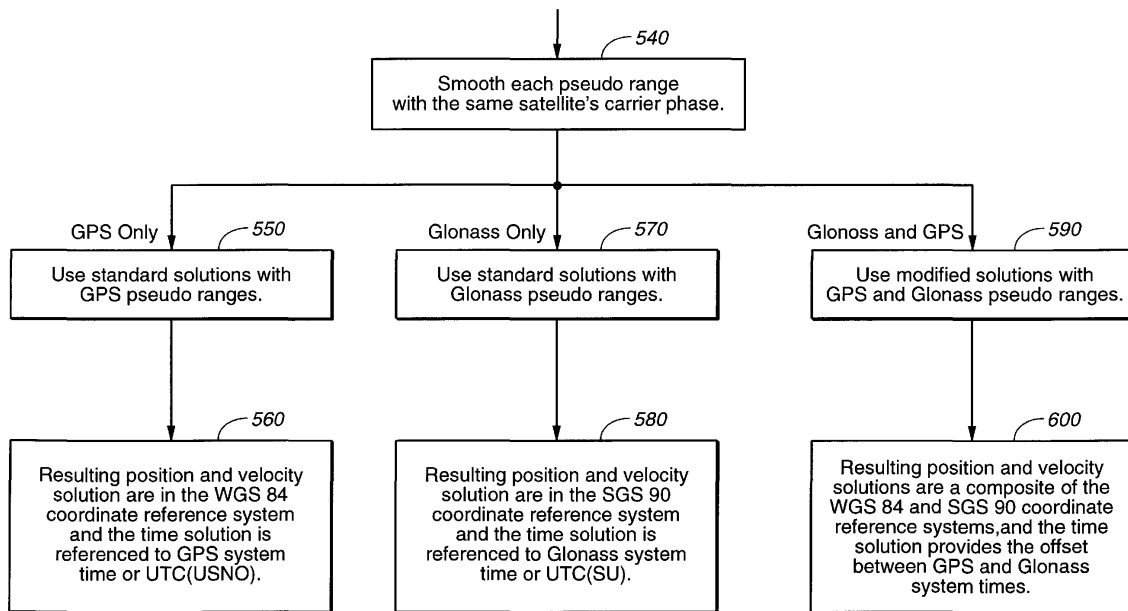
In particular, we find that (1) Petitioner’s proposed level of ordinary skill in the art is consistent with the art of record; (2) the asserted references teach all the limitations of claims 5 and 15; (3) one of ordinary skill in the art would have had a reason to combine Beser with GLONASS ICD; and (4) there is no objective evidence of nonobviousness in the record. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claims 5 and 15 of the ’104 patent are unpatentable over the combination of Beser, GLONASS ICD, and the knowledge of a person of ordinary skill in the art.

F. Challenge Under 35 U.S.C. § 102 Based on Lennen

Petitioner challenges claims 1, 2, 6, 7, and 11–13 under 35 U.S.C. § 102(b) as anticipated by Lennen. Pet. 47–61. For these challenges, Petitioner cites to Lennen and the Heppe Declaration. *Id.*

1. Lennen (Ex. 1005)

Lennen relates to a “combined GPS/GLONASS satellite positioning system receiver.” Ex. 1005, 1:5–6. Lennen describes applications that may benefit from the use of both GPS and GLONASS navigation systems, including aircraft, car, and marine navigation. *Id.* at 3:31–34. In one embodiment, Lennen describes combining “the GPS and GLONASS measurements into one navigational solution.” *Id.* at 13:1–2. Lennen’s Figure 15 is reproduced below.



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FIG. 15

Figure 15 “depicts combined GPS/GLONASS measurement processing.” Ex. 1005, 5:54–55. More specifically, it depicts the flow of information when processing pseudoranges “to solve for position, velocity and time.” *Id.* at 13:22–24. First, Lennen discloses smoothing measured pseudoranges to decrease noise. *Id.* at 13:24–26. Next, when both GPS and GLONASS pseudoranges are available, Lennen describes using an equation that requires a satellite to solve for the “time offset between the GPS and GLONASS system times.” *Id.* at 13:45–49. According to Lennen, the “timing solution provides a measure of the offset between GPS and GLONASS system times and hence accurate time referenced to the GPS system time, GLONASS system time,” and UTC times that “can be presented to the user.” *Id.* at 13:56–61.

2. Discussion of Independent Claim 1

Petitioner asserts that Lennen discloses all of the limitations of claim 1. Pet. 49–54. Petitioner provides analysis of each limitation in claim 1, with citations to Lennen that correspond to each of the claim limitations. *Id.* Petitioner also cites to the relevant declarant testimony. *Id.* (citing various portions of Ex. 1003).

Claim 1’s preamble states: “A method for determining a position of a mobile receiver.” Petitioner asserts that Lennen discloses the requirements of the preamble, to the extent it limits the claim, because it discloses determining a receiver position, and refers to motion of the user platform, which one of ordinary skill in the art would have understood as requiring a “mobile receiver.” Pet. 49 (citing Ex. 1003 ¶¶ 160–161; Ex. 1005, Abstract, 1:5–6, 1:67–2:2, 3:31–35, 11:36–39, 13:22–24, Figs. 1, 15).

The first two steps of claim 1 require “measuring a first pseudorange” and “measuring a second pseudorange” measured from the receiver to satellites in the first and second navigation systems, respectively. Petitioner contends that Lennen discloses measuring both the GPS and GLONASS pseudoranges, and provides an equation with a variable that represents the measured pseudoranges. Pet. 50–52 (citing Ex. 1003 ¶¶ 162–165; Ex. 1005, 13:1–10, Fig. 15; Ex. 1008, 12:59–13:10, Figs. 16a–b).

The next limitation in claim 1 requires “determining a difference between a first time reference of the first satellite navigation system and a second time reference of the second satellite navigation system.” Petitioner contends that Lennen discloses this limitation because in the context of combining the GPS and GLONASS pseudoranges, it notes the need to “take into account the offset between the GPS and GLONASS system times,” and

provides an equation that uses a variable that represents the time offset. Pet. 52–53 (citing Ex. 1003 ¶¶ 166–168; Ex. 1005, 13:12–21, 13:45–61).

Petitioner also relies on Lennen’s statement that “[t]he timing solution provides a measure of the offset between GPS and GLONASS system times.” Pet. 53 (quoting Ex. 1005, 13:56–58 (emphasis removed)). Based on Lennen’s descriptions, Petitioner argues that Lennen discloses, “determining a difference (*i.e.*, Δt_{System}) between a first time reference of the first satellite navigation system (*e.g.*, GLONASS system) and a second time reference of the second satellite navigation system (*e.g.*, GPS system).” *Id.* (citing Ex. 1003 ¶¶ 167–168).

As to the “combining” step we construed above, Petitioner relies on Lennen’s express statement that “when combining GPS and GLONASS pseudo ranges into the same solution we must also take into account the offset between the GPS and GLONASS system times.” Pet. 53–54 (quoting Ex. 1005, 13:11–13). Petitioner also relies on Lennen’s representation of the time offset as Δt_{System} in the equations, which is determined in the previous claim step. *Id.* at 54 (quoting Ex. 1005, 13:15–18). Petitioner argues that by “combining” the pseudoranges into the “same” solution with the time offset, “Lennen accounts for the difference in time references between the two satellite navigation systems and uses the difference to generate pseudoranges that can be used together.” *Id.* (citing Ex. 1003 ¶¶ 170–171).

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Lennen discloses all of the limitations of claim 1. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Lennen discloses all of the limitations of

claim 1, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 49–54; Ex. 1003 ¶¶ 159–171.

3. Remaining Claims

We have also reviewed Petitioner’s challenge of claims 2, 6, 7, and 11–13. Petitioner provides analysis of each limitation in claims 2, 6, 7, and 11–13, with citations to Lennen that correspond to each of the claim limitations. Pet. 54–61. Petitioner also cites to the relevant declarant testimony of Dr. Heppe. *Id.* (citing Ex. 1003 ¶¶ 172–187). Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Lennen discloses all of the limitations of claims 2, 6, 7, and 11–13.

We are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Lennen discloses all of the limitations of claims 2, 6, 7, and 11–13, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 54–61; Ex. 1003 ¶¶ 172–187.

G. Challenge Under 35 U.S.C. § 103 Based on Lennen and Kaplan

Petitioner challenges claims 8–10 and 16 under 35 U.S.C. § 103 based on Lennen and Kaplan. Pet. 62–70. For these challenges, Petitioner cites to the asserted references and the Heppe Declaration. *Id.*

1. Kaplan (Ex. 1007)

Kaplan relates to understanding GPS principles and applications, and describes the fundamentals of satellite navigation. Ex. 1007, Title, 15.¹⁰ As part of its calculation of a user position, Kaplan discloses use of measured pseudoranges. *Id.* at 43–44. Kaplan also discloses using approximate positions and the offset from the approximation to the true position, along with the clock offset. *Id.* at 44. Kaplan discloses use of these variables in a series of equations, providing a solution that determines a user’s position and the receiver clock offset. *Id.* at 44–47.

2. Discussion of Dependent Claims 8–10 and 16

Dependent claims 8–10 and 16 all recite “pseudorange residuals.” Ex. 1001, 9:58, 9:61, 9:66–67, 10:3, 10:42, 10:45. Petitioner relies on Lennen as disclosing all of the limitations from which these claims depend, and argues that Lennen discloses a relationship between a measured and actual pseudorange and the means to obtain pseudoranges from multiple satellite systems, and combining them to determine actual positions. Pet. 62–63. Petitioner argues that the limitations of claims 8–10 and 16 not expressly disclosed by Lennen would have already been known to one of ordinary skill in the art, as well as expressly disclosed by Kaplan. *See* Pet. 62–70. For example, as to claim 8,¹¹ Petitioner argues that one of ordinary skill in the art

¹⁰ We cite to the native page numbering used in Kaplan, rather than the pagination added when Kaplan was filed as an exhibit.

¹¹ Claim 8 depends from claim 1, and further requires, “forming a first pseudorange residual as a difference between an expected first pseudorange and the measured first pseudorange; and forming a second pseudorange residual as a difference between an expected second pseudorange and the measured second pseudorange.” Ex. 1001, 9:58–63.

would already know that Lennen’s actual position calculation includes the steps of forming pseudorange residuals and using them to update measurements because such methods were standard at the time.

Id. at 63 (citing Ex. 1003 ¶ 189). Petitioner also argues that Kaplan discloses, “that this was all well known by 1996.” *Id.* (citing Ex. 1003 ¶ 189). More specifically, Petitioner alleges that Kaplan’s equations disclose forming pseudorange residuals as the difference between Kaplan’s approximate pseudoranges and pseudorange measurements. *Id.* at 63–64 (citing Ex. 1007, 43–44, 46–47, Equations 2.16–2.20, 2.22, 2.23, 2.27–2.31).

As to a reason to combine, Petitioner argues that Lennen already suggests, at a minimum, forming pseudorange residuals, providing a motivation “to apply the specific linearization method disclosed by Kaplan,” which “avoids the complexities of solving a set of nonlinear equations.” Pet. 65–66 (citing Ex. 1003 ¶ 190). Petitioner also alleges that Kaplan’s method provides various advantages, and that it would have at least been “obvious to try” given Kaplan’s “comprehensive disclosure on how to form pseudorange residuals and update measurements.” *Id.* at 66 (citing Ex. 1003 ¶ 191; Ex. 1005, 3:26–30; Ex. 1007, 47). Petitioner also characterizes the combination as “nothing more than choosing from a finite number of identified, predictable solutions (*i.e.*, forming pseudorange residuals as a difference between an approximated pseudorange and a measured pseudorange as disclosed by Kaplan (and as understood by a POSITA)), with a reasonable expectation of success (*i.e.*, actually perform and complete the steps of determining the receiver position).” *Id.* at 66–67 (citing Ex. 1003 ¶¶ 191–192; *KSR*, 550 U.S. at 416).

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Lennen and Kaplan disclose all of the limitations of claims 8–10 and 16 and that one of ordinary skill in the art would have been motivated to make the proposed combination. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Lennen and Kaplan disclose all of the limitations of claims 8–10 and 16 and that one of ordinary skill in the art would have been motivated to combine the references for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 62–70; Ex. 1003 ¶¶ 188–203.

In particular, we find that (1) Petitioner’s proposed level of ordinary skill in the art is consistent with the art of record; (2) the asserted references teach all the limitations of claims 8–10 and 16; (3) one of ordinary skill in the art would have had a reason to combine Lennen and Kaplan; and (4) there is no objective evidence of nonobviousness in the record. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claims 8–10 and 16 of the ’104 patent are unpatentable over the combination of Lennen and Kaplan.

H. Challenge Under 35 U.S.C. § 103 Based on Lennen, GLONASS ICD, in light of the Knowledge of a Person of Ordinary Skill in the Art

Petitioner challenges claims 5 and 15 under 35 U.S.C. § 103 based on Lennen, GLONASS ICD, and the knowledge of a person of ordinary skill in the art. Pet. 70–72. For these challenges, Petitioner cites to the asserted references and the Heppe Declaration. *Id.*

The analysis of this challenge to claims 5 and 15 follows that discussed above with respect to the challenge to claims 5 and 15 based on

Beser and GLONASS ICD. Here, Petitioner relies on Lennen, rather than Beser, as disclosing the limitations of independent claims 1 and 12, from which claims 5 and 15 depend, respectively. *See* Pet. 70, 72. As discussed above, Petitioner has established sufficiently, on the present record, that GLONASS ICD discloses the limitations of claims 5 and 15.

As to the motivation to combine Lennen and GLONASS ICD, Petitioner argues that one of ordinary skill in the art would have been “motivated by the desire to: a) avoid having to compute the time difference; b) avoid having to smooth the time difference over time to eliminate measurement noise; and c) save computing resources.” Pet. 71 (citing Ex. 1003 ¶ 207). Petitioner also contends that modifying Lennen in view of GLONASS ICD “would have been obvious to try, given that the standard was already being developed in the 1990s,” and that there would have been a reasonable expectation of success when making the modification. *Id.* at 72 (citing Ex. 1003 ¶¶ 208–209; Ex. 1006, 6); *see also id.* (citing Ex. 1003 ¶ 210) (relying on same arguments for claim 15).

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Lennen and GLONASS ICD disclose all of the limitations of claims 5 and 15 and that one of ordinary skill in the art would have been motivated to make the proposed combination. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Lennen and GLONASS ICD disclose all of the limitations of claims 5 and 15 and that one of ordinary skill in the art would have been motivated to combine the references for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Heppe Declaration. *See* Pet. 70–72; Ex. 1003 ¶¶ 204–210.

In particular, we find that (1) Petitioner’s proposed level of ordinary skill in the art is consistent with the art of record; (2) the asserted references teach all the limitations of claims 5 and 15; (3) one of ordinary skill in the art would have had a reason to combine Lennen and GLONASS ICD; and (4) there is no objective evidence of nonobviousness in the record. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claims 5 and 15 of the ’104 patent are unpatentable over the combination of Lennen, GLONASS ICD, and the knowledge of one of ordinary skill in the art.

I. Patent Owner’s Revised Motion to Amend

Patent Owner filed a Revised Motion to Amend original claims 1, 2, 5–13, 15, and 16 and replace them with proposed substitute claims 21–33 (“substitute claims”). RMTA, App. A (claim listing). We have determined that all of the original claims that are subject to Patent Owner’s Revised Motion to Amend are unpatentable by a preponderance of the evidence; therefore, we proceed to address Patent Owner’s Revised Motion to Amend.¹² As explained below, Petitioner has proven, by a preponderance of

¹² Unlike Patent Owner’s original Motion to Amend, which was described as “contingent upon a finding of unpatentability with respect to the original challenged claims,” Patent Owner describes its Revised Motion to Amend as non-contingent. Paper 11, 1; RMTA 1; Tr. 51:12–23, 59:26–60:7. While such a motion would typically require cancellation of the original claims to ensure our consideration of the proposed substitute claims, Patent Owner has not sought cancellation of any claims. In any event, because we determine that Petitioner has established the unpatentability of all of the challenged original claims, even if the Revised Motion to Amend is more properly interpreted as contingent, that does not impact our ability to address the Motion, as the contingency has occurred.

the evidence based on the entirety of the record, that the substitute claims are unpatentable under 35 U.S.C. § 103(a), and we deny Patent Owner's Revised Motion to Amend on that basis.

1. Legal Standards

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend.

35 U.S.C. § 316(d). Patent Owner “does not bear the burden of persuasion to demonstrate the patentability of substitute claims.” *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential). “[T]he burden of persuasion ordinarily will lie with the petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence.” *Id.* (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017)).

In determining whether a petitioner has proven unpatentability of the substitute claims, the Board focuses on “arguments and theories raised by the petitioner in its petition or opposition to the motion to amend.” *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020). “Although the Board may, in certain rare circumstances, raise a ground of unpatentability that a petitioner did not advance, or insufficiently developed, against substitute claims proposed in opposing a motion to amend, those circumstances are limited to situations in which the adversarial process fails to provide the Board with potential arguments of patentability with respect to the proposed substitute claims.” *Hunting Titan, Inc. v. DynaEnergetics Europe GMBH*, IPR2018-00600, Paper 67 at 25 (PTAB July 6, 2020) (precedential).

2. Requirements Under 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121

Patent Owner asserts that the proposed substitute claims are responsive to an asserted ground of unpatentability, do not enlarge the scope of the originally issued claims, constitute a reasonable number of substitute claims, and are supported by the original specification (as well as the parent applications). RMTA 1–9.

For the reasons below, whether or not the requirements under 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121 are met, Petitioner persuades us that proposed substitute claims 58–64 are unpatentable. Thus, we do not reach the arguments mentioned above.

3. Proposed Substitute Claims and Petitioner’s Challenges

Patent Owner’s substitute claims 21–33 include two independent claims, substitute claims 21 and 30. RMTA, App. A 1, 4. Patent Owner proposes amendments in substitute claims 21 and 30 that are substantively the same, and are argued together. *See id.*; *see also id.* at 1, 10, 12–14, 20–22 (arguing the added limitations together). The remaining proposed substitute claims are unchanged from the original claims, with the exception of changes made to maintain the correct dependency. RMTA, App. A, 2–3, 5. Proposed substitute claim 21 appears below.

21. (substitute for claim 1, if found unpatentable) A method for determining a position of a mobile receiver, comprising:

measuring a first pseudorange from the mobile receiver to a first satellite of a first satellite navigation system;

measuring a second pseudorange from the mobile receiver to a second satellite of a second satellite navigation system;

determining a difference between a first time reference of the first satellite navigation system and a second time reference of the second satellite navigation system; and

~~combining the first pseudorange and the second pseudorange using the difference to generate combined first and second pseudoranges~~ accounting for the difference in time references between the first time reference and the second time reference and using the difference to generate pseudoranges;
and

using the generated pseudoranges in a mathematical model without knowing absolute time to compute at least absolute time tag error.

RMTA, App. A, 1 (strikethroughs indicate deletions; underlining indicates additions).

Patent Owner's first amendment to the claim replaces the "combining" step with language from Petitioner's proposed claim construction for the limitation, which we adopted above when analyzing the original claims. *See* RMTA 3; Pet. 13–18. Patent Owner's second amendment, requiring use of the generated pseudoranges "without knowing absolute time," seeks to narrow the claim to avoid prior art and address indefiniteness concerns identified in our Preliminary Guidance. RMTA 1–4. Patent Owner relies on a first Declaration of Dr. Steven Goldberg in support of its Motion to Amend (Ex. 2003), a second Declaration of Dr. Steven Goldberg in support of its Revised Motion to Amend (Ex. 2005), and a third Declaration of Dr. Steven Goldberg in support of its Reply in support of its Revised Motion to Amend (Ex. 2006).

Petitioner argues that all of the proposed substitute claims are unpatentable as (1) indefinite under 35 U.S.C. § 112; (2) obvious under

35 U.S.C. § 103(a) based on Beser and van Diggelen¹³; (3) obvious under 35 U.S.C. § 103(a) based on Beser and Peterson¹⁴; and (4) patent-ineligible under 35 U.S.C. § 101. Pet. Opp. RMTA 1, 10, 20–21. Petitioner relies on a second Declaration of Dr. Heppe (Ex. 1024) in support of its Opposition to Patent Owner’s Motion to Amend, and a third, follow-on Declaration of Dr. Heppe (Ex. 1029) in support of its Opposition to Patent Owner’s Revised Motion to Amend. Petitioner also relies on various exhibits and declarations in support of its arguments that Beser and Peterson are prior art to the ’104 patent.

4. *Claim Construction*

Patent Owner asserts that no limitations require construction. RMTA 9–10. Although Petitioner takes issue with Patent Owner’s assumed meaning for the limitations added by amendment, Petitioner does not contend that we need to construe any claim term to resolve the issues presented by the Revised Motion to Amend. *See* Pet. Opp. RMTA 2–4, 7. We agree with the parties that no claim terms require express construction. *See Nidec Motor Corp.*, 868 F.3d at 1017 (only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy).

¹³ US 6,417,801 B1, issued July 9, 2002 (“van Diggelen”) (Ex. 1010).

¹⁴ Capt. Benjamin Peterson, et al., *GPS Receiver Structures for the Urban Canyon*, 8th International Technical Meeting of the Satellite Division of the Institute of Navigation, 1323–1332 (proceedings held Sept. 12–15, 1995) (“Peterson”) (Ex. 1029).

5. Obviousness Based on Beser and van Diggelen

Petitioner opposed Patent Owner’s original MTA by arguing that those proposed substitute claims were unpatentable over Beser and van Diggelen. *See* Pet. Opp. MTA 13–18.¹⁵ In our Preliminary Guidance, we noted that Petitioner’s arguments appeared to have merit based on the record before us at that time. PG 11–13. In its Opposition to Patent Owner’s Revised Motion to Amend, Petitioner again argues that the revised proposed substitute claims are unpatentable as obvious over Beser and van Diggelen. Pet. Opp. RMTA 10–14, 16–18.

Patent Owner argues that Petitioner fails to establish that Beser is prior art as a printed publication before the effective filing date of the ’104 patent in 2005. RMTA 10–12. Patent Owner also argues that one of ordinary skill in the art would not have been motivated to combine Beser and van Diggelen, and that a long-felt but unresolved need supports a finding of nonobviousness. *Id.* at 14–19.¹⁶ We will address these issues in turn, along with Petitioner’s arguments and evidence in support of its challenge.

¹⁵ We consider the parties’ briefing on the original Motion to Amend, as well as the Revised Motion to Amend, because the parties’ briefing refers back to and relies on the original briefing for context. *See, e.g.*, RMTA 1–3; Pet. Opp. RMTA 10–11.

¹⁶ Patent Owner also argues that Beser fails to disclose the “without knowing absolute time” limitation added by amendment, but Petitioner does not contend that Beser discloses that limitation and we will not address the issue further. *See* RMTA 12–14.

a. The Prior Art Status of Beser

Patent Owner argues that Petitioner fails to meet its burden of proving that Beser is prior art to the '104 patent. RMTA 10–11 (citing *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 11 (PTAB Dec. 20, 2019) (precedential)). Patent Owner argues that Petitioner improperly relies on hearsay statements in the form of WorldCat and ISBN catalog listings from two websites. RMTA 11 (citing Exs. 1010, 1011). Patent Owner argues that, even if there were no hearsay problem, dates from Beser itself and the websites fail to establish the date Beser was made publicly accessible. *Id.* at 11–12. Patent Owner also argues that Petitioner cannot rely on Beser's inclusion on the face of an unrelated patent and file history as sufficient to establish public accessibility. *Id.* at 12 (citing Pet. 5–6; Ex. 1012).

Petitioner argues that Patent Owner waived its hearsay objection to the WorldCat and ISBN catalog listings that include Beser by missing the deadline for such objections. Pet. Opp. RMTA 12. Petitioner contends that because Petitioner submitted these exhibits (Exs. 1010, 1011) along with the Petition, the deadline for any objection was due on September 16, 2019, and Patent Owner's objection came nearly seven months after that deadline, and was improperly included in a motion rather than filed as a separate objection. *Id.* (citing 37 C.F.R. § 42.64(b)(1)). Petitioner also contends that the evidence supports its argument that Beser was sufficiently publicly accessible by at least 2001. *Id.* at 13. First, Petitioner argues that a copy of Beser could have been obtained in 2001 along with an order of the file history of the patent that lists Beser. *Id.* (citing MPEP 707.05(a)). Second, Petitioner argues that Beser is part of a NATO document related to the

AGARD Lecture Series,¹⁷ and “the compendium indicates that it was presented in three cities during the first half of July 1996.” *Id.* (citing Ex. 1004, 1). Third, Petitioner argues that a separate document summarizing the history of AGARD notes that copies of the AGARD Lecture Series were typically published to attendees just before the lectures, and copies were sent free of charge to distribution centers of each NATO country. *Id.* at 13–14 (citing Ex. 1030, 150, 154; Ex. 1031). Fourth, Petitioner argues that “AGARD also authorized three Sales Agencies, in US, UK and France, to sell copies of its unclassified publications,” and was therefore publicly available by 1996. *Id.* at 14 (citing Ex. 1030, 154).

In its Reply to Petitioner’s Opposition, Patent Owner argues that it objects to the sufficiency of the evidence, not its admissibility due to hearsay. PO Reply 5. Patent Owner also argues that the catalog websites do not establish the date Beser was “disseminated or otherwise made available.” *Id.* Patent Owner also argues that Beser’s inclusion on the face of another patent and in its file history does not establish public accessibility due to Petitioner’s lack of evidence that those skilled in the art could locate it. *Id.* (citing *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194–95 (Fed. Cir. 2008)). As to the AGARD Lecture Series issue, Patent Owner argues that: (1) Petitioner’s evidence fails to establish when Beser was disseminated; (2) the “presentations” that were “normally” distributed may not include papers such as Beser; and (3) Petitioner’s evidence lacks detail

¹⁷ “AGARD” stands for Advisory Group for Aerospace Research & Development. Ex. 1004, 1, 4.

as to publication practices and dates of publication. *Id.* at 5–7 (citing Pet. Opp. RMTA 13–14; Ex. 1030, xiii, 150, 154; Ex. 1031).

In its Sur-reply, Petitioner argues that Patent Owner concedes that it waived the hearsay objection and improperly imposes a sufficiency of the evidence standard that requires someone to testify personally as to receipt of a copy of Beser in 1996. Pet. Sur-reply 4–5 (citing PO Reply 5). According to Petitioner, “Agard itself showing a date of 1996 and describing its distribution channels, the catalog listings showing a published date in 1996, the Agard a History book stating in 1999 that Beser was published in 1996, and the file history of U.S. Patent No. 6,229,479 showing that inventors of a combined GPS/GLONASS technique were aware of Beser—establishes a publication date of 1996.” *Id.* at 5. Petitioner also argues that the case law supports its position. *Id.* at 5–6 (citing cases).

Whether a document qualifies as a printed publication under § 102 “involves a case-by-case inquiry into the facts and circumstances surrounding the reference’s disclosure to members of the public.” *Hulu*, IPR2018-01039, Paper 29 at 9 (quoting *Medtronic, Inc. v. Barry*, 891 F.3d 1368, 1380 (Fed. Cir. 2018)). Petitioner bears the burden of establishing by a preponderance of the evidence that a particular document is a printed publication. *Id.* at 11. A reference is publicly accessible upon a satisfactory showing that it has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it. *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1348 (Fed. Cir. 2016) (quoting *Kyocera Wireless Corp. v. Int’l Trade Comm’n*, 545 F.3d 1340, 1350 (Fed. Cir. 2008)); *see also GoPro, Inc. v. Contour IP Holding LLC*, 908 F.3d 690, 693

(Fed. Cir. 2018) (explaining that accessibility goes to the issue of “whether interested members of the relevant public could obtain the information if they wanted to”). “If accessibility is proved, there is no requirement to show that particular members of the public actually received the information.” *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1569 (Fed. Cir. 1988). Petitioner bears the burden of establishing that a particular document is a printed publication. *Medtronic*, 891 F.3d at 1380.

We are persuaded by Petitioner’s arguments and evidence. First, we agree that Patent Owner waived its hearsay objection by not filing the objection “within ten business days of the institution of the trial” as required by 37 C.F.R. § 42.64(b)(1). That deadline passed in September 2019, and Patent Owner did not raise the hearsay issue until filing its Revised Motion to Amend in April 2020. *See* RMTA 25. Patent Owner presents no argument or evidence that its delay should be excused for good cause, and our review of the record reveals no basis to entertain the late objection.

We are also persuaded that Petitioner met its burden of establishing that Beser is a prior art printed publication because it was publicly accessible at least as early as 2001. There are a number of indicia that, standing alone, may not establish that Beser was publicly accessible, but taken together do meet that standard. First, Beser itself indicates that it was a NATO

“AGARD”¹⁸ document “published June 1996,” that the material was assembled to support a series of lectures in July 1996, and bears a stamp with a “DISTRIBUTION STATEMENT”¹⁹ stating that the material was “Approved for public release[;] Distribution Unlimited.” Ex. 1004, 1. Beser itself, therefore, states that it was published in June 1996, ahead of a series of July lectures, and that there were no restrictions on its distribution or expectation of confidentiality. *Id.* A separate document, detailing “AGARD The History 1952–1997,” notes that the Lecture Series of which Beser was a part included “full texts of the presentations” that “were normally published just before the lectures were presented and made available to persons attending the lectures.” Ex. 1030, 1, 150 (showing list including 1996 Lecture Series that includes Beser), 154 (describing publication practices); Ex. 1031 (showing Library of Congress catalog entry for Ex. 1030, dated 1999).²⁰ This document corroborates what already appears apparent from

¹⁸ AGARD seeks “to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace.” Ex. 1004, 4. Beser was created under “the sponsorship of the Mission Systems Panel of AGARD and the Consultant and Exchange Programme of AGARD.” *Id.* at 1. The AGARD Panels are composed of appointed experts, with the results of AGARD work “reported to the member nations and the NATO Authorities through the AGARD series of publications of which this is one.” *Id.* at 4.

¹⁹ Our ultimate conclusion would not change even if Beser lacked the “DISTRIBUTION STATEMENT” stamp on the first page of the Lecture Series document. Patent Owner does not argue that any recipients of Beser were under some sort of express or implied obligation of confidentiality.

²⁰ Patent Owner suggests that the publication practices may have changed in 1996 due to a change in organizational structure, but nothing in the document ties the organizational changes to any changes in publication practices. *See* PO Reply 6 (citing Ex. 1030, xiii).

Beser itself—that Beser was distributed to attendees of the lecture without restriction in June 1996, prior to the upcoming lectures in July 1996.

Ex. 1004, 1. The same document states that the publications were not only distributed to those attending the upcoming lectures, but were also sent to NATO member nations, “often a national defence or aerospace scientific information unit,” for further distribution. *Id.* at 154. The WorldCat catalog page supports the proposition that this second round of distribution occurred by suggesting that, while AGARD published the document, “NASA Center for AeroSpace Information” distributed the document in 1996. Ex. 1010, 1; *see also* Ex. 1004, 163 (Beser noting that requests for copies in the United States could be made to “NASA Center for AeroSpace Information (CASI)” in the United States). The remaining documents, while not determinative, generally support Petitioner’s position. *See* Ex. 1011 (catalog page with ISBN number showing publication by December 1996); Ex. 1012, 3 (2001 patent listing Beser as prior art reference, suggesting that Beser was available to some extent by that date).

Patent Owner suggests that Petitioner fails to establish when dissemination occurred, and the content of the material disseminated. PO Reply 6. We disagree. As noted above, Beser itself indicates that it was disseminated in June 1996 ahead of the lectures, and a separate document confirms that publication prior to the lectures was the practice of the organization. Ex. 1004, 1; Ex. 1030, 154. Patent Owner’s argument that some other document may have been sent rather than Beser contradicts Beser itself, and has no support in the record. *See* Ex. 1004, 1. To the extent that Patent Owner suggests the record lacks evidence of what was distributed at the lectures, or after them, that is of no moment when the

record already establishes what was sent to attendees prior to the lectures.²¹ Although cases addressing printed publication issues in the context of lectures or conferences typically focus on what was disseminated *at* the lecture, and conclude that unrestricted distribution at the lecture supports a conclusion of public accessibility, we see no reason why distribution *prior to* the event in question should lead to a different result. *See, e.g., Massachusetts Inst. of Tech. v. AB Fortia*, 774 F.2d 1104, 1109 (Fed. Cir. 1985) (holding that 6 copies of paper delivered to attendees at a conference, where paper was orally presented, was a printed publication).

Based on the foregoing, we conclude that Petitioner has established by a preponderance of the evidence that Beser is prior art to the '104 patent.

b. Van Diggelen

Van Diggelen relates to a “method and apparatus for computing GPS receiver position without using absolute time information transmitted by the satellite or by an alternative source of timing available at the GPS receiver.” Ex. 1025, code (57). In van Diggelen, the “GPS receiver measures satellite pseudoranges and uses the wireless communication transceiver to send the pseudoranges to the server. The server fits the pseudoranges to a mathematical model in which the GPS receiver position and the absolute time are unknown parameters.” *Id.* The server then computes a position and absolute time to fit the model, producing an accurate position and the

²¹ We note, however, that the record does support an inference that a separate, wider publication of Beser occurred when it was distributed by NASA. *See* Ex. 1030, 154 (describing secondary distribution through aerospace agencies of NATO member states); Ex. 1010 (indicating distribution by NASA in 1996). These documents further support Petitioner’s argument that Beser was publicly disseminated in 1996.

absolute time that the measurements were made. *Id.*; *see id.* at 3:55–4:5, 4:45–64. Van Diggelen describes the novel aspect of its invention as including a fifth column to its matrix of equations, which adds a fifth variable to account for unknown time errors. *Id.* at 7:35–42. Van Diggelen notes that adding a sixth satellite can enable the solution to the additional equation presented by the additional unknown variable. *Id.* at 10:66–11:5.

c. Disclosure of Limitations and Combination of References

As noted above, Patent Owner’s first amendment replaces the “combining” claim language with Petitioner’s proposed construction for that term, which we used in our analysis of those claims and found to be disclosed in Beser. *See* RMTA 3, App. A, 1, 4. Patent Owner’s second amendment adds the following language to proposed substitute claim 21: “using the generated pseudoranges in a mathematical model without knowing absolute time to compute at least absolute time tag error” (“without knowing absolute time” limitation). *Id.* at App. A, 1. Substantively identical language was added to proposed substitute claim 30. *See id.* at App. A, 5 (“use the generated pseudoranges in a mathematical model without knowing absolute time to compute at least absolute time tag error”). The parties argue the claims as a group, and we will analyze the claims as a group in our analysis.

Petitioner contends that van Diggelen discloses the “without knowing absolute time” limitation because it seeks to find a solution when absolute time is unknown by using a fifth variable to account for the unknown time variable, which in turn requires at least one more satellite to be in view. Pet. Opp. MTA 15 (citing Ex. 1025, 7:35–42, 7:45–48; Ex. 1024 ¶¶ 93–94); Pet. Opp. RMTA 11 (citing Pet. Opp. MTA 14–22; Ex. 1029 ¶¶ 57–58).

Petitioner argues that Patent Owner concedes the issue by failing to argue that any of the claim limitations are missing from the proposed combination. Pet. Opp. RMTA 10.

The record fully supports Petitioner's assertion that van Diggelen discloses "using the generated pseudoranges in a mathematical model without knowing absolute time to compute at least absolute time tag error." Based on its title and abstract, and other portions of its disclosure, van Diggelen primarily focuses on solving GPS equations in the absence of knowing absolute time, and it discloses methods for doing so using mathematical models including an equation accounting for absolute time error. *See* Ex. 1025, codes (54), (57), 7:35–42, 7:45–48; Ex. 1024 ¶¶ 93–94. Based on the foregoing, we find that van Diggelen discloses the "without knowing absolute time" limitations in the substitute claims for the reasons advanced by Petitioner, as supported by its declarant.

As to the motivation to combine Beser and van Diggelen, Petitioner argues that the two references "offer complementary solutions to the same problem: obtaining position without sufficient GPS satellite measurements." Pet. Opp. MTA 14. Petitioner asserts that van Diggelen's method for addressing unknown time requires an additional satellite measurement, and Beser offers a solution by providing a method that increases the number of available satellites by teaching how to combine the GPS and GLONASS systems. *Id.* at 14–15 (citing Ex. 1004, 3-1; Ex. 1024 ¶¶ 93–94; Ex. 1025, 7:35–42, 7:45–48). According to Petitioner, "[a] POSITA would have been motivated to use Beser to improve van Diggelen's method by increasing the number of satellites to choose from, by allowing for the use of more than one GNSS. (Each GNSS has its own dedicated set of satellites)." *Id.* at 15–

16 (citing Ex. 1024 ¶¶ 93–99). Petitioner asserts that the combination would make “van Diggelen’s method available more often (and more reliable).” *Id.* at 16. Petitioner also contends that “van Diggelen expressly espoused the benefits of increasing numbers of satellite measurements.” *Id.* (citing Ex. 1024 ¶ 99; Ex. 1025, 10:66–11:5). Petitioner also argues that it would have been “trivial” to make modifications to Beser based on van Diggelen’s teachings. *Id.* at 16–18 (citing Ex. 1004, 3-16; Ex. 1024 ¶¶ 100–102; Ex. 1025, 7:18–31, 7:35–42).

Patent Owner argues that “Beser and van Diggelen offer competing, not complimentary, solutions to different problems” and combining them would have frustrated the principles under which each reference was designed to operate. RMTA 14. Patent Owner contends that both references were attempting to solve the problem of limited access to satellites and providing solutions in light of that problem. *Id.* at 15 (citing Ex. 1004, 3-6; Ex. 1025, 1:36–39; Ex. 2005 ¶ 60). According to Patent Owner, both references propose solutions that require acquisition of a signal from an additional satellite, so combining them would have frustrated their “basic principles.” *Id.* at 15–16 (citing Ex. 1004, 3-8 to 3-10; Ex. 1025, 7:35–42; Ex. 2005 ¶ 61).

Petitioner argues that Patent Owner misconstrues van Diggelen by suggesting that van Diggelen sought to solve the problem of acquiring position in environments with limited access to satellites. Pet. Opp. RMTA 16 (citing Ex. 1025, 1:36–39; Ex. 1029 ¶ 67). Petitioner contends that van Diggelen addresses the problem of computing position without knowing absolute time. *Id.* at 16–17 (citing Ex. 1025, 1:52–65, 3:50–52, 3:55–62). Petitioner also contends that the references complement each other in that

“van Diggelen teaches a way to solve for absolute time if at least one additional satellite measurement is available” and “Beser teaches a way to make many more satellite measurements available.” *Id.* at 17 (citing Ex. 1004, 3-1; Ex. 1029 ¶ 68). Petitioner also takes issue with Patent Owner’s argument that Beser requires an additional satellite signal because, in some embodiments, Beser utilizes information already known or provided by an external source, negating the need for an additional satellite source. *Id.* at 17–18 (citing Ex. 1004, 3-9 to 3-10; Ex. 1029 ¶¶ 68–69); *see also* Pet. Sur-reply 6–7.

In its Reply, Patent Owner argues that Petitioner ignores the intended purpose of van Diggelen and that the proposed combination requires van Diggelen to “process every visible satellite from the GLONASS system,” which is the problem van Diggelen sought to avoid. PO Reply 7–8 (citing RMTA 17; Ex. 1025, 1:31–39; Ex. 2006 ¶¶ 38–39). Patent Owner also argues that adding an additional satellite reduces the times that a position solution can be obtained. *Id.* at 8 (citing RMTA 16–18; Ex. 1004, 3-6, Fig. 3-1; Ex. 2006 ¶¶ 40–41).

Based on our review of the parties’ arguments and evidence, including the competing declarant testimony, we find that Petitioner has established that one of ordinary skill in the art would have been motivated to use Beser to improve accessibility to satellites, which enables use of van Diggelen’s method that does not require knowing absolute time. We agree with Petitioner that the two references complement one another in that van Diggelen discloses a solution to the problem of computing position without knowing absolute time, but it requires an additional satellite measurement to do so, and Beser discloses a method that makes more of such satellite

measurements available. Ex. 1004, 3-1; Ex. 1025, 1:52–65, 3:50–52, 3:55–62; Ex. 1024 ¶¶ 93–96; Ex. 1029 ¶¶ 67–68. We are also persuaded that the combination provides benefits such making van Diggelen’s valuable method available more often, and therefore more useful. Ex. 1024 ¶ 99. Given these complementary primary purposes and advantages in the combination, we disagree with Patent Owner’s position that the references were focused on avoiding the use of additional satellites to such an extent that the combination would frustrate the purposes of the references. Patent Owner does not point to persuasive evidence that any such concern would have overridden the advantages of the combination that Petitioner identifies. Based on the foregoing, for the reasons provided by Petitioner and its declarant, we find that one of ordinary skill in the art would have been motivated to combine Beser and van Diggelen. *See* Ex. 1024 ¶¶ 93–102; Ex. 1029 ¶¶ 66–70.

d. Long-Felt Need

Patent Owner argues that objective evidence such as long-felt but unresolved need supports a finding of nonobviousness here. RMTA 16. In particular, Patent Owner argues “that there was a long-felt need for satellite positioning receivers that could obtain a quick and accurate position in environments where there was a limited number of satellites available to receiver.” *Id.* at 17–18 (citing Ex. 1004; Ex. 1025, 1:36–39; Ex. 1026, 1323). Patent Owner also alleges that the prior art only provided “partial solutions” to this problem that either required absolute time, or supplied absolute time but required additional satellites and performed poorly in environments with few satellites. *Id.* at 18 (citing Ex. 1004; Ex. 1025; Ex. 1026; Ex. 2005 ¶ 64). Patent Owner contends that the ’104 patent “was the

first invention that met this long-felt need.” *Id.* at 18–19 (citing Ex. 2005 ¶ 65).

Petitioner argues that Patent Owner’s “cursory discussion” fails to meet its burden of establishing a nexus to the substitute claims. Pet. Opp. RMTA 19–20. Petitioner argues that no nexus can be found here given that the alleged long-felt need was met by the prior art of record. *Id.* at 20 (citing Pet. 25–27, 41; Pet. Opp. MTA, 14–21); *see also* Pet. Sur-reply 8–9.

In its Reply, Patent Owner argues that Petitioner’s lack of nexus argument fails to identify a “single prior art reference that quickly and accurately obtains a position in environments where there was a limited number of satellites available to [a] receiver *and* absolute time is not known.” PO Reply 9 (citing RMTA 10–22). Patent Owner also argues that the passage of time between the existence of the prior art and the 2005 priority date of the ’104 patent, varying between 3 and 10 years, supports its position that the claims would not have been obvious. *Id.* at 10.

Patent Owner bears the burden of establishing a nexus between the alleged long-felt need and the substitute claims. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019). Based on our review of the arguments and evidence, we find that Patent Owner has failed to establish any long-felt but unresolved need allegedly satisfied by the ’104 patent. Patent Owner does not address the limitations of the proposed substitute claims, or otherwise explain what aspects of the claimed invention satisfied a long-felt need. Patent Owner suggests that a long-felt need exists because no “single prior art reference” discloses all of the limitations of the claims, but Patent Owner provides no support for the proposition that a long-felt need arises merely because no prior art *anticipates* the claims. *See* PO

Reply 7–8. Indeed, secondary considerations evidence is not part of an anticipation analysis, in which a single prior art reference discloses all limitations of a claim. *See Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008) (distinguishing anticipation from obviousness because “obviousness requires analysis of secondary considerations of nonobviousness, while secondary considerations are not an element of a claim of anticipation”). In addition, Patent Owner refers to the need for “quick and accurate position in environments where there was a limited number of satellites available to receiver,” but does not identify the speed and accuracy of its claimed invention in comparison with the prior art. *See* RMTA 17–18. Without any objective evidence of the relative speed and accuracy of prior art systems in comparison to the claimed system, we cannot ascertain the degree to which the claimed invention satisfies any alleged need.

We conclude that Patent Owner has not shown any nexus of the alleged long-felt need to the substitute claims, and even if some nexus were shown, the record lacks sufficient support for an assertion that the claimed invention addresses a need for improved speed and accuracy through noticeably better results. Accordingly, we find the objective evidence of long-felt need weak.

e. Conclusion

We find that (1) Petitioner’s proposed level of ordinary skill in the art is consistent with the art of record; (2) the Beser and van Diggelen combination teaches all the limitations of the proposed substitute claims; (3) one of ordinary skill in the art would have had a reason to combine the Beser and van Diggelen; and (4) the evidence of long-felt but unresolved

need, if any, is weak. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that substitute claims 21–33 are unpatentable over the combination of Beser and van Diggelen.

6. Obviousness Based on Beser and Peterson

Petitioner opposed Patent Owner’s original MTA by arguing that those proposed substitute claims were unpatentable over Beser and Peterson. *See* Pet. Opp. MTA 18–21. In our Preliminary Guidance, we noted that Petitioner’s arguments appeared to have merit based on the record before us at that time. PG 13. In its Opposition to Patent Owner’s Revised Motion to Amend, Petitioner again argues that the current proposed substitute claims are unpatentable as obvious over Beser and Peterson. Pet. Opp. RMTA 10–11, 14–16, 18–19.

Patent Owner argues that Petitioner fails to establish that Peterson is prior art as a printed publication before the effective filing date of the ’104 patent in 2005. RMTA 19–20. Patent Owner also argues that one of ordinary skill in the art would not have been motivated to combine Beser and Peterson, and that a long-felt but unresolved need supports a finding of nonobviousness. *Id.* at 20–22. We will address these issues in turn, along with Petitioner’s arguments and evidence in support of its challenge.

f. The Prior Art Status of Peterson

Patent Owner argues that Petitioner fails to meet its burden of proving that Peterson is prior art to the ’104 patent. RMTA 19 (citing *Hulu*, IPR2018-01039, Paper 29 at 11). Patent Owner argues that “Petitioners provide no evidence that Peterson was ‘disseminated or otherwise made accessible to persons interested and ordinarily skilled in the subject matter to which the [document] relates prior to the critical date.’” *Id.* (quoting *Orion*

IP, LLC v. Hyundai Motor Am., 605 F.3d 967, 974 (Fed. Cir. 2010)). Patent Owner contends that Petitioner relies solely “on the date printed on the front of Peterson,” which, standing alone, does not establish public availability. *Id.*²²

Petitioner argues that “Peterson was presented at the 8th International Technical Meeting of the Satellite Division of the Institute of Navigation in 1995 (‘the ION Conference’).” Pet. Opp. RMTA 14 (citing Ex. 1026, 1). Petitioner relies on personal testimony from Dr. Dafesh, a declarant in the related IPR2019-00737, who testifies that he attended the ION Conference and that “copies of Peterson were distributed to attendees in 1995.” *Id.* (citing Ex. 1034 ¶¶ 8–12; Ex. 1035, 7). Petitioner also relies on the testimony from Dr. Heppe, who testifies that he is a member of ION, that “all ION conferences were open to the public,” and that ION “attendees could order a CD containing ION Conference proceedings, including Peterson,” and that he kept a copy of his CD that contains Peterson. *Id.* (citing Ex. 1029 ¶¶ 62–63). Petitioner asserts that its declarants’ testimony as to their attendance at ION conferences, distribution of Peterson at the 1995 ION Conference, the copies of Peterson that they still retain from that distribution, and corroboration of that testimony “by the conference name and date on Peterson’s cover” all support its position that Peterson was

²² Patent Owner also argues that the Petitioner cannot rely on an earlier Board decision that treated Peterson as prior art to van Diggelen, because the § 102(b) issue Patent Owner raises here was not before the Board at that time. RMTA 20 (citing Ex. 1027, 4). Our analysis does not rely on the treatment of Peterson in any related decisions.

publicly accessible and prior art as of 1995. *Id.* at 15–16 (citing Ex. 1026, 1; Ex. 1029 ¶¶ 62–65; Ex. 1034 ¶¶ 8–12).

In its Reply to Petitioner’s Opposition, Patent Owner does not respond to Petitioner’s arguments and evidence as to the public accessibility of Peterson as of 2005. *See* PO Reply 10–11. Patent Owner’s sole argument rests on the mistaken assertion that Petitioner merely relies on the date on the front of Peterson, which is not the case based on our summary of Petitioner’s position above.

Based on our review of the record, Petitioner’s arguments are supported by persuasive evidence tending to show that Peterson was publicly accessible by 1995. Dr. Dafesh testifies that he attended the ION Conference in 1995, which the attendee list for the conference confirms. Ex. 1034 ¶¶ 8–9; Ex. 1035, 7. Dr. Dafesh also testifies that the ION Conference was open to the public and that attendees could obtain copies of Peterson and other proceedings, and that he obtained a copy of Peterson at the ION Conference. Ex. 1034 ¶¶ 10–12. Dr. Heppe provides testimony that ION conferences are open to the public, and that he received a CD from the 1995 ION Conference that includes a copy of Peterson. Ex. 1029 ¶¶ 62–65; Ex. 1032 (image of CD); Ex. 1033 (copy of table of contents of CD listing Peterson). Taken together, this unrebutted personal testimony, combined with the dates on Peterson itself,²³ establish by a preponderance of the

²³ We agree with Patent Owner that the dates on the face of the document may not, standing alone, establish a date of publication on that date. Nevertheless, those dates are probative, and are consistent with the declaration evidence in the record showing that Peterson was distributed and available as of 1995. *See Nobel Biocare Servs. AG v. Intradent USA, Inc.*, 903 F.3d 1365, 1376 (Fed. Cir. 2018), *as amended* (Sept. 20, 2018) (finding

evidence that Peterson was publicly accessible as of 1995, and that Peterson is a prior art printed publication with respect to the '104 patent.

g. Peterson

Peterson addresses the problem of losing sight of satellites in cities having “deep urban canyons.” Ex. 1026, 1323. In such situations, Peterson discloses a method of determining GPS position without knowing absolute time, and only knowing rough estimates of time within “several minutes” of absolute time, when satellite positions are also unknown. *Id.* Peterson devotes a section of the paper to “OBTAINING FIXES WITHOUT TIME FROM SATELLITES” and provides a “POSITION SOLUTION” that includes a series of equations. *Id.* at 1329–1330. These equations include position and time-error variables. *Id.* at 1330. Peterson discloses use of its method even when small portions of a signal can be obtained from “brief glimpses” satellites. *Id.* at 1323 (“obtaining fixes based on as little as one millisecond of data”).

h. Disclosure of Limitations and Combination of References

Petitioner contends that Peterson discloses the “without knowing absolute time” limitation added to the proposed substitute claims. Pet. Opp. MTA 18. Petitioner relies on Peterson’s goal: to find a solution when absolute time is unknown due to obstructions in cities, using equations that

date on cover of a catalog was “relevant evidence” that, in conjunction with other evidence, supported the Board’s finding of public accessibility as of that date); *Hulu*, Paper 29, at 17 (“the indicia on the face of the reference, such as printed dates and stamps, are considered as part of the totality of the evidence”); *see also Massachusetts Inst. of Tech.*, 774 F.2d at 1109 (holding that six copies of paper delivered to attendees at a conference, where paper was orally presented, was a printed publication).

include variables for time errors. *Id.* (citing Ex. 1026, Abstract, 1329; Ex. 1024 ¶ 103); Pet. Opp. RMTA 11 (citing Pet. Opp. MTA 14–21; Ex. 1029 ¶¶ 57–58). Petitioner argues that Patent Owner concedes the issue by failing to argue that any of the claim limitations are missing from the proposed combination. Pet. Opp. RMTA 10.

The record supports Petitioner’s assertion that Peterson discloses “using the generated pseudoranges in a mathematical model without knowing absolute time to compute at least absolute time tag error.” Peterson discloses determining a GPS position, or a “fix,” when absolute time is unknown, and does so using mathematical models that include variables accounting for absolute time error. *See* Ex. 1026, 1323, 1329–1330. Based on the foregoing, we find that Peterson discloses the without knowing absolute time limitations in the proposed substitute claims.

As to the motivation to combine Beser and Peterson, Petitioner argues that “a POSITA faced with the urban canyon problem would have looked to Peterson to obtain position fix without absolute time (which requires an additional satellite measurement) and to Beser to make more satellites available to a receiver with sightlines blocked by buildings.” Pet. Opp. MTA 18 (citing Ex. 1024 ¶ 103). Petitioner contends that the same reasoning supporting the combination of Beser and van Diggelen applies to Beser and Peterson. *Id.* Petitioner also contends that Peterson’s method of using small “snapshots” of the satellite signal overcomes the deficiency in Beser that “can require continuously tracking the satellites until absolute time can be decoded from the satellite signal.” *Id.* at 18–19 (citing Ex. 1024 ¶ 104). Petitioner also argues that Peterson and Beser are analogous art, and employ very similar equations that “include position and clock-error

variables.” *Id.* at 19–20. Due to the alleged similarity, Petitioner contends that modifying Beser’s method with the equations in Peterson “would have been simple and obvious.” *Id.* at 20–21. Petitioner alleges that additional motivations support the combination, such as increasing the number of satellites available using Peterson’s snapshot approach and reducing the time necessary to track satellites in urban canyons. *Id.* at 21 (citing Ex. 1024 ¶¶ 112–115).

Patent Owner argues, as it did in its arguments against the combination of Beser and van Diggelen, that “Beser and Peterson offer competing, not complementary, solutions to different problems,” and that combining them would have frustrated the principles under which each reference was designed to operate. RMTA 20. Patent Owner contends that both references were attempting to solve the problem of limited access to satellites and providing solutions in light of that problem. *Id.* at 20–21 (citing Ex. 1004, 3-6; Ex. 1026, 1323; Ex. 2005 ¶ 68). According to Patent Owner, both references propose solutions that require acquisition of a signal from an additional satellite, so combining them would have exacerbated the problems they were attempting to solve. *Id.* at 21 (citing Ex. 1004, 3-8 to 3-10; Ex. 1026, 1329–1330; Ex. 2004 ¶ 70).

Petitioner argues that Beser and Peterson complement one another because “Peterson provides a technique to solve for position without knowledge of absolute time,” but requires an additional satellite signal, and “Beser solves this problem by adding 3 or 4 additional measurements.” Pet. Opp. RMTA 18–19 (citing Ex. 1004, 3-9 (Fig. 3-1); Ex. 1026, 1323, 1329; Ex. 1029 ¶ 71). Petitioner contends that Beser offers more satellites than typically required and enhances performance in the environments Peterson

describes. *Id.* (citing Ex. 1029 ¶ 72). Petitioner also argues that a “POSITA could have easily applied the teachings of one to enhance the other,” and “would have been capable of combining” Beser and Peterson. *Id.* at 19 (citing Ex. 1029 ¶¶ 72–75).

In its Reply, Patent Owner argues that adding an additional satellite reduces the times that a position solution can be obtained. PO Reply 8–10 (citing Ex. 1004, Fig. 3-1; Ex. 2006 ¶¶ 40–41).

Based on our review of the parties’ arguments and evidence, including the competing declarant testimony, we find that Petitioner has established that one of ordinary skill in the art would have had reason to and would have been motivated to use Peterson’s positioning equations when absolute time is unknown, and would look Beser’s method as a way to obtain additional satellite measurements. We agree with Petitioner that the two references complement one another in that Peterson discloses a solution to the problem of computing position without knowing absolute time, but it requires an additional satellite to do so, and Beser discloses a method that makes more of such satellite measurements available. Ex. 1004, 3-1, 3-9 (Fig. 3-1); Ex. 1024 ¶¶ 103–104, 112–115; Ex. 1026, 1323, 1329–1330. We are also persuaded that the combination provides benefits such as overcoming Beser’s need to continuously track satellites to obtain absolute time, increasing the number of satellites available using Peterson’s snapshot approach, and reducing the time necessary to track satellites in urban canyons. Ex. 1024 ¶¶ 104, 112–115; *see also* Ex. 1029 ¶¶ 71–75.

Patent Owner’s arguments do not adequately address the advantages that are readily apparent based on Petitioner’s proposed combination. Instead, Patent Owner argues, without persuasive support, that requiring one

additional satellite signal to either Beser or Peterson would entirely frustrate their purpose, and presumably outweigh all of the potential advantages of that combination. *See, e.g.*, RMTA 20–21. We are more persuaded by Petitioner’s reading of the references and supporting declarant testimony that Beser’s combination of the GPS and GLONASS systems would have provided more than enough satellites for use in urban environments, and requiring one additional satellite signal would not have frustrated the purpose of either reference. *See* Ex. 1029 ¶¶ 71 (“Beser typically provides 3 or 4 additional measurements.”), 72 (“Beser typically provides many more than the needed number of satellites.”). Based on the foregoing, for the reasons provided by Petitioner and its declarant, we find that one of ordinary skill in the art would have been motivated to combine Beser and Peterson.

i. Long-Felt Need

Patent Owner relies on the same long-felt need argument we addressed above in the context of the Beser/van Diggelen challenge. *See* RMTA 22. For the same reasons, we find the evidence of long-felt need weak.

j. Conclusion

We find that: (1) Petitioner’s proposed level of ordinary skill in the art is consistent with the art of record; (2) the Beser and Peterson combination teaches all the limitations of the substitute claims; (3) one of ordinary skill in the art would have had a reason to combine the Beser and Peterson; and (4) the evidence of long-felt but unresolved need, if any, is weak. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that proposed substitute claims 21–33 are unpatentable over the combination of Beser and Peterson.

7. Remaining Challenges

Petitioner argues that proposed substitute claims 21–33 are patent-ineligible under 35 U.S.C. § 101. Pet. Opp. 20–25; Pet. Sur-reply 9–12. Patent Owner disagrees. RMTA 22–25; PO Reply 11–12. Petitioner also argues that the proposed substitute claims are indefinite, and Patent Owner disagrees. Pet. Opp. RMTA 1–10; RMTA 10; PO Reply 1–4.

Because we have already determined that all of the proposed substitute claims are unpatentable based on Petitioner’s obviousness challenges, we need not determine whether they are also unpatentable due to their alleged ineligibility under § 101 or indefiniteness.²⁴

²⁴ The potential indefiniteness concerns raised by Petitioner are not of the type that prevents us from applying the prior art to the claims. *See* Pet. Opp. 1–9. We also note that Patent Owner does not argue that the prior art (van Diggelen and Peterson) fails to disclose the without using absolute time limitation that forms the basis for Petitioner’s indefiniteness arguments.

CONCLUSION²⁵

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 6–13, 16	102(b)	Beser	1, 2, 6–13, 16	
5, 15	103(a)	Beser, GLONASS ICD	5, 15	
1, 2, 6, 7, 11–13	102(b)	Lennen	1, 2, 6, 7, 11–13	
8–10, 16	103(a)	Lennen, Kaplan	8–10, 16	
5, 15	103(a)	Lennen, GLONASS ICD	5, 15	
Overall Outcome			1, 2, 5–13, 15, 16	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	21–33
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–33
Substitute Claims: Not Reached	

²⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 2, 5–13, 15, and 16 of U.S. Patent No. 8,902,104 B2 have been shown, by a preponderance of the evidence, to be unpatentable;

FURTHER ORDERED that Patent Owner's Revised Motion to Amend is *denied*; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2019-00816
Patent 8,902,104 B2

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