

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

BROADCOM CORP.,  
Patent Owner.

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IPR2019-00737  
Patent 8,902,104 B2

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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

u-blox AG and Japan Radio Co., Ltd. (collectively, “Petitioner”) filed a Petition (Paper 3, “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”). Broadcom Corp. (“Patent Owner”) did not file a Preliminary Response. 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 14, “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 20, Pet. Opp. RMTA), Patent Owner filed a Corrected Reply (Paper 26, “PO Reply”), and Petitioner filed a Sur-reply (Paper 32, “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 36, “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 u-blox AG, u-blox America, Inc., u-blox San Diego, Inc., and Japan Radio Co., Ltd. Pet. 53. Patent Owner states that it is the sole real party in interest for Patent Owner. Paper 6, 2.

### *B. Related Matters*

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 Patent Owner: *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 6, 2; Pet. 53. The parties also identify IPR2019-00816 as a related proceeding, which challenges the '104 patent on different grounds. Pet. 53; *see also* Paper 6, 2. We issue the Final Written Decision in IPR2019-00816 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.

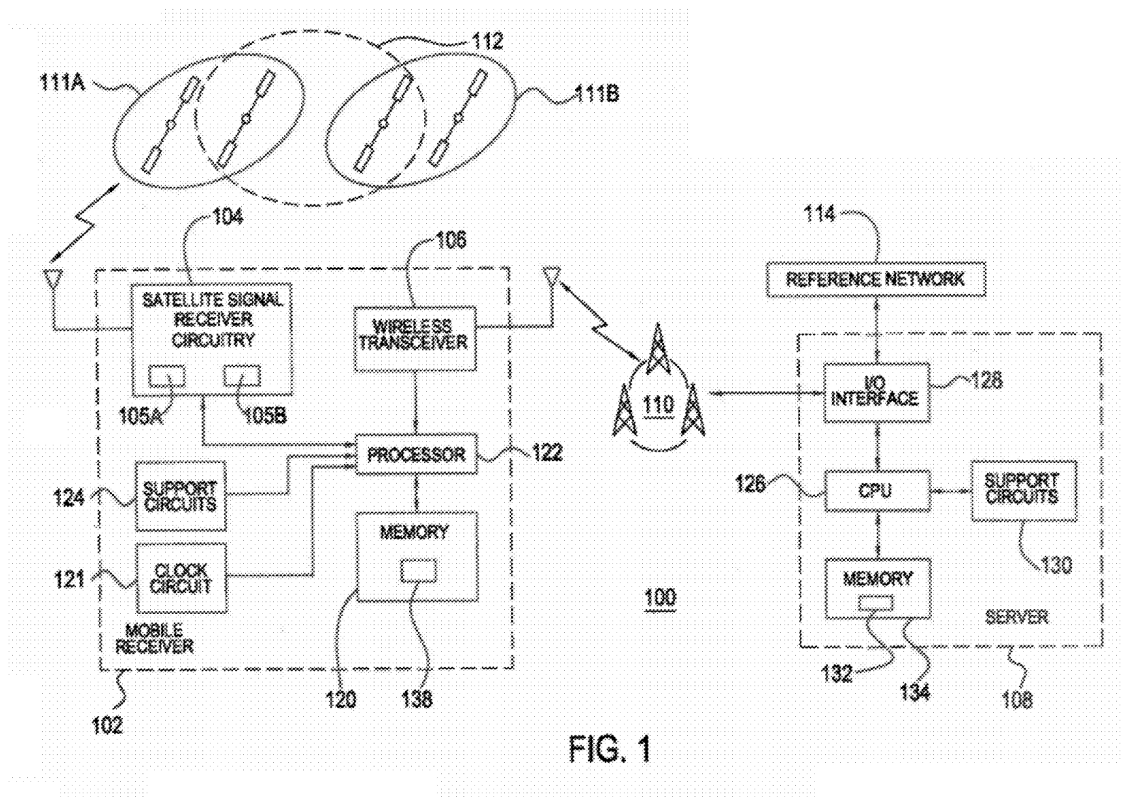


Figure 1 is “a block diagram depicting an exemplary embodiment of a position location system.” Ex. 1001, 3:25–26. Figure 1 depicts mobile receiver 102 in communication with server 108 via wireless communication network 110. *Id.* at 3:49–52. Mobile receiver 102 obtains satellite measurement data with 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. Challenged Claims*

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.<sup>1</sup>

*E. Asserted Grounds*

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

Pet. 13, 35, 45. Petitioner challenges:

|                    |                     |                                  |
|--------------------|---------------------|----------------------------------|
| 1, 2, 5–13, 15, 16 | 102(b) <sup>2</sup> | Rossbach <sup>3</sup>            |
| 1, 2, 5–13, 15, 16 | 103(a)              | Rossbach, Beser <sup>4</sup>     |
| 8–10, 16           | 103(a)              | Rossbach, Sheynblat <sup>5</sup> |
| 8–10, 16           | 103(a)              | Rossbach, Beser, Sheynblat       |

Petitioner also relies on the Declaration of Dr. Philip Dafesh.

Ex. 1002 (“Dafesh Declaration”).

We briefly address the prior art status of the references Petitioner relies upon. As to Rossbach, Petitioner contends that Rossbach was submitted for publication in 2000 and published by the University of Armed Forces in Neubiberg, in 2001, and was added to the library system of Bundeswehr University Munich in 2003. Pet. 13 (citing Ex. 1016, Ex. 1017;

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<sup>1</sup> 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.

<sup>2</sup> The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the effective filing date of the ’104 patent was before the effective date of the relevant amendments, the pre-AIA versions of §§ 102 and 103 apply.

<sup>3</sup> Rossbach, Udo, Positioning and Navigation Using the Russian Satellite System GLONASS (Ex. 1004) (“Rossbach”).

<sup>4</sup> Beser, Jacques, Ph.D., Integrated GPS/GLONASS User Equipment, Advisory Group for Aerospace Res. & Dev., Lecture Series 207 (Ex. 1005) (“Beser”).

<sup>5</sup> US 7,660,588 B2, filed April 17, 2003 (Ex. 1006) (“Sheynblat”).

Ex. 1018, 4; Ex. 1019, 4); Ex. 1016 ¶ 3. Petitioner also asserts that Rossbach was indexed in the library’s catalog and that any person could search for Rossbach in that system using tags such as “GPS,” “GLONASS,” and “Navigation.” *Id.* (citing Exs. 1016, 1017, 1020–1021). We are persuaded that Petitioner has proven by a preponderance of the evidence that Rossbach 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 Beser, Petitioner contends that Beser was published in a lecture series titled “System Implications and Innovative Applications of Satellite Navigation” in June 1996. Pet. 36 (citing Exs. 1005, 1013–1015; Ex. 1016 ¶¶ 10–11; Ex. 1023). Petitioner also contends that Beser was publicly accessible in 2001 via the file history of U.S. Patent No. 6,229,479. *Id.* 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).

As to Sheynblat, Petitioner contends that Sheynblat is prior art under 35 U.S.C. § 102(e) based on its filing date in 2003. *See* Pet. 45 (citing Ex. 1006, code (22), (45)). We are persuaded that Petitioner has established adequately that it is prior art to the ’104 patent under 35 U.S.C. § 102(e). *See id.*; Ex. 1001, code (63) (earliest effective filing date of Mar. 18, 2005); Ex. 1006, code (22) (filing date of April 17, 2003).

## 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. 7 (citing Ex. 1002 at ¶ 24). 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. 9. Petitioner relies on two passages from the specification to support its construction. *Id.* at 10. 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. 10.<sup>6</sup>

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

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<sup>6</sup> Petitioner also addresses an alleged proposed construction from Patent Owner in the related ITC proceeding. *See* Pet. 11–13. 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.

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 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 Rossbach*

Petitioner challenges claims 1, 2, 5–13, 15, and 16 under 35 U.S.C. § 102(b) as anticipated by Rossbach. Pet. 13–35. For this challenge, Petitioner cites to Rossbach and the Dafesh Declaration. *Id.*

*1. Rossbach*

Rossbach relates to positioning and navigation of a satellite receiver. Ex. 1004, Title. Rossbach notes that both GPS and GLONASS satellite systems may be used in combined applications, but that “first a number of

inter-operability issues have to be solved.” *Id.* at ii<sup>7</sup> (Abstract). In particular, “[i]n combined GPS/GLONASS data processing the differences between [the] time scales must be accounted for.” *Id.* at 31.

Rossbach discloses a number of receivers capable of receiving information from different satellite systems. Rossbach’s Figures 3.13 and 3.14 are reproduced below.

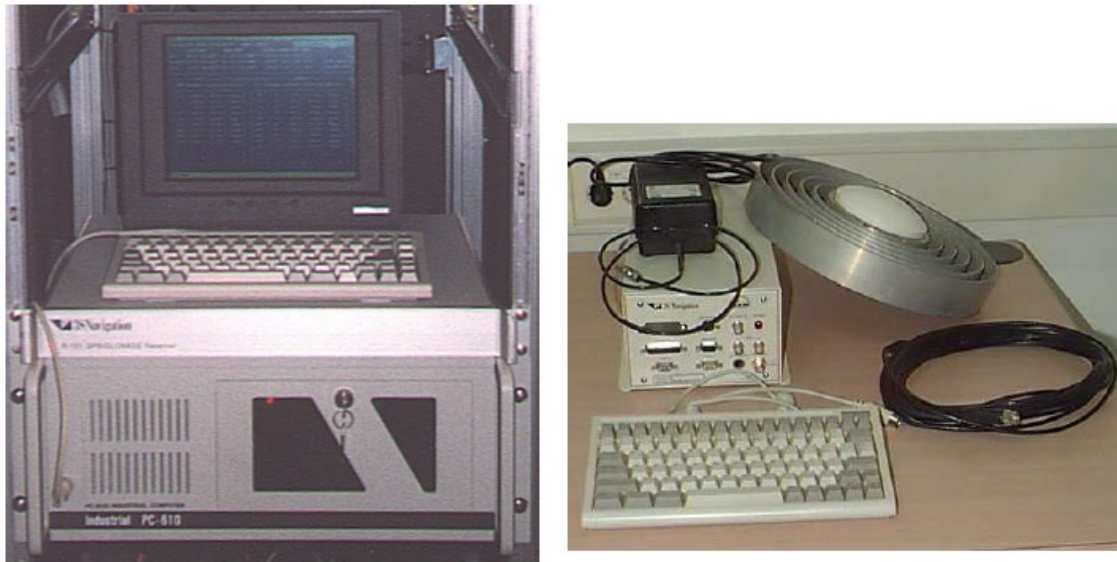


Figure 3.13, shown on the left above, depicts an R-100/R-101 GPS/GLONASS receiver. Ex. 1004, 25. Multiple GPS and GLONASS satellites can be tracked at the same time using the R-100 receiver. *Id.* Figure 3.14, shown on the right above, depicts a GNSS-200 GPS/GLONASS receiver. *Id.* at 26. Rossbach describes the GNSS-200 receiver as “merely the basic R-100 version . . . fitted into a specially modified industrial computer.” *Id.* According to Rossbach, these receivers were developed by 1995. *Id.* at 25–26. A year later, a GNSS-300 receiver

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<sup>7</sup> We cite to the native page numbering used in Rossbach, rather than the pagination added when Rossbach was filed as an exhibit.

was introduced as a successor to the GNSS-200 receiver, which “provided the same features as the GNSS-200, but was again shrunk.” *Id.* at 26.

Rossbach describes accounting for the time difference between different satellite systems as “the crucial problem to be solved when combining GPS and GLONASS data in navigation.” Ex. 1004, 33. Rossbach devotes a section to resolving the time reference difference. *See id.* In a series of equations, Rossbach refers to “( $t_{\text{GPS}} - t_{\text{GLONASS}}$ ) as the difference in system time scales,” which “is now independent of the receiver.” *Id.* at 35. Rossbach also discloses measuring pseudoranges from satellites, referred to in Rossbach’s equations as “PR.” *Id.* at 73, 85.

Rossbach refers to measured pseudoranges from GPS satellites as  $\text{PR}_R^i$ , and measured pseudoranges from GLONASS satellites as  $\text{PR}_R^j$ . *Id.* at 88.

Rossbach then shows use of the difference in system time with pseudoranges measured from the two satellite systems. *Id.*

## 2. Independent Claim 1

Petitioner asserts that Rossbach discloses all of the limitations of claim 1. Pet. 14–23. Petitioner provides analysis of each limitation in claim 1, with citations to Rossbach that correspond to each of the claim limitations. *Id.* Petitioner also cites to the relevant declarant testimony. *Id.* (citing various portions of Ex. 1002).

Claim 1’s preamble states: “A method for determining a position of a mobile receiver.” Petitioner asserts that Rossbach discloses the requirements of the preamble, to the extent it limits the claim, because it relates to positioning and navigation of a receiver, and discloses the R-100 and GNSS-200 receivers. Pet. 14–15 (citing Ex. 1002 ¶¶ 68–70; Ex. 1004, Title, 25, 26, 100, 106, 118, 135). Petitioner also relies on a “‘much smaller’

GG24 and NovAtel MiLLenium combined GPS/GLONASS receiver” that Rossbach discloses, “which have numerous mobile applications in sea, air, or land vehicles.” *Id.* at 15 (citing Ex. 1002 ¶¶ 71–72; Ex. 1004, 27).

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 Rossbach discloses use of a combined GPS/GLONASS receiver that measures the pseudoranges from a satellite in the GPS system and GLONASS system. Pet. 15–17 (citing Ex. 1002 ¶¶ 73–75; Ex. 1004, 73, 85–91, 94). More specifically, Petitioner points to Rossbach’s Equations 8.1.14 and 8.1.15, which identify measured pseudoranges associated with the GLONASS and GPS satellites. *Id.* at 16–17 (citing Ex. 1004, 88).

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 Rossbach discloses this limitation because it describes a time difference between GPS time and GLONASS time, and denotes that difference as “ $t_{\text{GPS}} - t_{\text{GLONASS}}$ ” or “ $t_{\text{GPS}} - t_{\text{GLO}}$ .” Pet. 18 (citing Ex. 1002 ¶ 78; Ex. 1004, 35, 88). Petitioner contends that Rossbach discloses resolution of the time difference in situations where a GLONASS-M satellite provides the difference, or when no GLONASS-M satellites are available, and the difference must be calculated by the receiver. *Id.* at 18–19 (citing Ex. 1002 ¶ 79; Ex. 1004, 33–37). Petitioner contends that Rossbach discloses the “determining a difference” limitation in both situations. *Id.* Petitioner also points to Rossbach’s disclosure of a “more-detailed version” of the algorithm that incorporates the time difference, with the receiver’s algorithm

using the results of the difference calculation when determining the receiver's position "at the next instant in time." *Id.* at 19–20 (citing Ex. 1002 ¶¶ 76–79; Ex. 1004, 34–35, 88).

As to the "combining" step we construed above, Petitioner argues that Rossbach discloses the step because it uses the measured first and second pseudoranges "together to compute a new position state by using the time difference  $t_{\text{GPS}} - t_{\text{GLONASS}}$ ." Pet. 20 (citing Ex. 1002 ¶ 81; Ex. 1004, 87–88). More specifically, Petitioner relies on Rossbach's Equation 8.1.20, which Petitioner alleges combines the pseudoranges into a "single matrix" that discloses the claimed "to generate combined first and second pseudorange[s]." *Id.* at 21 (citing Ex. 1004, 88). Petitioner points to Equations 8.1.21 to 8.1.23 as "other equations used in the GPS/GLONASS algorithm to determine position." *Id.* (citing Ex. 1002 ¶¶ 82–83). Petitioner also alleges that Rossbach discloses "accounting for the difference in time references between GPS and GLONASS system times  $\delta t_{\text{sys}}$ ," and, consistent with Petitioner's construction, using the difference  $\delta t_{\text{sys}}$  to generate pseudoranges that can be used together to determine the position of the receiver. *Id.* at 22 (citing Ex. 1002 ¶¶ 81–83; Ex. 1004, 88–89).

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Rossbach 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 Rossbach 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 Dafesh Declaration. *See* Pet. 14–23; Ex. 1002 ¶¶ 65–91.

### *3. Independent Claim 12*

Petitioner asserts that Rossbach discloses all of the limitations of claim 12. Pet. 32–34. Claim 12’s preamble states: “A mobile receiver, comprising.” Petitioner asserts that Rossbach discloses the requirements of the preamble for the same reasons as the preamble of claim 1. Pet. 32 (citing Ex. 1002 ¶¶ 66–72, 118).

Claim 12 requires “satellite receiver circuitry configured to receive first and second satellite signals from first and second satellites respectively, the first and second satellites corresponding to first and second respective satellite navigation systems.” Petitioner asserts that Rossbach discloses implementing a positioning algorithm on an R-100 GPS/GLONASS receiver that could receive signals from both systems. *Id.* at 33 (citing Ex. 1002 ¶¶ 118–119; Ex. 1004, 86–91). Petitioner also contends that Rossbach discloses other GPS/GLONASS receivers include satellite receiver circuits. *Id.* (citing Ex. 1002 ¶¶ 118–119).

Claim 12 also requires “a processor configured to” perform certain functions. Petitioner contends that Rossbach discloses the R-100 receiver, which included a processor “for processing the received GPS/GLONASS satellite signals.” Pet. 33 (citing Ex. 1002 ¶ 120; Ex. 1004, 86–91). Petitioner also contends that Rossbach discloses other receivers that include processors. *Id.* (citing Ex. 1002 ¶¶ 120–121). Claim 12 also requires functions that the processor is configured to perform that mirror limitations in claim 1, such as “measure” first and second pseudoranges, “determine a difference between” first and second time references, and “combine” the first and second pseudoranges “using the difference to generate combined first and second pseudoranges.” For these limitations, Petitioner relies on the analysis for the nearly identical limitations in claim 1. *See id.* at 34.

Patent Owner did not file a Response, and does not dispute that Petitioner carried its burden of proving that Rossbach discloses all of the limitations of claim 12. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Rossbach discloses all of the limitations of claim 12, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Dafesh Declaration. *See* Pet. 32–34; Ex. 1002 ¶¶ 118–121.

#### *4. Dependent Claims 2, 5–11, 13, 15, and 16*

Petitioner contends that Rossbach discloses all of the limitations of the challenged dependent claims. Pet. 24–32, 34–35.

Claim 2 depends from claim 1 and further requires “computing the position of the mobile receiver using the combined first and second pseudoranges.” Claim 13 depends from claim 12 and contains similar

requirements: “wherein the processor is further configured to compute a position of the mobile receiver using the combined first and second pseudoranges.” For claim 2, Petitioner contends that Rossbach discloses algorithms using the combined pseudorange measurements to compute the receiver’s position. Pet. 24 (citing Ex. 1002 ¶ 93; Ex. 1004, 88–89). For claim 13, Petitioner relies on its analysis for claim 2. *See id.* at 34 (citing Ex. 1002 ¶¶ 123–124).

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.” Claim 15 depends from claim 12 and contains similar requirements: “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.” For claim 5, Petitioner asserts that Rossbach describes how GLONASS satellites can include a time difference between its system and the GPS system in the navigation message “transmitted by the satellite to the receiver.” Pet. 25 (citing Ex. 1002 ¶¶ 96–97; Ex. 1004, 36–37). For claim 15, Petitioner relies on its analysis for claim 5. *See id.* at 35 (citing Ex. 1002 ¶¶ 125–126).

Claim 6 depends from claim 1 and further requires “computing a time of day using the combined first and second pseudoranges.” Petitioner contends that “a receiver’s clock and the GPS system time are not always in sync” and that the receiver will estimate a “clock offset” that corresponds to this difference. Pet. 26 (citing Ex. 1002 ¶ 100). Petitioner also contends that a GPS receiver will determine the “time of day” using this clock offset. *Id.* (citing Ex. 1001, 8:1–4; Ex. 1001 ¶ 100). Petitioner argues that Rossbach

discloses computing the receiver clock offset “using the combined GPS and GLONASS pseudoranges” and using that offset to determine the claimed “time of day.” *Id.* at 26–27 (citing Ex. 1002 ¶¶ 99–103; Ex. 1004, 33, 88–89).

Claim 7 depends from claim 1 and further requires “wherein combining the first pseudorange and the second pseudorange comprises converting the first pseudorange from the first time reference to the second time reference.” Petitioner contends that Rossbach’s equations include a variable that represents the difference between the first and second time references. Pet. 27–28 (citing Ex. 1004, 88). Petitioner also argues that the GLONASS pseudorange contains that time difference term, but the GPS pseudorange does not, and Rossbach combines the two pseudoranges “by converting the GLONASS pseudorange (‘first pseudorange’) from the GLONASS time reference (‘first time reference’) to the GPS time reference (‘second time reference’).” Pet. 28 (citing Ex. 1002 ¶¶ 105–107).

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.” Claim 16 depends from claim 12 and further recites limitations similar to those in claim 8: “wherein the processor is further configured to:” (1) “form a first pseudorange residual as a difference between an expected first pseudorange and the measured first pseudorange;” (2) “form a second pseudorange residual as a difference between an expected second pseudorange and the measured second pseudorange;” and (3) “compute a position update of a position of the

mobile receiver using the first and second pseudorange residuals.” For claim 8, Petitioner argues that Rossbach describes forming pseudorange residuals that correspond to the difference between an expected and a measured pseudorange. Pet. 29 (citing Ex. 1002 ¶¶ 110–112; Ex. 1004, 88). For claim 16, Petitioner relies on its arguments for claims 7 and 8. *Id.* at 35 (citing Ex. 1002 ¶¶ 127–128).

Claim 9 depends from claim 8 and further requires “computing a position update of the position of the mobile receiver using the first and second pseudorange residuals.” Petitioner contends that “[p]seudorange residuals are conventional quantities used to determine a receiver’s position when solving a set of linearized observation equations.” Pet. 30 (citing Ex. 1002 ¶¶ 110–112). Petitioner argues that Rossbach teaches determining a position, as set forth in Petitioner’s arguments for claims 1 and 2, and using first and second pseudorange residuals to compute an updated position of the receiver as discussed in connection with claim 8, and the combination of these teachings satisfies the limitations of claim 9. *Id.*

Claim 10 depends from claim 8 and further requires “computing an update to a time of day measurement using the first and second pseudorange residuals.” Petitioner contends that, as discussed in connection with claim 6, Rossbach discloses use of a clock offset to compute time of day and, as discussed in connection with claims 1 and 8, discloses using the pseudorange residuals. Pet. 31 (citing Ex. 1004, 33). Petitioner further argues that Rossbach discloses the claimed “update to a time of day measurement” because value of the difference between the local receiver time and the satellite “time of day,” which Rossbach uses, “represents an

update to a ‘time of day’ measurement in the receiver.” *Id.* (citing Ex. 1002 ¶¶ 110–112).

Claim 11 depends from claim 1 and further requires “the first satellite navigation system and the second satellite navigation system include any two of GPS, GALILEO, and GLONASS.” Petitioner contends that Rossbach discloses deals with GLONASS in combination with GPS systems, and discloses a combined GPS/GLONASS receiver that implements an algorithm using measurements from both systems. Pet. 32 (citing Ex. 1004, 2, 87).

Patent Owner did not file a Response, or dispute that Rossbach discloses all of the limitations in these challenged dependent claims. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find that Petitioner has established by a preponderance of the evidence that Rossbach discloses all of the limitations of claims 2, 5–11, 13, 15, and 16, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Dafesh Declaration. *See* Pet. 24–32, 34–35; Ex. 1002 ¶¶ 92–116, 122–129.

Based on the foregoing, we determine Petitioner has proven by a preponderance of the evidence that claims 1, 2, 5–13, 15, and 16 are unpatentable as anticipated by Rossbach.

*E. Challenge Under 35 U.S.C. § 103 Based on Rossbach and Beser*  
Petitioner challenges claims 1, 2, 5–13, 15, and 16 under 35 U.S.C. § 103 based on Rossbach and Beser. Pet. 35–44. For these challenges, Petitioner cites to the asserted references and the Dafesh Declaration. *Id.*

*1. Beser*

Beser relates to “[i]ntegrated GPS/GLONASS receivers” that offer “better availability, performance and integrity than GPS-only receivers.” Ex. 1005, 3-1.<sup>8</sup> Beser uses the R-100 and GNSS-200 receivers—the same receivers described in Rossbach—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.

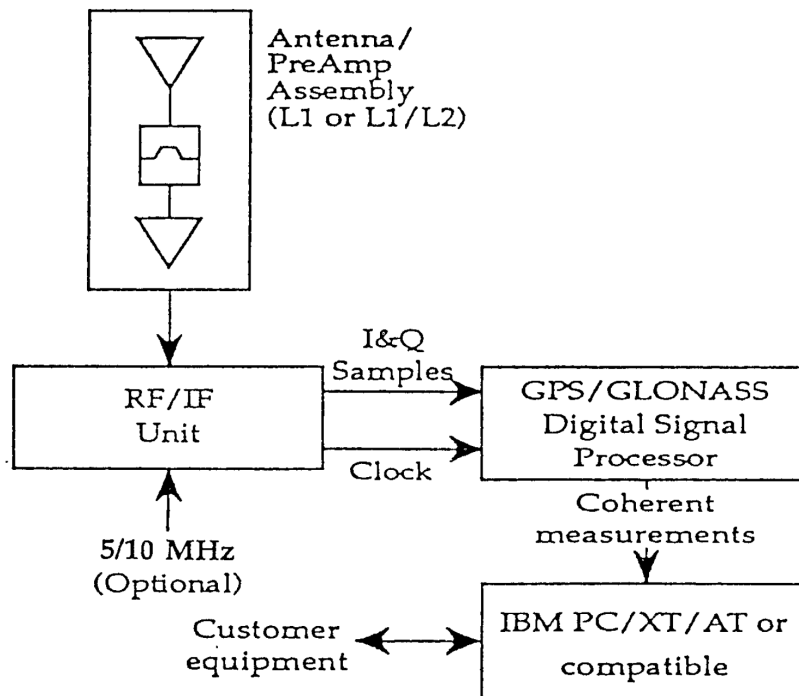


**FIGURE 4-1. R-100 INTEGRATED GPS/GLONASS RECEIVER ARCHITECTURE.**

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

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

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. 1005, 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. Disclosure of Limitations in Challenged Claims and Combination of References*

We first address whether the combination of Rossbach and Beser discloses the limitations in independent claims 1 and 12. Independent claim 1 requires a “mobile receiver,” and independent claim 12 requires “satellite receiver circuitry” and a “processor.” Ex. 1001, 9:26, 10:8, 10:14. Petitioner alleges that Rossbach alone discloses these limitations as part of its first challenge, addressed above. Pet. 14–15, 33, 36–37. For purposes of its challenge based on Rossbach and Beser, Petitioner assumes that Rossbach does not disclose these limitations, and argues that the claims would have been obvious because Beser discloses the limitations, and that it would have been obvious to modify Rossbach with Beser’s further teachings. *Id.* at 38–44.

More specifically, Petitioner argues that Beser discloses the same “mobile receivers” discussed in Rossbach—the R-100 and GNSS-200

satellite receivers. Pet. 40. Petitioner points out that Beser discloses the mobile nature of the receivers by describing their use in various “ground, air and sea applications” and describing field tests using an SUV, airplane, and ship. *Id.* (citing Ex. 1005, 3-11, 3-17, 3-23 to 3-25).

As to the “satellite receiver circuitry” limitation in claim 12, Petitioner contends that Beser discloses this circuitry in its figures. *Id.* at 40–42. For example, Beser contends that the “antenna/preamp assembly and the RF/IF unit” in Beser’s Figure 4-1 (reproduced above) constitute “satellite receiver circuitry,” as well as the “antenna/preamp unit and the RF unit” shown in Figure 5-2, which describes the GNSS-200 receiver architecture. *Id.* at 41–42 (citing Ex. 1002 ¶¶ 118–121, 136; Ex. 1005, 3-11 to 3-18, Figures 4-1, 5-2).

As to the “processor” limitation in claim 12, Petitioner points to the R-100’s “GPS/GLONASS Digital Signal Processor” depicted in Figure 4-1, and contends that this processor, “alone or in combination with the IBM PC/XT/AT” also disclosed in Figure 4-1, discloses the claimed “processor.” *Id.* at 42–43 (citing Ex. 1002 ¶¶ 118–121; Ex. 1005, 3-12 to 3-13, Figure 4-1). Petitioner also argues that the GNSS-200’s digital processor card, alone or in combination with the receiver’s “internal PC/AT host computer,” discloses the claimed processor. *Id.* at 43–44 (citing Ex. 1002 ¶¶ 118–121; Ex. 1005, 3-12, 3-16 to 3-17, Figure 5-2).

For the challenged dependent claims 2, 5–11, 13, 15, and 16, Petitioner relies on its contention that Rossbach discloses all of the limitations of these claims. Pet. 44 (citing Ex. 1002 ¶¶ 134–137).

As to the motivation to combine Rossbach and Beser, Petitioner notes that Beser expands on the description provided for the R-100 and GNSS-200

receivers provided in Rossbach. Pet. 38–39. Petitioner argues that “it would have been obvious to use either the R-100 or GNSS-200 as further described in Beser to implement the positioning algorithm disclosed in Rossbach.” *Id.* at 39 (citing Ex. 1002 ¶¶ 118–121, 131–137). Petitioner also argues that “[s]uch a modification would merely combine known elements—i.e., a commercially-available satellite receiver and the concept of combined GPS/GLONASS positioning using such a receiver.” *Id.*

Patent Owner did not file a Response or dispute any of Petitioner’s assertions in connection with this challenge. Moreover, we are persuaded by Petitioner’s arguments and evidence, and find Petitioner has established by a preponderance of the evidence that the combination of Rossbach and Beser discloses all of the limitations of claims 1, 2, 5–13, 15, and 16, and that one of ordinary skill in the art would have been motivated to modify Rossbach by applying the further details Beser discloses regarding the R-100 or GNSS-200 receivers, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Dafesh Declaration. *See* Pet. 35–44; Ex. 1002 ¶¶ 118–121, 131–137.

### 3. Conclusion

“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 1, 2, 5–11, 13, 15, and 16; (3) one of ordinary skill in the art would have had a reason to combine the Rossbach with Beser; 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 1, 2, 5–11, 13, 15, and 16 of the ’104 patent are unpatentable over the combination of Rossbach with Beser.

*F. Challenge Under 35 U.S.C. § 103 Based on Rossbach, Beser, and Sheynblat*

Petitioner challenges dependent claims 8–10 and 16 under 35 U.S.C. § 103 based on Rossbach and Sheynblat, or Rossbach, Beser, and Sheynblat.<sup>9</sup> Pet. 45–53. For these challenges, Petitioner cites to the asserted references and the Dafesh Declaration. *Id.*

*1. Sheynblat*

Sheynblat relates to methods for improving the accuracy of an initial position estimate for a wireless terminal. Ex. 1006, Abstract. The method includes the steps of obtaining an estimated initial position of the terminal, measuring the position of the terminal, and updating the initial position estimate using the measured information. *Id.* The updating step “may be performed by first deriving a measurement vector,” with the vector typically

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<sup>9</sup> Because Petitioner sets forth the challenge in the alternative, the challenge encompasses two distinct challenges, one based on Rossbach and Sheynblat, and the other based on Rossbach, Beser, and Sheynblat. *See* Pet. 45.

including pseudorange residuals. *Id.* at 3:30–34. Sheynblat describes each pseudorange residual as the difference between a “measured” pseudorange and a “computed” pseudorange from the initial position estimate. *Id.* at 3:34–38.

## 2. Discussion

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 alleges that Rossbach alone discloses these limitations as part of its first challenge, addressed above. Pet. 28–31, 35. For purposes of its challenge based on Rossbach, Beser, and Sheynblat, Petitioner assumes that “Rossbach (and/or Rossbach and Beser) fails to disclose elements relating to pseudorange residuals because it does not explicitly label the difference between expected and measured pseudoranges as ‘pseudorange residuals.’” *Id.* at 45.

Petitioner argues that Sheynblat discloses the limitations relating to pseudorange residuals. *Id.* at 48–49. For example, as to claim 8, Petitioner contends that Sheynblat’s disclosure of forming a pseudorange residual for “each” pseudorange discloses these limitations, although Sheynblat uses the term “computed” pseudorange rather than the equivalent term “expected” pseudorange used in the ’104 patent. *Id.* (citing Ex. 1002 ¶¶ 141, 146–147; Ex. 1006, 3:34–46, 10:44–61). According to Petitioner, one of ordinary skill in the art “would have known that the term ‘pseudorange residual’ [in Sheynblat] refers to the difference between a ‘measured’ pseudorange and an ‘expected’ pseudorange, and then [to] use the residual values to update the measured values.” *Id.* at 49 (citing Ex. 1002 ¶ 148).

As to the motivation to combine, Petitioner argues that one of ordinary skill in the art would have combined Rossbach and Sheynblat to

practice the claimed invention because the combination “involves only common knowledge well-known” to one of ordinary skill in the art. *Id.* at 49–50 (citing Ex. 1002 ¶¶ 146–150). Petitioner also contends that “to form a ‘residual’ would merely have involved transforming Rossbach’s equations 8.1.9–8.1.13 to reflect a ‘residual’ value, as shown in Sheynblat’s Eq. 6, rather than the difference between the ‘measured’ and ‘expected’ values shown in Rossbach’s equations.” *Id.* at 50 (citing Ex. 1002 ¶ 149).

Petitioner further contends that one of ordinary skill in the art “would have had a reasonable expectation of success in doing so because Sheynblat demonstrates that GPS receiver algorithms used ‘pseudorange residuals’ to accurately determine the receiver’s position in the same type of equations used in Rossbach.” *Id.* (citing Ex. 1002 ¶¶ 148–149).

Patent Owner did not file a Response or dispute any of Petitioner’s assertions in connection with this challenge. Moreover, we are persuaded by Petitioner’s argument and evidence, and find that Petitioner has established by a preponderance of the evidence that, in the event that Rossbach does not anticipate because it does not disclose the claimed “pseudorange residuals,” the combination of Rossbach and Sheynblat, and Rossbach, Beser, and Sheynblat discloses all of the limitations of claims 8–10 and 16, and that one of ordinary skill in the art would have been motivated to modify Rossbach by applying the further teachings of Sheynblat, for the reasons stated by Petitioner in the Petition, which we adopt as our own findings, as further supported by the Dafesh Declaration. *See* Pet. 45–53; Ex. 1002 ¶¶ 110–112, 141, 146–150.

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 (Rossbach and

Sheynblat, and Rossbach, Beser, and Sheynblat) 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 the Rossbach and Sheynblat, or Rossbach, Beser, and Sheynblat; 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 Rossbach and Sheynblat, as well as Rossbach, Beser, and Sheynblat.

*G. 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.<sup>10</sup> As explained below, Petitioner has proven, by a preponderance of the evidence based on the entirety of the record, that the substitute claims are

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<sup>10</sup> 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; R. MTA 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.

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) (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)). “[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.*

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). R. MTA 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 proposed 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, 12–15, 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. 8–13. 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 Rossbach and van Diggelen<sup>11</sup>; (3) obvious

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<sup>11</sup> US 6,417,801 B1, issued July 9, 2002 (“van Diggelen”) (Ex. 1010).

under 35 U.S.C. § 103(a) based on Rossbach and Peterson<sup>12</sup>; and (4) patent-ineligible under 35 U.S.C. § 101. Pet. Opp. RMTA 1, 9, 22. Petitioner relies on a Declaration of Dr. Dafesh (Ex. 1028) in support of its Opposition to Patent Owner's Motion to Amend, and follow-on Declaration of Dr. Dafesh (Ex. 1032) 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 Rossbach and Peterson are prior art to the '104 patent. *See, e.g.*, Exs. 1016, 1033.

#### 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 2–3, 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).

#### 5. *Obviousness Based on Rossbach and van Diggelen*

Petitioner opposed Patent Owner's original MTA by arguing that those proposed substitute claims were unpatentable over Rossbach and van

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<sup>12</sup> 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).

Diggelen. *See* Pet. Opp. MTA 15–19.<sup>13</sup> In our Preliminary Guidance, we noted that Petitioner’s arguments appeared to have merit based on the record before us at that time. PG 11–12. 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 Rossbach and van Diggelen. Pet. Opp. RMTA 9–15, 17–19.

Patent Owner argues that Petitioner fails to establish that Rossbach is prior art as a printed publication before the effective filing date of the ’104 patent in 2005. RMTA 10. Patent Owner also argues that one of ordinary skill in the art would not have been motivated to combine Rossbach and van Diggelen, and that a long-felt but unresolved need supports a finding of nonobviousness. *Id.* at 13–19.<sup>14</sup> We will address these issues in turn, along with Petitioner’s arguments and evidence in support of its challenge.

*a. The Prior Art Status of Rossbach*

Patent Owner argues that Petitioner fails to meet its burden of proving that Rossbach 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

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<sup>13</sup> 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 9–10.

<sup>14</sup> Patent Owner also argues that Rossbach fails to disclose the “without knowing absolute time” limitation added by amendment, but Petitioner does not contend that Rossbach discloses that limitation and we will not address the issue further. *See* RMTA 12–13.

Petitioner’s declarant, Rachel Coffin, improperly relied on hearsay statements in an email attached to her declaration. RMTA 11 (citing Ex. 1016 ¶¶ 2–3; Ex. 1017). Patent Owner argues that without that hearsay evidence, Petitioner’s declarant fails to establish that Rossbach was publicly available in 2003. *Id.* (citing Pet. 13–14; Ex. 1016 ¶¶ 4–6; Ex. 1017).

Petitioner argues that Patent Owner waived its hearsay objection to the email (Ex. 1017, “Schorsch Email”) by missing the deadline for such objections. Pet. Opp. RMTA 10–11. Petitioner contends that because Petitioner included the email as part of 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.* at 11–12 (citing 37 C.F.R. § 42.64(b)(1)). Petitioner also contends that the evidence supports its argument that Rossbach was sufficiently publicly accessible at least by 2003. *Id.* at 12. Petitioner argues that the Schorsch Email was “from a librarian at Rossbach’s publishing university library” and confirms “that Rossbach was published, cataloged, and indexed at least by 2003.” *Id.* at 11. Petitioner also argues that Ms. Coffin relied on “a catalog page from Rossbach’s publishing library showing that Rossbach was indexed and cataloged in 2003.” *Id.* at 13 (citing Exs. 1020–1021). According to Petitioner, the catalog page “further shows that Rossbach can be (1) located by keywords, and (2) directly downloaded from the catalog page” and was first published in 2000. *Id.* at 13–14 (citing Exs. 1020–22). Petitioner also asserts that the Schorsch Email confirms Ms. Coffin’s understanding that anyone would have been able to search for Rossbach based on its title or other associated tags, and to request a copy via email. *Id.* at 14 (citing

Ex. 1017). Petitioner also relies on a copy of Rossbach stating that “150 copies” of Rossbach were printed and published as early as 2001. *Id.* (citing Exs. 1018–1019).

In its Reply to Petitioner’s Opposition, Patent Owner does not respond to Petitioner’s argument and evidence as to Patent Owner’s waiver of its hearsay objection and the public accessibility of Rossbach as of 2003. *See* PO Reply 5–7.

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 Rossbach is a prior art printed publication because it was publicly accessible at least as early as 2003. Notably, Patent Owner rests its argument against the public accessibility of Rossbach on the premise that the Schorsch Email is hearsay and that Ms. Coffin’s declaration standing alone, without resort to the Schorsch Email, is insufficient. RMTA 11. Patent Owner does not argue that Petitioner fails to meet its burden if the Schorsch Email cannot be excluded based on Patent Owner’s hearsay objection, and Patent Owner waived any such argument by failing to include it in its Motion or Reply. Moreover, Petitioner supports its position with persuasive evidence. Petitioner’s un rebutted declarant testimony and evidence include statements by a librarian with personal knowledge of the pertinent facts and a library catalog page showing that Rossbach was indexed, cataloged, searchable, and available via download as of 2003. Ex. 1016 ¶¶ 2–6; Ex. 1017; Exs. 1020–1022. Petitioner also points to evidence that 150 copies of Rossbach were printed in 2001. *See* Ex. 1018; Ex. 1019, 1–4.

Based on the foregoing, we conclude that Petitioner has established by a preponderance of the evidence that Rossbach 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. 1010, 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 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 Rossbach. *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 15–16 (citing Ex. 1010, 7:35–42, 7:45–48; Ex. 1028 ¶¶ 84–85); Pet. Opp. RMTA 9–10 (citing Pet. Opp. MTA 14–23; Ex. 1032 ¶¶ 59–63). 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 9

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. 1010, codes (54), (57), 7:35–42, 7:45–48; Ex. 1028 ¶¶ 84–85. 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 of Rossbach 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 15. Petitioner asserts that van Diggelen’s method for addressing unknown time requires an additional satellite measurement, and Rossbach 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 15–16 (citing Ex. 1004, 1; Ex. 1010, 7:35–42, 7:45–48; Ex. 1028 ¶¶ 84–88). According to Petitioner, “[g]iven these teachings, a POSITA would have been motivated to use van Diggelen’s positioning equations to improve Rossbach’s method, by further making use of the additional satellites measurements resulting from the use of more than one GNSS.” *Id.* at 16 (citing Ex. 1028 ¶ 93). Petitioner also contends that “van Diggelen expressly espoused the benefits of increasing numbers of satellite measurements” and one of ordinary skill in the art would have been motivated to modify Rossbach “so that Rossbach’s combined positioning method is usable and reliable when absolute time may not be available before the satellite signals can be decoded.” *Id.* at 16–17 (citing Ex. 1010, 10:66–11:5). Petitioner also argues that Rossbach allows for adding satellite measurements (pseudoranges) to its model, and it would have been “trivial” to make such modifications to Rossbach based on van Diggelen’s teachings. *Id.* at 17–18 (citing Ex. 1004, 85–89; Ex. 1010, 7:18–31; Ex. 1028 ¶¶ 87, 91, 94–95).

Patent Owner argues that “Rossbach and van Diggelen offer competing, not complimentary, solutions to different problems” and that 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 14–15 (citing Ex. 1004, 1; Ex. 1010, 1:36–39; Ex. 2005 ¶¶ 57–62). 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 (citing Ex. 1004, 35; Ex. 1010, 7:35–42; Ex. 2004 ¶ 62).

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 17–18 (citing Ex. 1005, 1:36–39; Ex. 1032 ¶ 69). Petitioner contends that van Diggelen addresses the problem of computing position without knowing absolute time. *Id.* at 18 (citing Ex. 1010, 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 “Rossbach teaches a way to make many more satellite measurements available.” *Id.* (citing Ex. 1004, 34; Ex. 1032 ¶ 70). Petitioner argues that the combination provides benefits in the form of “better availability, accuracy, integrity, and time-to-first fix.” *Id.* (citing Ex. 1032). Petitioner also takes issue with Patent Owner’s argument that Rossbach requires an additional satellite signal because, in some embodiments, Rossbach utilizes information already known or provided by an external source (e.g., difference in time references), negating the need for an additional satellite source. *Id.* at 18–19 (citing Ex. 1004, 35–37); *see also* Pet. Sur-reply 5–6.

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 5–6 (citing Ex. 1010, 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 6–7 (citing RMTA 18–19; IPR2029-00816, Ex. 1004, 9; 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 van Diggelen’s positioning equations when absolute time is unknown to improve Rossbach’s method. 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 Rossbach discloses a method that makes more of such satellite measurements available. Ex. 1004, 34; Ex. 1010, 1:52–65, 3:50–52, 3:55–62; Ex. 1032 ¶ 70. We are also persuaded that the combination provides benefits such as better availability, accuracy, integrity, and time-to-first fix, that would outweigh any disadvantages due to the need to add an extra satellite, assuming that was required for certain embodiments. Ex. 1032 ¶ 72. 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 Rossbach and van Diggelen. *See* Ex. 1032 ¶¶ 68–72.

*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 16–17 (citing Ex. 1004, 1; Ex. 1005; Ex. 1010, 1:36–39; Ex. 1029, 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 17–18 (citing Ex. 1004; Ex. 1005; Ex. 1010; Ex. 1029; Ex. 2005 ¶ 65). Patent Owner contends that the ’104 patent “was the first invention that met this long-felt need.” *Id.* at 18 (citing Ex. 2005 ¶ 66).

Petitioner argues that Patent Owner’s “cursory discussion” fails to meet its burden of establishing a nexus to the substitute claims. Pet. Opp. RMTA 21. 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.* (citing Pet. Opp. MTA, 14–23); *see also* Pet. Sur-reply 6–8.

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 7–8 (citing RMTA 9–22). 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 8–9.

Patent Owner bears the burden of establishing a nexus between the alleged long-felt need and the proposed 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 16–17. 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 Rossbach 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 Rossbach 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 proposed substitute claims 21–33 are unpatentable over Rossbach and van Diggelen.

*6. Obviousness Based on Rossbach and Peterson*

Petitioner opposed Patent Owner’s original MTA by arguing that those proposed substitute claims were unpatentable over Rossbach and Peterson. *See* Pet. Opp. MTA 19–23. 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 Rossbach and Peterson. Pet. Opp. RMTA 9–10, 15–17, 19–20.

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 Rossbach 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.*<sup>15</sup>

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<sup>15</sup> 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 19–20 (citing Ex. 1030, 4). Our analysis does not rely on the treatment of Peterson in any related decisions.

Petitioner argues that Patent Owner does not dispute that “Peterson was a paper presented at the 1995 International Technical Meeting of the Satellite Division of the Institute of Navigation (‘the ION Conference’).” Pet. Opp. RMTA 15 (citing Ex. 1029, 1). Petitioner relies on personal testimony from Dr. Dafesh, who testifies that he attended the ION Conference and that “copies of Peterson were distributed to attendees in 1995.” *Id.* (citing Ex. 1032 ¶¶ 64–67; Ex. 1037, 2053). Petitioner also relies on the testimony from Dr. Heppe, its declarant in the related matter, IPR2019-00816, 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.” *Id.* at 15–16 (citing Ex. 1033 ¶¶ 9–10). 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 publicly accessible and prior art as of 1995. *Id.* at 17 (citing Ex. 1029, 1; Ex. 1032 ¶¶ 64–67; Ex. 1033 ¶¶ 10–15).

In its Reply to Petitioner’s Opposition, Patent Owner does not respond to Petitioner’s argument and evidence as to the public accessibility of Peterson as of 2005. *See* PO Reply 9–10. 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. 1032 ¶¶ 64–65; Ex. 1037, 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 shortly after the ION Conference. Ex. 1032 ¶ 66; Ex. 1029 (Dr. Dafesh’s personal copy of Peterson). 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. 1033 ¶¶ 11–15; Ex. 1035 (image of CD); Ex. 1036 (copy of table of contents of CD listing Peterson). Taken together, this unrebutted personal testimony, combined with the dates on Peterson itself,<sup>16</sup> establish by a preponderance of the 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*

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<sup>16</sup> 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 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. v. AB Fortia*, 774 F.2d 1104, 1109 (Fed. Cir. 1985) (holding that six copies of paper delivered to attendees at a conference, where paper was orally presented, was a printed publication).

Peterson addresses the problem of losing sight of satellites in cities having “deep urban canyons.” Ex. 1029, 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 19–20. Petitioner relies on Peterson’s goal: to find a solution when absolute time is unknown due to obstructions in cities, using equations that include variables for time errors. *Id.* (citing Ex. 1029, 1329–30; Ex. 1028 ¶¶ 98–100); Pet. Opp. RMTA 9–10 (citing Pet. Opp. MTA 14–23; Ex. 1032 ¶¶ 59–63). 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 9.

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* Exs. 1029, 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 of Rossbach and Peterson, Petitioner argues that “a POSITA faced with the urban canyon problem would look to Peterson to obtain position fix without absolute time (which requires an additional satellite measurement).” *Pet. Opp. MTA* 19 (citing Ex. 1028 ¶ 99). Petitioner contends that “Rossbach describes the exact same scenario as an issue that can be solved using the combined GPS-GLONASS model” that Rossbach discloses. *Id.* at 19–20 (citing Ex. 1004, 1). According to Petitioner, a “POSITA would thus also look to Rossbach and would understand that Rossbach’s teachings supply the additional satellite measurement required by Peterson.” *Id.* at 20 (citing Ex. 1028 ¶¶ 98–99). Petitioner also contends that Peterson’s method of using small “snapshots” of the satellite signal overcomes the deficiency in Rossbach that “can require continuously tracking the satellites until absolute time can be decoded from the satellite signal.” *Id.* (citing Ex. 1028 ¶ 98). Petitioner also argues that Peterson and Rossbach are analogous art, and employ very similar equations that “include position and clock-error variables.” *Id.* at 20–22. Due to the alleged similarity, Petitioner contends that “modifying Rossbach’s method with the 5-satellite equations in Peterson would have been simple and obvious.” *Id.* at 22 (citing Ex. 1028 ¶¶ 102–106). 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 22–23 (citing Ex. 1028 ¶¶ 96–99, 107–108).

Patent Owner argues, as it did in its arguments against the combination of Rossbach and van Diggelen, that “Rossbach 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, 1; Ex. 1029, 1323; Ex. 2005 ¶¶ 67–71). 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 21–22 (citing Ex. 1004, 35; Ex. 1029, 1329–1330; Ex. 2005 ¶ 71).

Petitioner argues that Rossbach 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 “Rossbach solves this problem by typically doubling the available measurements, even though Rossbach’s method requires only 1 or no additional measurements.” Pet. Opp. RMTA 20 (citing Ex. 1004, 34; Ex. 1029, 1323, 1329; Ex. 1032 ¶ 73). Petitioner contends that Rossbach offers more satellites than typically required and enhances performance in the environments Peterson describes. *Id.* (citing Ex. 1032 ¶ 74). 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” Rossbach and Peterson. *Id.* (citing Ex. 1032 ¶¶ 73–76).

In its Reply, Patent Owner argues that Petitioner disregards the problems the combination would have created and how the combination would have frustrated the intended purpose of the references. PO Reply 9–10 (citing Ex. 1004, 1; Ex. 1029, 1323; Ex. 2006 ¶¶ 43–44). Patent Owner also argues that adding an additional satellite reduces the times that a position solution can be obtained. *Id.* at 10 (citing IPR2029-00816, Ex. 1004, 9; Ex. 2006 ¶¶ 42–44).

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 to improve Rossbach’s method. Notably, both Rossbach and Peterson identify and seek to provide solutions to the problems encountered in urban areas when fewer satellites are visible. Ex. 1004, 1 (noting advantages in combining GPS and GLONASS systems “[i]n cases with obstructed visibility of the sky, such as mountainous or urban areas”); Ex. 1029, 1323 (noting use of method in “deep urban canyons” where only “brief glimpses of satellites” are available). 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 Rossbach discloses a method that makes more of such satellite measurements available. Ex. 1004, 34; Ex. 1029, 1323, 1329–1330; Ex. 1028 ¶¶ 98–99; Ex. 1032 ¶ 73. We are also persuaded that the combination provides benefits such as overcoming Rossbach’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. 1028 ¶¶ 96–99; Ex. 1032 ¶¶ 73–75.

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 Rossbach 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 Rossbach’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. 1032 ¶¶ 73 (“Rossbach can approximately double the number of satellite signals.”), 74 (“Rossbach 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 Rossbach and Peterson. *See* Ex. 1028 ¶¶ 96–109; Ex. 1032 ¶¶ 73–75, 78.

*i. Long-Felt Need*

Patent Owner relies on the same long-felt need argument we addressed above in the context of the Rossbach/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 Rossbach 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 Rossbach 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 Rossbach and Peterson.

*7. Remaining Challenges*

Petitioner argues that proposed substitute claims 21–33 are patent-ineligible under 35 U.S.C. § 101. Pet. Opp. 22–25; Pet. Sur-reply 8–11. Patent Owner disagrees. RMTA 22–25; PO Reply 10–12. Petitioner also argues that the proposed substitute claims are indefinite. Pet. Opp. RMTA 1–9.

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.<sup>17</sup>

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<sup>17</sup> 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.

CONCLUSION<sup>18</sup>

In summary:

| Claims                     | 35 U.S.C.<br>§ | Reference(s)/Basis            | Claims<br>Shown<br>Unpatentable | Claims<br>Not Shown<br>Unpatentable |
|----------------------------|----------------|-------------------------------|---------------------------------|-------------------------------------|
| 1, 2, 5–<br>13, 15, 16     | 102(b)         | Rossbach                      | 1, 2, 5–13, 15,<br>16           |                                     |
| 1, 2, 5–<br>13, 15, 16     | 103(a)         | Rossbach, Beser               | 1, 2, 5–13, 15,<br>16           |                                     |
| 8–10, 16                   | 103(a)         | Rossbach,<br>Sheynblat        | 8–10, 16                        |                                     |
| 8–10, 16                   | 103(a)         | Rossbach, Beser,<br>Sheynblat | 8–10, 16                        |                                     |
| <b>Overall<br/>Outcome</b> |                |                               | 1, 2, 5–13, 15,<br>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              |          |

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<sup>18</sup> 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.

IPR2019-00737  
Patent 8,902,104 B2

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