

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

GEOSCOPE TECHNOLOGIES PTE. LTD.,
Patent Owner.

IPR2024-00255
Patent 7,561,104 B2

Before ANNETTE R. REIMERS, SHEILA F. McSHANE, and
BRIAN D. RANGE, *Administrative Patent Judges*.

REIMERS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review (“IPR”) of claims 1–4 and 6–11 of U.S. Patent No. 7,561,104 B2 (Ex. 1001, “the ’104 patent”). Geoscope Technologies Pte. Ltd. (“Patent Owner”) filed a Preliminary Response (Paper 11, “Prelim. Resp.”). On May 31, 2024, we instituted inter partes review of the challenged claims on all asserted grounds. Paper 14 (“Dec. Inst.”). On May 28, 2024, Patent Owner disclaimed claims 1, 3, and 11. Ex. 2021.

After institution, Patent Owner filed a Patent Owner Response (Paper 24, “PO Resp.”), Petitioner filed a Reply (Paper 26, “Pet. Reply”), and Patent Owner filed a Sur-Reply (Paper 27, “PO Sur-Reply”). An oral hearing was held on February 7, 2025, and a transcript of the hearing is included in the record (Paper 34, “Tr.”). We have jurisdiction under 35 U.S.C. § 6. This decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 2, 4, and 6–10 of the ’104 patent are unpatentable.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies itself as the real party in interest. Pet. 82. Patent Owner identifies itself as the real party in interest. Paper 8, 2.

B. *Related Matters*

The parties identify the following matters as related to this proceeding:

Geoscope Technologies Pte. Ltd. v. Google LLC f/k/a Google Inc., No. 1:22-cv-01331-MSN (E.D. Va.) (filed Nov. 22, 2022) (“the Google Action”);

Geoscope Technologies Pte. Ltd. v. Apple Inc., No. 1:22-cv-01373-MSN (E.D. Va.) (filed Dec. 1, 2022) (“the Apple Action”); and

Google LLC. v. Geoscope Technologies Pte. Ltd.,
IPR2023-01209.

Pet. 82–83; Paper 8, 2.

Patent Owner additionally identifies the following matters as related to this proceeding:

Google LLC. v. Geoscope Technologies Pte. Ltd., IPR2023-01210, IPR2023-01211, IPR2023-01212 and IPR2023-01213;

Geoscope Technologies Pte. Ltd. v. Google LLC, No. 24-1003 (Fed. Cir.) (docketed Oct. 2, 2023);

Geoscope Technologies Pte. Ltd. v. Apple, Inc., No. 24-1018 (Fed. Cir.) (docketed Oct. 5, 2023); and

Apple Inc. v. Geoscope Technologies Pte. Ltd., IPR2024-00031, IPR2024-00032, and IPR2024-00259.

Paper 8, 2–3.

C. The ’104 Patent

The ’104 patent, titled “Method to Modify Calibration Data Used to Locate a Mobile Unit,” issued July 14, 2009, with claims 1–21. Ex. 1001, codes (45), (54), 11:65–14:22.¹ The ’104 patent explains that “[w]hen a wireless device is located indoors, the signal strengths of signals received from the serving and/or neighboring base stations tend to be lower than the

¹ A Reexamination Request of the ’104 patent was filed September 24, 2012, and following an *ex parte* reexamination of the ’104 patent, an *Ex Parte* Reexamination Certificate for the ’104 patent issued August 18, 2014. Ex. 1001, 19–20.

strength of the signals received by a wireless device located outdoors,” which may result in “poor estimated location accuracy.” *Id.* at 1:33–40. The ’104 patent aims to address this issue with its method of locating a mobile station in an indoor facility, in which calibration data samples obtained outdoors are used to simulate indoor calibration data. *Id.* at 3:38–42; *see also id.* at 1:46–54.

In one embodiment of the ’104 patent, the method includes “providing a database of previously-gathered calibration data for a region in a wireless network including a first transmitter and a second transmitter,” “collecting observed network measurement data including a first and second signal characteristic from the first and second transmitters,” “determining which of the first and second signal characteristics has a greater magnitude,” modifying “[t]he observed network measurement data . . . using the greater magnitude signal characteristic,” and comparing “the modified network measurement data . . . with the database of calibration data to determine the location of the mobile station.” Ex. 1001, 2:9–22; *see also id.* at 1:65–2:34, 3:38–49, 9:54–64, Fig. 3. The ’104 patent also describes that “a non-uniform grid point (NUG) may represent the signal characteristics and/or calibration data over a given region.” *Id.* at 3:50–52. In one example, “a set of NUGs . . . are . . . part of a larger geographical region . . . includ[ing] various wireless networking components,” where “[t]he NUGs represent an area of collected calibration data, which may be stored in a database for easy retrieval during a calibration data comparison operation between the NUG and a received network measurement report (NMR).” *Id.* at 3:52–60.

D. Challenged Claims

Of the challenged claims, claim 1 is the sole independent claim, claims 2, 4, and 6–10 depend from claim 1. *See* Ex. 1001, 11:65–67, 12:1–

18, 12:22–44. As noted above, Patent Owner has disclaimed claims 1, 3, and 11, such that claims 2, 4, and 6–10 are the remaining claims for our consideration at trial. *See* PO Resp. 1; Ex. 2021. Although independent claim 1 has been disclaimed, claim 2 includes all the limitations of claim 1 by virtue of depending from claim 1. Claims 1 and 2 are reproduced below:

1. A method for determining a location of a mobile station, comprising:
providing a database of previously-gathered calibration data for a predetermined region in a wireless network, wherein said network includes a first transmitter and a second transmitter;
collecting observed network measurement data including a first signal characteristic from said first transmitter and a second signal characteristic from said second transmitter;
determining which of said first and second signal characteristics has a greater magnitude;
modifying said observed network measurement data using the greater magnitude signal characteristic; and
comparing said modified network measurement data with said database of calibration data to thereby determine the location of the mobile station.
2. The method of claim 1 wherein said database comprises previously-gathered calibration data for one or more non-uniform grid points within said region.

Ex. 1001, 11:66–12:18.

E. Instituted Grounds of Unpatentability

We instituted *inter partes* review of the challenged claims based on the following grounds of unpatentability asserted by Petitioner:²

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, effective March 16, 2013. Because the challenged claims of the ’104 patent have an

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
4, 6–10 ³	103(a)	Bhattacharya, ⁴ Zeng ⁵
2, 4, 6–10 ⁶	103(a)	Bhattacharya, Zeng, Spain ⁷

III. ANALYSIS

A. Legal Standard

“In an IPR, 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 burden of proof in *inter partes* review).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and “the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406

effective filing date before March 16, 2013, the pre-AIA versions of 35 U.S.C. §§ 102, 103 apply.

³ We omit claims 1, 3, and 11 from this listing of claims challenged, and do not consider these claims except to the extent other claims depend from those claims, because Patent Owner disclaimed them. Ex. 2021.

⁴ U.S. 2006/0211376 A1, published Sept. 21, 2006 (Ex. 1005).

⁵ Qing-An Zeng & Dharma P. Agrawal, “Chapter 1 - Handoff in Wireless Mobile Networks,” “Handbook of Wireless Networks and Mobile Computing,” John Wiley & Sons, Inc., 2002, 1-25 (Ex. 1006).

⁶ See footnote 3 above.

⁷ US 2006/0240843 A1, published Oct. 26, 2006 (Ex. 1007).

(2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness.⁸ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Issues Related to Ordinary Skill in the Art

1. Determination of Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103 requires us to resolve the level of ordinary skill in the pertinent art at the time of the invention. *Id.* at 17. 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.*

Patent Owner argues that the level of ordinary skill described by Dr. Sundaresan is incorrect because “[t]he ’104 Patent and the asserted references . . . are all from the field of wireless telecommunications—specifically, cellular technology,” and a level of ordinary skill “that accounts for experience in wireless telecommunications and cellular technology is necessary.” PO Resp. 22 (citing Ex. 2018 ¶¶ 46). Patent Owner contends

⁸ The parties have not presented arguments regarding objective evidence of nonobviousness.

that the definition proposed by the petitioner in the related IPR2024-01209 proceeding would be more appropriate. *Id.* That definition is:

A POSITA would have been (1) someone knowledgeable in wireless networks, cellular radio systems, mobile communication devices and radio navigation systems, (2) having at least a bachelor's degree in electrical engineering, with a background in radio frequency communications and/or navigation system technology as well as approximately two years of industry experience working on radio communication and/or navigation systems.

Id. at 22–23 (citing *Google LLC v. Geoscope Technologies Pte. Ltd.*, IPR2023-01209⁹, Paper 2 at 13–14).

We agree with Patent Owner for the following reasons. First, Patent Owner's definition is consistent with our determination in IPR2023-01209, which involved the same '104 patent, and Petitioner does not explain sufficiently why we should adopt a different definition. *See generally* Pet. Reply.

Second, the key differences between Petitioner's and Patent Owner's proposed qualifications for a person of ordinary skill in the art at the time of the invention is that Patent Owner asserts "experience in wireless telecommunications and cellular technology is necessary," as well as a background in radio frequency communications and/or navigation system technology with two years of industry experience working in the same, would be required. PO Resp. 22–23 (citing Ex. 2018 ¶ 46); *see also id.* 44–45.

The '104 patent is directed to locating a wireless mobile device in a geographic region. Ex. 1001, 1:13–20; PO Resp. 44. Bhattacharya is

⁹ Patent Owner refers to IPR2024-01209, but the correct citation is IPR2023-01209. *See* PO Resp. 22.

directed to estimating the geographic location of a wireless terminal. Ex. 1005, code (57), ¶¶ 1, 13; PO Resp. 44. Zeng is directed to handoff from one cell to another in a wireless cellular communication system to achieve continuous service. Ex. 1006, 1; PO Resp. 44. Spain is directed to a method for locating the concentration of mobile radio traffic in a coverage area. Ex. 1007, code (54), ¶¶ 1, 11; PO Resp. 44. We find that there is support in the '104 patent and prior art consistent with Patent Owner's assertion that the qualifications of a person of skill in the art would include knowledge of radio navigation and mobile communications technology. Accordingly, we adopt Patent Owner's proposed qualifications for a person of ordinary skill in the art.

Patent Owner argues that Petitioner's proposed definition for the proposed person of skill in the art "doesn't have a background in the cellular technology described in the asserted prior art." *See* PO Sur-Reply 25–26; *see also* PO Resp. 44–48. As noted above, we have adopted Patent Owner's proposed qualifications for a person of ordinary skill in the art. In addition, Petitioner asserts that "[t]he Petition demonstrates unpatentability irrespective of the dispute regarding the POSITA definition because the asserted prior art is nonetheless pertinent to each definition." *See* Pet. Reply 17 (citing PO Resp. 22–23); *see also id.* at 23 (Petitioner asserting that aspects of the prior art "were within the skill level of a POSITA—whether as defined based on the Sundaresan Declaration or instead on Geoscope's alternative POSITA definition.") Moreover, Dr. Sundaresan¹⁰ testifies that his prior art analysis would be the same whether Petitioner's or Patent

¹⁰ As noted below, Dr. Sundaresan is qualified as a person of ordinary skill in the art under Patent Owner's proposed level of qualifications, which we adopt here.

Owner’s proposed definition of a person of ordinary skill in the art were adopted. Ex. 1055 ¶ 29. On this point, we note that our obviousness analysis discussed below in this Decision would not differ if we adopted Petitioner’s definition instead of that of Patent Owner.

2. Issues Related to Dr. Sundaresan’s Declaration

Petitioner relies on the testimony of Dr. Sundaresan to address level of ordinary skill in the art. Pet. 7 n.2 (citing Ex. 1003 ¶¶ 8, 10, 26). In the declaration, Dr. Sundaresan testifies: “I have been informed that a person of ordinary skill in the art (‘POSITA’) had at least a Bachelor’s degree in electrical engineering, computer science, or a similar discipline, and at least two years of experience in the field working with . . . navigation and/or geolocation systems,” and “[s]uperior education could compensate for a deficiency in work experience, and *vice-versa*.” Ex. 1003 ¶ 8.

Patent Owner did not dispute Petitioner’s proposed definition of the level of ordinary skill in the art in its Preliminary Response (Prelim. Resp. 32), and we adopted Petitioner’s proposed definition of the ordinary level of skill in the art for the purposes of our Decision on Institution. Dec. Inst. 7–8 (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001)).

Patent Owner now argues that “[t]he Petition does not address the level of ordinary skill. Instead, it references Dr. Sundaresan’s expert declaration.” PO Resp. 40 (citing Pet. 7); *see also id.* at 21 (“The Petition does not identify a level of ordinary skill.”).

We disagree that the Petition fails to identify the level of ordinary skill in the art.¹¹ As noted above, the Petition points to Dr. Sundaresan’s testimony as describing the level of ordinary skill in the art. Pet. 7 n.2 (citing Ex. 1003 ¶¶ 8, 10, 26). Although Petitioner could have been clearer in the Petition, we understand Petitioner as indicating that the level of ordinary skill in the art is what Dr. Sundaresan describes in his Declaration, particularly in Paragraph 8 of his Declaration. Indeed, in arguing that Petitioner’s proposed definition of the level of ordinary skill in the art is incorrect (*see* PO Resp. 21–22; Sur-Reply 20–23), Patent Owner demonstrates that it is aware that Petitioner proposed this level of ordinary skill in the art and that Patent Owner understands the level Petitioner proposed. Furthermore, Patent Owner’s allegation that Petitioner’s attorneys provided the qualifications for the level of ordinary skill to Dr. Sundaresan (*see* PO Resp. 20–21) tends to show that Patent Owner understood that Petitioner intended to convey that Dr. Sundaresan’s testimony described the level of ordinary skill in the art. We agree with Petitioner that Patent Owner’s “identification of an alternative POSITA definition demonstrates awareness of a level of ordinary skill sufficient to permit a comparison of the asserted prior art and the features claimed in the ’104 patent.” *See* Pet. Reply 14.

Patent Owner also argues that Dr. Sundaresan’s testimony describing the level of ordinary skill in the art is improperly incorporated by reference.

¹¹ We note that there is no explicit requirement that the proposed qualifications of person of ordinary skill and associated expert testimonial support be explicitly set forth in a petition. *See* 35 U.S.C. § 312(a); 37 CFR §§42.104(b), 42.22.

PO Resp. 40–41 (citing 37 C.F.R. § 42.6(a)(3); PTAB Trial Practice Guide, 35–36; *Gen. Access Sols., Ltd. v. Sprint Spectrum L.P.*, 811 F. App’x 654, 658 (Fed. Cir. 2020); *Bos. Sci. Neuromodulation Corp. v. Nevro Corp.*, 813 F. App’x 572, 582–83 (Fed. Cir. 2020); *3M Co. v. Evergreen Adhesives, Inc.*, 860 F. App’x 724, 725–28 (Fed. Cir. 2021)).

Patent Owner, however, has not identified any language in the Petition that explicitly incorporates by reference Dr. Sundaresan’s testimony. *See generally* PO Resp.; PO Sur-Reply. Nevertheless, to the extent that the Petition purportedly incorporates by reference Dr. Sundaresan’s testimony, we do not find such incorporation sufficiently extensive to merit disregarding the testimony. Typically, an incorporation by reference is deemed improper in instances in which large portions of a declaration are incorporated—particularly where the incorporation serves to circumvent a word-count limit. *See, e.g., Cisco Systems, Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 10 (PTAB Aug. 29, 2014) (informative).

In this case, however, Dr. Sundaresan’s testimony describing the level of ordinary skill in the art is only 92 words. Ex. 1003 ¶ 8. This amount of testimony is not extensive and, thus, its purported incorporation into the Petition presents little or no imposition on Patent Owner or the Board. Furthermore, Petitioner certifies that the Petition has 12,995 total words. Pet. 85. This word count is 1,005 words under the 14,000 words for petitions allowed by 37 C.F.R. § 42.24(a)(1)(i). Thus, incorporating Dr. Sundaresan’s testimony by reference does not circumvent the Petition’s word-count limit.

Next, Patent Owner argues that Dr. Sundaresan’s testimony describing the level of ordinary skill in the art is insufficient “because it simply adopts attorney argument without any evidentiary basis.” PO Resp. 41.

Specifically, Patent Owner argues that, because Dr. Sundaresan states “I have been informed” about a person of ordinary skill in the art and does not “indicate that he agrees with the definition he was provided, much less provide any analysis supporting the definition he was provided,” he is uncritically adopting a definition provided by Petitioner’s attorneys without providing any analysis or evidence in support. *Id.* at 41–42 (citing Ex. 1003 ¶ 8). Thus, in Patent Owner’s view, Dr. Sundaresan’s testimony “does not constitute ‘evidence or opinions’ (35 U.S.C. § 312(a)(3)(B)) and is entitled to no weight.”¹² *Id.* at 42–43 (citing Fed. R. Evid. 702(b); *TQ Delta, LLC v. Cisco Sys.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019); *Xerox Corp. et al. v. Bytemark, Inc.*, IPR2022-00624, Paper 12 at 5 (PTAB Director Review Decision, Feb. 10, 2023)).

In reply, Petitioner argues that “under any reasonable read of the Sundaresan Declaration, Dr. Sundaresan implied agreement with the POSITA definition based on its inclusion in a signed declaration.” Pet. Reply 14. We agree with Petitioner. Although Dr. Sundaresan does not state explicitly that the proposed definition of the ordinary skill in the art is

¹² Dr. Sundaresan has a doctoral degree in electrical and computer engineering and has extensive experience in wireless communications. Ex. 1003 ¶¶ 75–78. Dr. Sundaresan also has experience with navigation and geolocation systems such as development of wireless tracking systems, as evidenced by his experience in companies such as NavigateIO Inc. *Id.* at ¶¶ 77–78. Patent Owner does not argue that Dr. Sundaresan fails to meet requirements for the level of qualifications of one of ordinary skill in the art under its proposed qualifications, which we adopt here. *See generally* PO Resp.; PO Sur-reply. Based on a review of his qualifications, we determine that Dr. Sundaresan qualifies as a person of ordinary skill at the time of the invention.

his opinion, we are persuaded that the manner in which the definition is set forth in his declaration indicates that he agrees with the definition.

In this case, Patent Owner attempts to make much of Dr. Sundaresan's statement that he had been informed of the qualifications of a person of ordinary skill in the art. *See* PO Resp. 41–43. Dr. Sundaresan's testimony, however, set forth this understanding of the requisite level of skill in the art (Ex. 1003 ¶ 8). In his supplemental declaration, Dr. Sundaresan further testifies that:

I agreed with this POSITA definition when preparing the Declaration, and I continue to hold the opinion that the POSITA definition is both correct and appropriate based on the disclosures of the '104 patent and the prior art analyzed in the Declaration.

Ex. 1055 ¶ 17. Dr. Sundaresan further testifies that “[i]f I did not agree with the POSITA definition, then it would not have been included in paragraph 8 of the Declaration.” *Id.* ¶ 18. Dr. Sundaresan's inclusion of the definition of the level of ordinary skill in his original declaration indicates that he agrees with the definition, as confirmed by his cited subsequent testimony. We note that, even with Patent Owner's arguments, the record is clear that Patent Owner was on notice of Petitioner's proposed definition of the level of ordinary skill at the time of the Petition. Pet. 7; *cf. Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1006 (Fed. Cir. 2023) (holding that Petitioner is not required to anticipate all arguments in its Petition and allowing consideration of reply where patent owner had sufficient notice of petitioner's position and adequate opportunity to respond).

Patent Owner also asserts that “Dr. Sundaresan's opinions on claim interpretation are unsupported by any evidence or analysis,” and he only adopts the claim constructions from the district court's order as his own. PO

Resp. 54. Patent Owner argues that “Dr. Sundaresan provides no evidence, argument, or other support, explaining why, in his opinion, the district court’s constructions are correct.” *Id.* (citing Ex. 1003 ¶¶ 26–29; Consolidated Trial Practice Guide,¹³ 44, 46). Patent Owner argues that Dr. Sundaresan “testified that he adopted the district court’s ultimate constructions without considering whether the underlying analysis was correct.” *Id.* at 55–56 (citing Ex. 2020, 38:12–15, 38:15–16, 39:25–40:6), 40:18–41:1, 43:25–44:6, 52:24–25, 53:11–13, 57:3–11).

Patent Owner further contends that Dr. Sundaresan did not consider the entire intrinsic record which includes Provisional Application No. 60/899,379 (“the ’379 provisional” application), which is incorporated by reference in the ’104 patent. PO Resp. 56. Patent Owner argues that Dr. Sundaresan did not list the ’379 provisional application in his list of material considered and, although he testified he had reviewed the provisional application at some point, he then stated that he was “not sure if I used it as part of the declaration [he did not] but I came to review it later” and that he was “not seeing it as part of my declaration, so I would assume that it wasn’t part of the analysis then.” *Id.* at 57 (citing Ex. 2020, 59:16–18, 60:6–8). Patent Owner also alleges that “Dr. Sundaresan’s analysis of the intrinsic record had other serious flaws,” such as listing only portions of the prosecution history as materials considered, only reviewing these portions briefly, and not considering some related patents. *Id.* (citing Ex. 1003 ¶ 20; Ex. 2020, 60:24–61:1, 65:1–15).

Patent Owner argues that the “[l]evel of ordinary skill and claim interpretation are foundational aspects of any patentability analysis” and

¹³ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

cites to *Phillips*, which states: “[t]he inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation.” PO Resp. 58 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005)). Patent Owner contends that because Dr. Sundaresan’s declaration adopts the opinions of others his testimony is entitled to no weight. *Id.* at 58–59. Patent Owner also asserts that these omissions prejudice Patent Owner and Petitioner will likely attempt to introduce new evidence that should have been included with the Petition. *Id.* at 59.

We disagree with Patent Owner that Dr. Sundaresan’s testimony should be afforded no weight because he adopted claim constructions from the district court’s order. PO Resp. 52–55. A petition need only include how the challenged claims are to be construed. 37 C.F.R. § 42.104(b)((3)).¹⁴ Here, Petitioner met this requirement by identifying the proposed interpretations of the claim terms (Pet. 2–3) and Dr. Sundaresan indicated that he used these interpretations in forming his opinions on obviousness (Ex. 1003 ¶¶ 26–27). We discern no requirements that requires more from an expert in this regard. Further, as discussed, *infra*, Section III(C), under *Phillips*, claim terms are generally given their ordinary and customary meaning, and if terms are disputed, the intrinsic record is principally considered in contrast to the extrinsic record, such as expert testimony. *See Phillips*, 415 F.3d at 1312–19 (“extrinsic evidence in general [is] less reliable than the patent and its prosecution history”). Accordingly, a party

¹⁴ Section 42.104(b)((3) includes additional requirements if a claim limitation is to be construed as a means-plus-function limitation under 35 U.S.C. § 112(f). No party asserts that any claim limitation at issue here falls under § 112(f). *See infra*, Section III(C).

need not rely on extrinsic evidence, such as expert opinion, in support of its assertions on claim construction.

Finally, we disagree with Patent Owner's assertion that Dr. Sundaresan's declaration should not be afforded weight because he did not consider some of the intrinsic evidence of record. PO Resp. 56–59. We may exercise our discretion to assign appropriate weight to the specific expert testimony based on the underlying facts supporting the opinion in accordance with 37 C.F.R. § 42.65(a).

For the above reasons, we are not persuaded by Patent Owner's arguments that Petitioner does not meet its burden under 35 U.S.C. § 312(a)(3) by failing to resolve the level of ordinary skill in the art.

C. Claim Construction

In *inter partes* reviews, the Board interprets claim language using the district-court-type standard, as described in *Phillips*. See 37 C.F.R. § 42.100(b). 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 should be considered in the context of the intrinsic evidence. See *id.* at 1317–19.

Petitioner argues that the applied prior art references “disclose and/or render obvious all of the elements of the challenged claims under any of the [following] constructions,” which are the same as those issued by the district court in the Google action (Ex. 1054):

CLAIM TERM	PETITIONER'S IDENTIFIED ¹⁵ CONSTRUCTION
calibration data	“modified or unmodified network measurement data associated with a geographic location”
observed network measurement data	“measurement data from a network measurement report (i.e., a report used in cellular networks which provides the results of a measurement from a mobile device on one or more cells)”
grid point	“a point associated with representative calibration data for an area”

Pet. 2–3. Petitioner also asserts that the parties have stipulated as to the order of the “collecting,” “modifying,” and “comparing” steps in claim 15. *Id.* at 3 (citing Ex. 1052). Petitioner argues that any other claim term should be interpreted consistent with the *Phillips* standard. *Id.* at 2.

Patent Owner addresses some of these terms and also proposes that “‘grid point’ or (alternatively) ‘Non-Uniform Grid Point’” be construed as “a point associated with representative calibration data for an area whose boundaries are determined from evaluation of the calibration data.” PO Resp. 26–27. Much of the parties’ dispute relates to construction of “grid point” or “non-uniform grid point.” We address each of the claim term at issue below.

1. calibration data

Patent Owner agrees with Petitioner’s proposed construction of calibration data. PO Resp. 25. Patent Owner also explains why Petitioner’s proposal is consistent with the ’104 patent specification. *Id.* We, thus, construe calibration data as “modified or unmodified network measurement data associated with a geographic location.”

¹⁵ Petitioner stops short of proposing these constructions expressly, but Petitioner identifies no other constructions and states that the challenged claims are unpatentable under these constructions.

2. *observed network measurement data*

Patent Owner does not appear to refute Petitioner’s proposed construction for “observed network measurement data.” *See, e.g.*, PO Resp. 5–7 (addressing “observed data” but not addressing “observed network measurement data”). Rather, Patent Owner contends that this term does not need to be construed. PO Resp. 23–25 (“PO does not believe any other terms need construed at this point in [this] proceeding.”). Consistent with the District Court’s analysis, we construe “observed network measurement data” as “measurement data from a network measurement report (i.e., a report used in cellular networks which provides the results of a measurement from a mobile device on one or more cells).” We also note that our analysis of the prior art below would be the same if “observed network measurement data” were not construed and was instead interpreted based on the plain and ordinary meaning.

3. *order of “collecting,” “modifying,” and “comparing” steps*

Patent Owner does not dispute Petitioner’s construction in this regard but contends that no construction is required. PO Resp. 25. We agree with Patent Owner that it is unnecessary to address this claim construction issue to resolve the issues before us.

4. *grid point and non-uniform grid point*

Patent Owner agrees that a grid point is, as the District Court determined (and as the Decision on Institution preliminary determined), “a point associated with representative calibration data for an area.” PO Resp. 26. But Patent Owner further contends that the phrase “‘representative calibration data for an area’ requires that the claimed grid points be generated based on the measured calibration data.” *Id.* at 26–27.

Patent Owner supports this contention by arguing that the district court’s construction of “grid point” requires that the representative calibration data be evaluated to determine the boundaries of the area represented by a “grid point.” PO Resp. 27. Patent Owner explains the construction as follows:

The district court adopted the phrase “representative calibration data for an area” in its construction of “grid point” to “reflect that *the defining characteristic of a NUG region*—as explained in the specifications of the ’753 Patent, ’104 Patent, and [’784] Patent—*is that the data points within an area are all ‘statistically very similar’* such that each of the grid points within the NUG region can represent the overall NUG.”¹⁶

Id. at 27–28 (quoting Ex. 2012, 20) (Patent Owner’s alteration).

Patent Owner further argues that the district court’s construction requires that a “‘grid point’ must be associated with calibration data that is *representative for an area*.” PO Resp. 28 (citing Ex. 2018) (Patent Owner’s emphasis). Patent Owner argues that this requires that boundaries of the area represented by a grid point be determined by evaluating calibration data. *Id.* Patent Owner also argues that the ’379 provisional application (incorporated by reference into the ’104 patent (Ex. 1001, 1:6–9)) and the related ’753 patent both describe the claimed grid points in the same way. *Id.* at 28–29 (citing Ex. 2039, 6, 7¹⁷; Ex. 2016, 10:39–65, 12:4–14; Ex. 2018

¹⁶ The ’753 patent refers to U.S. Patent No. 8,406,753 (Ex. 2016), and the ’784 patent refers to U.S. Patent No. 9,097,784 (Ex. 2017). Patent Owner notes that the ’753 patent and the ’784 patent both claim priority to the ’379 provisional application, which is incorporated by reference into the ’104 patent. PO Resp. 8–9.

¹⁷ When citing Exhibit 2030, we cite the page numbers added for this proceeding at the lower right of each page rather than the internal pagination.

¶ 89). According to Patent Owner, because “how the claimed grid points are generated is fundamental to what they are,” “the boundaries of the area represented by a given grid point . . . are not defined until the calibration data is evaluated.” *Id.* at 31. Patent Owner, however, does not limit its construction based on statistical similarity or any other particular way of evaluating grid points. PO Sur-Reply 12 (“PO’s proposed construction does not use the term ‘statistical similarity’ and thereby accounts for generating NUGs based on methods of evaluating calibration data that do not involve the statistical analyses discussed in the ’379 Provisional.”).

In addition, Patent Owner argues that the district court’s construction of “grid point” “requires evaluating the calibration data to determine the boundaries of the area represented by a grid point so that ‘representative calibration data for [the] area’ can be associated with it.” PO Resp. 29 (citing Ex. 2018 ¶ 90). Patent Owner argues that if calibration data is not evaluated, the “representative calibration data for an area” cannot be defined. *Id.* at 29–30.

Patent Owner further argues:

The district court also stated that the ’753 Patent’s explanation that “calibration data for a number of locations” is “gathered and analyzed so that particular grid points within the geographic region can be determined and associated with a particular set or sets of calibration data” demonstrates “what *must be done* to arrive at a grid point or set of grid points.”

PO Resp. 30 (citing Ex. 2012, 19 (quoting ’753 Patent, Abstract)). Patent Owner contends that this passage “further demonstrates the district court’s recognition that generating a grid point involves evaluating calibration data, as reflected in its use of the phrase ‘representative calibration data for an area’ in its adopted construction.” *Id.* (citing Ex. 2018 ¶ 91).

Patent Owner also argues that “how the claimed grid points are generated is fundamental to what they are—they must be generated based on evaluation of the calibration data so that they are representative of a particular area.” *Id.* at 31 (citing Ex. 2018 ¶ 92). Patent Owner argues that the “boundaries of the area represented by a given grid point . . . are not defined until the calibration data is evaluated.” *Id.* (citing Ex. 2029, 7). Patent Owner emphasizes that the ’379 provisional states “evaluation of data vectors is of great importance [because] it is fundamental to the method.” *Id.* (quoting Ex. 2029, 6; citing Ex. 2018 ¶ 93).

For the above reasons, Patent Owner concludes that “the district court’s construction of ‘grid point,’ . . . requires that a grid point—including the boundaries of the area represented by that grid point—be determined from evaluation of calibration data,” and “the ‘non-uniform grid points’ claimed in the ’104 Patent have this same requirement.” *Id.* at 32.

In the event the Board is not persuaded by Patent Owner’s arguments regarding the district court’s construction of “grid point,” Patent Owner argues, in the alternative, that the intrinsic record requires the term “non-uniform grid point” to be construed as “a point associated with representative calibration data for an area whose boundaries are determined from evaluation of the calibration data.” *Id.* at 32–38. In support of this alternative argument, Patent Owner asserts that the claim language requires this construction because the term “non-uniform” means that the area covered by each grid point is not uniform. *Id.* at 33 (Ex. 2018 ¶ 97).

Patent Owner also asserts that the Specification of the ’104 patent requires the proposed construction. *Id.* at 33–34. Patent Owner argues, for example, that the claim term “‘non-uniform’ means that the area covered by each grid point is not uniform—*i.e.*, the shapes, sizes and boundaries of the

non-uniform grid points are different.” *Id.* at 33 (citing Ex. 2018 ¶ 97). Patent Owner argues that the Specification “explains that a ‘non-uniform grid point (NUG) may represent the signal characteristics and/or calibration data over a given region’ such that each NUG ‘represent[s] an area of collected calibration data.’” *Id.* (quoting Ex. 1001, 3:50–56; citing Ex. 2018 ¶ 98) (alteration in original).

According to Patent Owner, “[t]he boundaries of the area represented by a non-uniform grid point—which define the shape of that area—are variable because they are based on evaluation of statistical similarities across the gathered calibration data.” *Id.* 33–34 (citing Ex. 2018 ¶ 98). Furthermore, Patent Owner argues that both the ’379 provisional application and the ’753 patent also explain that the shape and boundaries of the area represented by a non-uniform grid point are variable because they are based on evaluation of statistical similarities across the gathered calibration data. *Id.* at 35–38.

Referencing Figure 6 of the ’784 patent, which shows a geographical region having three NUGs (NUG1, NUG2, NUG3), Patent Owner argues that “[c]alibration data is gathered at different locations in this broader region and then analyzed to define grid points that divide the region into different areas represented by each grid point.” *Id.* at 35 (citing Ex. 2016, 2:31–35; Ex. 2017, 6:21–34, Fig. 6; Ex. 2018 ¶¶ 101–102). Patent Owner contends that the boundaries for each NUG area must be defined because the non-uniform grid points represent an area of collected calibration data and are associated with the representative data for the area. *Id.* at 36 (citing Ex. 1001, 3:63–67); Ex. 2029, 7.

Patent Owner argues that the ’104 patent and the ’379 provisional application both disclose that evaluation of calibration data is “of great

importance” because it is fundamental to generating the grid points. *Id.* at 36 (citing Ex. 2029, 6; Ex. 1001, 1:6–9; Ex. 2018 ¶ 104). Patent Owner contends that the ’379 provisional application describes using statistical similarity to evaluate calibration data and discloses multiple methods for evaluating statistical similarity. *Id.* at 36–37 (citing Ex. 2029, 6–7; Ex. 2018 ¶ 104). Thus, according to Patent Owner, “the ‘geometrical shape’ (*i.e.*, boundaries) of the area represented by a particular non-uniform grid point is ‘determined by the statistical similarity of the data’ allocated to a grid point, which is based on evaluation of the calibration data.” *Id.* at 38 (citing Ex. 2029, 7; Ex. 2016, 10:66–11:6, 12:7–14; Ex. 2018 ¶ 105).

In view of the above assertions, Patent Owner concludes “that the term ‘non-uniform grid point’ as used in the ’104 Patent means ‘a point associated with representative calibration data for an area whose boundaries are determined from evaluation of the calibration data.’” *Id.* (citing Ex. 2018 ¶ 106).

In reply, Petitioner argues that the Board correctly construed “non-uniform” in the Decision on Institution when determining that “non-uniform grid points” are “grid points that are non-uniformly spaced throughout a geographic region.” Pet. Reply at 3–9. Petitioner argues that, based on plain meaning, “non-uniform” modifies the term “grid point” and a “grid point” represents “a point . . . for an area.” *Id.* at 3. Thus, “non-uniform grid points” reflect a type of spacing of multiple grid points within a corresponding area, namely a “*non-uniform* spacing.” *Id.*

Petitioner argues that the intrinsic record reinforces this construction. *Id.* at 4. The specification states that NUGs “may be separately defined by a variety of parameters” and that “parameters” are expressed as two examples which are each a “factor in deciding the boundaries of a NUG.” *Id.* (citing

Ex. 1001, 3:61–4:6). The first factor is “geographical areas (e.g., mountains, buildings, roads.”). *Id.* The second factor is “varying concentrations of [mobile stations (MSs)].” *Id.* (citing Ex. 1001, 3:61–4:6).

Petitioner argues that a person having ordinary skill in the art would have understood that at least some types of NUGs “have boundaries that may be determined without necessarily evaluating calibration data.” *Id.* at 5 (citing Ex. 1055 ¶¶ 41–47). Petitioner cites Patent Owner’s expert witness, Mark Alan Sturza, as stating that “mountains, buildings and roads, you know, and other geographical features would come into play” when determining NUG boundaries. *Id.* (citing Ex. 1056, 43:8–20). Petitioner notes that the Specification states that NUG “may represent the signal characteristics and/or calibration data over a given region.” *Id.* (citing Ex. 1001, 3:50–60). We note that the “or” here indicates that a NUG could represent only “signal characteristics” and not “calibration data.”

Petitioner further argues that Patent Owner’s narrow construction is not justified by the ’104 patent specification or based on the ’379 provisional. Pet. Reply 6–9. Petitioner again notes that the specification indicates that NUG boundaries can be based on “static characteristics of a physical environment.” *Id.* at 6 (citing Ex. 1055 ¶ 42). The ’379 provisional states that NUGs can be generated “based not on statistical consistency but on other conditions.” *Id.* at 8 (citing Ex. 2029, 8; Ex. 1055 ¶¶ 51–54).

Petitioner argues that Patent Owner’s construction is not legally justified because the intrinsic evidence Patent Owner relies upon does not identify an “express definition” or “clear and unmistakable disclaimer, disavowal, or redefinition” in the intrinsic record. *Id.* at 9–10. Petitioner also argues that the ’379 provisional description of aspects as “fundamental” is absent from the ’104 specification and that, if the descriptions were

fundamental, the examiner would have asserted lack of written description. *Id.* at 10–12.

In its Sur-Reply, Patent Owner argues that the '104 specification incorporates the '379 provisional by reference. PO Sur-Reply 2–3 *see also* Ex. 1001, 1:6–9 (supporting Patent Owner's position). Patent Owner also argues that Petitioner's arguments regarding examples of determining NUG boundaries that do not "necessarily require [] evaluation of calibration data" rely on unduly narrow interpretation of "geographical areas" and "varying concentration of MSs [mobile stations]." PO Sur-Reply 8–9. Patent Owner argues, for example, that concentration of mobile stations may just be one factor but "[n]othing in the '104 Patent indicates NUGs may be formed based on concentration of MSs without evaluation of calibration data." *Id.* at 11.

Patent Owner further argues that Petitioner's arguments are not consistent with the district court's construction. *Id.* Patent Owner emphasizes that the district court explained that calibration data is "representative" because it is "intended to reflect that the defining characteristic of a NUG region [] is that the data points within an area are all 'statistically very similar' such that each of the grid points within the NUG region can represent the overall NUG." *Id.* at 9 (quoting Ex. 1054, 20). Patent Owner also, however, argues that its proposed construction does not use the term "statistical similarity" and accounts for methods of evaluating calibration data "that do not involve the statistical analyses discussed in the '379 provisional." *Id.* at 12.

Patent Owner also argues that disavowal is, legally, not at issue. *Id.* at 15–16. Patent Owner argues that "[non-uniform] grid point" is not a term of art that can be understood without reference to the intrinsic record. *Id.* at 15.

Upon consideration of the parties' arguments and for the reasons explained below, we agree with Petitioner that Patent Owner's additional requirement of evaluating the calibration data to determine the boundaries of the area represented by a grid point should not be included in the construction of either "grid point" or "non-uniform grid point." Instead, based on the full record, we discern no reason to alter our prior construction of "grid point" as "a point associated with representative calibration data for an area" and maintain that construction for this Final Written Decision.

The construction of "grid point" we adopt is supported by the Specification of the '104 patent. Namely, the '104 patent discloses that "[i]n general, a non-uniform grid point (NUG) may represent the signal characteristics and/or calibration data over a given region," and "NUGs represent an area of collected calibration data."¹⁸ Ex. 1001, 3:50–60. The district court identified the second quoted passage, which is identically recited in the '104 patent (*see* Ex. 2018, 3:56–60) as "provid[ing] a *clear indication* of the meaning of 'grid point.'" Ex. 2012, 19 (emphasis added). We agree with the district court's analysis. Although the '104 patent does not explain how a generic "grid point" might differ from the described "non-uniform grid point," we do not find this distinction pertinent to construing "grid point" in this case because neither party raises this issue. Also, based on the claim wording "non-uniform grid point," a "non-uniform grid point" is a type of grid point. *See* Pet. Reply 3 (explaining why that plain meaning supports Petitioner's proposed construction). Furthermore, the district court construed "grid point" only, not "non-uniform grid point." Ex. 2012, 18–20.

¹⁸ The '104 patent indicates that a set of three NUGs is illustrated in Figure 1 (Ex. 1001, 3:52–56), but neither Figure 1 nor any other figure of the '104 patent depicts any such NUGs.

As to the term “non-uniform” or “non-uniform grid points,” the ’753 patent describes “non-uniform grid points” or “NUGs” as grid points that are not part of a uniform grid and usually are not uniformly distributed throughout the geographic region. Ex. 2016, 2:31–35, 2:43–50; *see also id.* at 9:40–43 (“The grid points may be non-uniformly spaced throughout the geographic region and hence may be referred to as non-uniform grid points (‘NUGs’).”). The ’379 provisional application describes a method for generating non-uniform grid points but does not describe a non-uniform grid point or a grid point as something different than a point associated with representative calibration data for an area. Ex. 2029, 5–8.

Turning to Patent Owner’s arguments, we are not persuaded by the contention that, because the district court referred to the data points within an area being statistically similar as the defining characteristic of a NUG region, the claimed grid points cannot exist until after the calibration data is gathered and analyzed. *See* PO Resp. 29–30. This contention, even if correct, is not persuasive because it is generally improper to read limitations from specific embodiments into the claims. *See Cadence Pharms. Inc. v. Exela PharmSci Inc.*, 780 F.3d 1364, 1369 (Fed. Cir. 2015) (“[E]ven if all of the embodiments discussed in the patent included a specific limitation, it would not be proper to import from the patent’s written description limitations that are not found in the claims themselves.” (internal quotations omitted)); *see also SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (“Though understanding the claim language may be aided by the explanations contained in the written description, it is important not to import into a claim limitations that are not a part of the claim.”).

Patent Owner's assertion that the '379 provisional application and the '784 patent both describe evaluating the statistical similarities of calibration data (PO Resp. 12–15) also fails to provide a sufficient reason to import a requirement to evaluate the calibration data into the construction of “grid point” or “non-uniform grid point.” Similarly, Patent Owner's assertion that the '379 provisional application discloses that evaluation of calibration data is “of great importance” because it is fundamental to generating the grid points is unpersuasive. *See* PO Resp. 31. Even describing this evaluation as being “of great importance” is an insufficient basis for importing an evaluation requirement into the construction. *See Texas Instruments, Inc. v. U.S. Int'l Trade Comm'n*, 805 F.2d 1558, 1563 (Fed. Cir. 1986) (“[The Federal Circuit] has cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification.”).

We also note that, when the '379 provisional application states “[t]he evaluation of the data vectors is of great importance since it is fundamental to the method” (emphasis added), this statement is made in the context of describing “Invention 1: A method for generating Non-Uniform Grid Points (NUGs) from calibration data.” Ex. 2029, 5–6. This is one of fifteen inventions described by the provisional application. The challenged claims of the '104 patent, in contrast, are directed to “[a] method for determining a location of a mobile station.” Ex. 1001, 12:66–67. Although evaluation of data vectors may be “fundamental” to the first way of generating non-uniform grid points set forth by the provisional application, this does not mean that evaluation of data vectors is necessarily fundamental to *every* way of generating non-uniform grid points. Indeed, the provisional application suggests that other methods may be available by describing invention 1 as

“[a] method” as opposed to describing it as the only possible method. Ex. 2029, 5–6. Also, the ’104 specification indicates that NUGs “may be separately defined by a variety of parameters” including “geographical areas (e.g., mountains, buildings, roads).” Ex. 1001, 4:1–4. Moreover, Patent Owner’s proposed construction does not require, in particular, “evaluation of data vectors”—the aspect that the ’379 provisional refers to as “fundamental,” and the testimony of Patent Owner’s witness, Sturza, lacks credibility with regard to evaluation of the ’379 provisional because Sturza “didn’t review the entire provisional.” Ex. 1056, 57:3–58:15.

Furthermore, we agree with Petitioner that evaluating the statistical similarities of calibration data is an *exemplary* method of generating grid points and not a requirement and many ways of generating grid points are disclosed. See Pet. Reply 8–9. As Petitioner notes, the ’379 provisional (incorporated by reference into the ’104 patent) discloses that one may “also consider the method of **generating NUGs based not on statistical consistency** but on **other conditions**.” *Id.* at 8 (quoting Ex. 2029, 8) (Petitioner’s alteration). Also, the ’379 provisional states that the invention “consider[s] the method of generating NUGs based not on statistical consistency but on other conditions such as [providing five other examples].” Ex. 2029, 7–8. Indeed, Patent Owner agrees that the correct construction of grid point does not require evaluating statistical similarity. PO Sur-Reply 14. As such, we are persuaded that evaluating calibration data for statistical similarities is not a *requirement* to generate a grid point.

Additionally, the related ’753 patent also lists alternate methods that are not based on statistical similarity. Ex. 2016, 12:17–25. The ’753 patent discloses several different methods, or ways, for generating grid points, such as “a minimum number of unique neighbors observed in data accumulated

from allocated calibration grid points.” *Id.* at 12:15–25. Indeed, the ’753 patent also teaches that “representative calibration data” can be a single calibration point and, in this instance, the single “calibration point may become the root of a separate NUG.” *Id.* at 10:59–65.

Also, Patent Owner’s argument that the *boundaries* of the area represented by a grid point must be determined by evaluating the calibration data does not persuasively undermine Petitioner’s position. *See* PO Resp. 32–34. Patent Owner does not direct us to disclosure in the ’104 patent that indicates the boundaries of the NUG area must be determined to generate the NUG or grid point.

Furthermore, the ’379 provisional application discloses evaluating “data vectors” by searching for data vectors that exhibit clustering.

Ex. 2029, 6. The ’379 provisional application further discloses:

If the data exhibits tight clustering, the data for the next candidate calibration point is aggregated to the former and the clustering property is re-evaluated. If the second also has a cluster but this cluster is sufficiently different, we deem that the data for the two considered calibration points should be allocated to the roots of separate NUGs. If the aggregate cluster is statistically very similar to either of the first clusters, the data for the two calibration points are allocated to the same NUG.

Id. This disclosure indicates that statistically similar calibration points are allocated to a NUG independently of the boundaries of the NUG area. In other words, for this embodiment, the calibration points allocated to a NUG define the boundaries of the NUG area rather than the size and shape of the NUG area determining which calibration points are allocated to the NUG. Accordingly, it is not necessary to first determine the boundaries of a NUG area first in order to generate the NUG.

In addition, we disagree with Patent Owner’s argument that the district court’s statement that the ’753 patent’s disclosure of gathering and analyzing calibration data demonstrates what must be done to arrive at a grid point or set of grid points shows “the district court’s recognition that generating a grid point involves evaluating calibration data, as reflected in its use of the phrase ‘representative calibration data for an area’ in its adopted construction.” *See* PO Resp. 30. (citing Ex. 2018 ¶ 91). Rather, for the following reasons, we agree with Petitioner’s argument that neither “grid point” nor “non-uniform grid point” should be limited to require evaluation because evaluating calibration data is an example of *what can be done* to arrive at a grid point, instead of what a grid point is.

As we discussed in the Decision on Institution, Patent Owner mischaracterizes the district court’s claim construction order. *See* Dec. Inst. 40–41 (addressing a similar argument made in the Preliminary Response). Instead of concluding that a “grid point” must be generated based on an evaluation of calibration data, the district court was explaining why it declined to adopt Patent Owner’s¹⁹ proposed construction in the Google Action. Ex. 2012, 19.

Patent Owner now argues that “[h]ow the claimed grid points are generated is fundamental to what they are—they must be generated based on evaluation of the calibration data so that they are representative of a particular area.” PO Resp. 31 (citing Ex. 2018 ¶ 92). We disagree, however, that the plain language and reasoning of the district court supports Patent Owner’s position that generating a grid point requires evaluating the calibration data to determine the boundaries of the grid point’s area.

¹⁹ Patent Owner is the plaintiff in the Google Action.

In the Google Action, Patent Owner argued “that the Abstract of the ’753 Patent provides a ‘near-definitional statement’ of [the ‘grid point’], and that its construction is derived from that text.” Ex. 1054, 19. Addressing this argument, the district court noted that the Abstract of the ’753 patent states, in relevant part:

The location of a wireless mobile device may be estimated using, at least in part, one or more pre-existing Network Measurement Reports (“NMRs”) which include calibration data for a number of locations within a geographic region. *The calibration data for these locations is gathered and analyzed so that particular grid points within the geographic region can be determined and associated with a particular set or sets of calibration data from, for example, one or more NMRs.*

Id. The district court then stated “[b]ut the italicized language from which [Patent Owner’s] construction is drawn is directed more toward what *must be done* to arrive at a grid point or set of grid points rather than what a grid point *is*.” *Id.* Therefore, the district court was explaining that the language related to a possible origin of a grid point rather than the meaning of “grid point.” The district court was not concluding that generating a grid point requires evaluating calibration data or that the grid points necessarily have a characteristic that results from being generated via evaluating calibration data. *See also* Ex. 2029, 5 (provisional application explaining that a non-uniform grid point may optionally have a wide variety of characteristics).

Also, Patent Owner’s contention that “[h]ow the claimed grid points are generated is fundamental to what they are” (PO Resp. 31) is not persuasive in this instance because, as discussed above, the ’753 patent, for example, discloses several methods for generating grid points. Ex. 2016, 10:31–38, 12:17–25. Similarly, the ’379 provisional discloses different

methods for generating a grid point. Ex. 2029, 7–8. Accordingly, no one method for generating a grid point can be considered “fundamental.”

Next, we are not persuaded by Patent Owner’s argument that the claim language requires its proposed construction because the term “non-uniform” means that the area covered by each grid point is not uniform. *See* PO Resp. 33. Claim 2 recites that the “database” comprises “previously-gathered calibration data for one or more non-uniform grid points within said region.” Ex. 1001, 12:17–19. This claim language does not suggest that “non-uniform” means that the area covered by each grid point is not uniform. On the contrary, the related ’753 patent discloses that “grid points do not necessarily have to be part of a uniform grid and usually will not be uniformly distributed throughout the geographic region,” and refers to such non-uniformly distributed grid points as “non-uniform grid points.” Ex. 2016, 2:43–50; *see also* PO Resp. 10 (indicating that term “non-uniform grid points” refers to the distribution of grid points). Thus, “non-uniform” describes the distribution of grid points, not the area of each grid point.

We also are not persuaded by Patent Owner’s arguments that the shape and boundaries of the area represented by a non-uniform grid point are variable. *See* PO Resp. 33. The mere fact that the shape, and thus the boundaries, of the area represented by a non-uniform grid point can vary does not establish that the boundaries must be determined in order to generate the grid point. Rather, as discussed above, the ’379 provisional application’s disclosure of evaluating “data vectors” indicates that statistically similar calibration points are allocated to a NUG independently of the boundaries of the NUG area. *See* Ex. 2029, 6.

In addition, Patent Owner’s arguments based on Figure 6 of the ’784 patent do not persuasively undermine Petitioner’s position. *See* PO Resp. 34–35. The ’784 patent states that Figure 6 “illustrates an *exemplary* non-uniform grid (NUG) region (R).” Ex. 2017, 3:12–13 (emphasis added). We are not persuaded that this exemplary depiction of three NUGs establishes that the boundaries of the NUGs must first be determined in order to generate the NUGs.

Patent Owner responds to Petitioner’s argument that grid points may be based on “geographical areas” or “MSs” (mobile stations) by arguing that the ’104 patent merely states “geographical areas” and “varying concentrations of MSs” may be “a factor” in forming NUGs. PO Sur-Reply 9. Patent Owner argues that nothing indicates these examples “exclude the fundamental evaluation of calibration data.” *Id.* As we explain above, however, the intrinsic record does not support that evaluation of calibration data is fundamental to what a grid point is. Indeed, the ’104 patent indicates that calibration data *may* be used in forming the grid point—akin to the “a factor” language used when referencing “geographical areas” and “varying concentrations of MSs.” *See, e.g.*, Ex. 1001, 3:50–52 (“a non-uniform grid point (NUG) *may* represent the signal characteristics and/or calibration data over a given region”) (emphasis added).

In view of the above and based on the full record, we maintain our prior construction of “grid point” as “a point associated with representative calibration data for an area.” Furthermore, in addition to finding Patent Owner’s proposed construction of “non-uniform grid point” to be unsupported, we note that Patent Owner does not propose any construction that would differentiate a “non-uniform grid point” from a generic “grid point.” Thus, we maintain our prior construction of “non-uniform grid

points” as “grid points that are non-uniformly spaced throughout a geographic region” for the reasons above and for the reasons discussed in our Decision on Institution. *See* Dec. Inst. 33.

5. *other claim terms*

We do not construe explicitly any other claim language because doing so would have no effect on our analyses below of Petitioner’s asserted grounds and would not assist in resolving the present controversy between the parties. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

A. Overview of the Asserted Art

1. *Bhattacharya (Exhibit 1005)*

Bhattacharya generally relates to “[a] process and machine for estimating the location of a wireless terminal” that is “based on the observation that the signal strength of a signal from a transmitter is different at some locations” so “the location of a wireless terminal can be estimated by comparing the signal strength it currently observes against a map or database that correlates locations to signal strengths.” Ex. 1005, code (54). Figure 2, reproduced below, is an illustrative embodiment of Bhattacharya’s system. *Id.* ¶ 28.

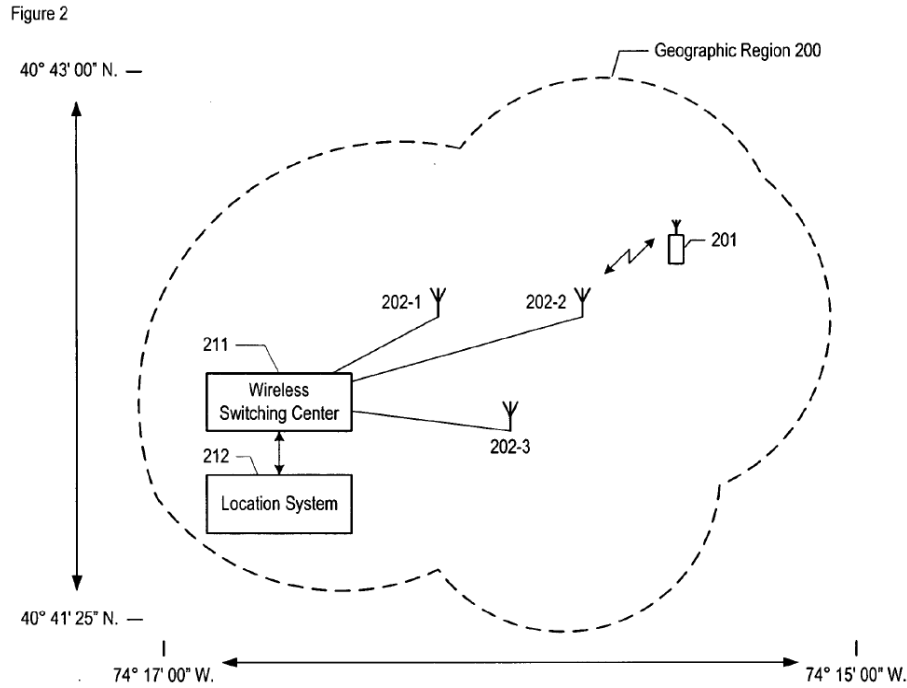


Figure 2, above, depicts a map and shows wireless switching center 211, location system 212, base stations 202-1, 202-2, and 202-3, and wireless terminal 201. Ex. 1005 ¶ 51. Location system 212 is a “data processing system that is capable of estimating the location of wireless terminal 201” that involves receiving reports that “contain the reported signal-strength measurements from wireless terminal 201 for the base stations that are on wireless terminal 201’s list of neighboring base stations.” *Id.* ¶¶ 59–60. Figure 4, reproduced below, depicts the tasks performed in estimating the location of wireless terminal 201 in geographic region 200. *Id.* ¶ 30.

Figure 4

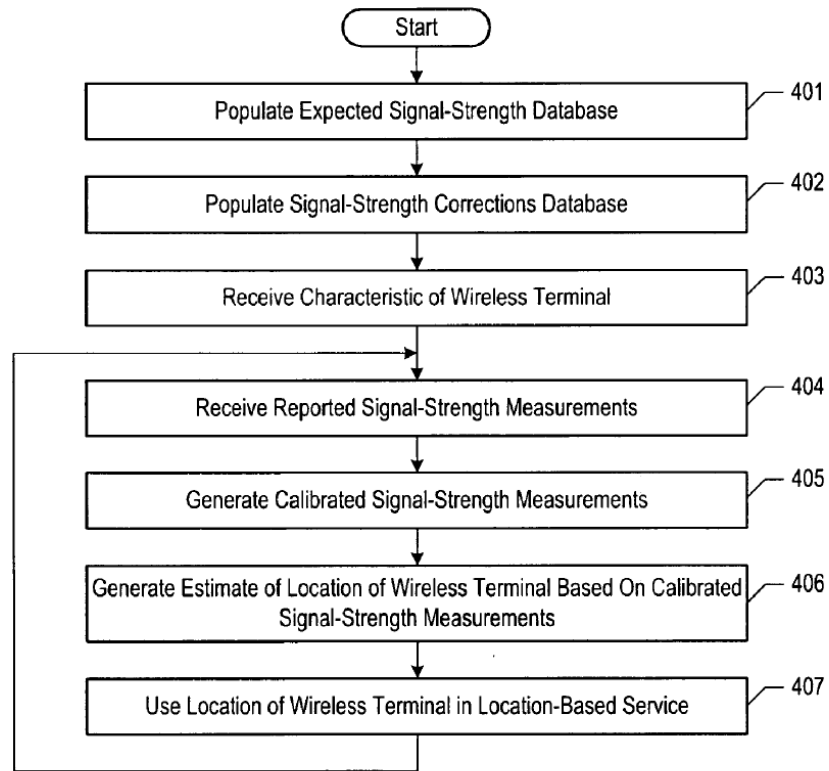


Figure 4, above, depicts the steps performed for estimating the location of wireless terminal 201 by populating an Estimated Signal-Strength Database and a Signal-Strength Database; receiving the characteristic of wireless terminal 201; receiving the reported signal-strength of wireless terminal 201; generating calibrated signal-strength characteristics based on reported signal-strength measurements and the characteristic of wireless terminal 201; generating the current estimate of the location of wireless terminal 201; and using the estimated location in a location-based service. *Id.* ¶¶ 72–84.

As a subtask of task 401 in Bhattacharya, “a rectangular grid of X by Y tessellated squares is overlaid onto geographic region 200” as shown in Figure 6, reproduced below. Ex. 1005 ¶¶ 105–106.

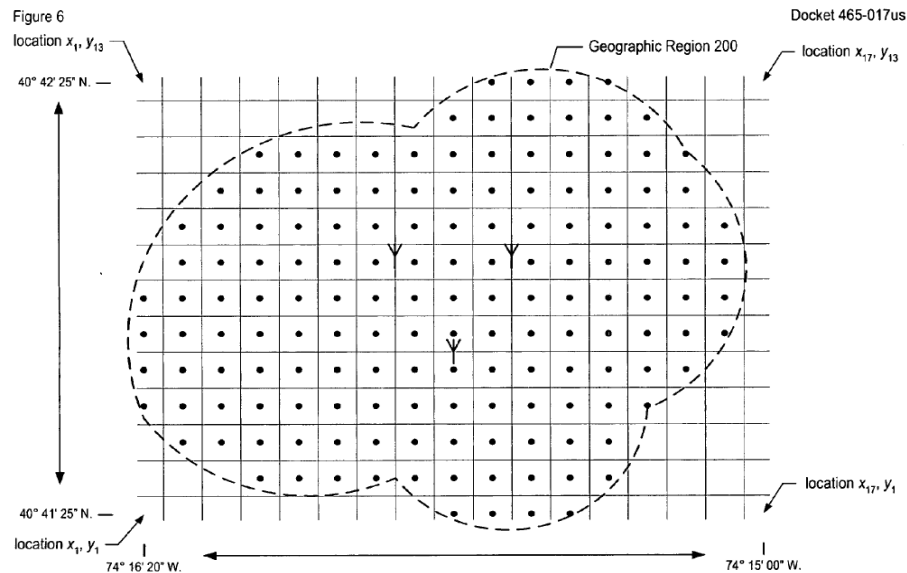


Figure 6, above, depicts a map of how geographic region 200 is partitioned. Ex. 1005 ¶ 30. As depicted in Figure 6, “the center of each square represents a location.” *Id.* ¶ 106. In the system, “expected signal-strength functions $E(1,x,y,t)$, $E(2,x,y,t)$, $E(3,x,y,t)$ ” are generated based on a combination of theoretical radio-frequency propagation models and empirical signal-strength measurements. *Id.* ¶¶ 112–117. Expected signal strength generally decreases as a function of the distance from the transmitter, however, “the topography of [a] region and the presence of buildings, trees, and other radio-frequency obstacles severely alters” the signal strength and “with time as the atmospheric and meteorological conditions change” so expected signal-strength functions is also a function of time. *Id.* ¶¶ 113–114.

2. Zeng (*Exhibit 1006*)

Zeng generally relates to handoff from one cell to another in a wireless cellular communication system to achieve continuous service. Ex. 1006, 1. Zeng describes a “handoff” as “the process of changing the channel (frequency, time slot, spreading code, or combination of them)

associated with the current connection while a call is in progress.” *Id.* Zeng identifies two categories of handoff: hard handoffs in which “current resources are released before new resources are used,” and soft handoffs in which “both existing and new resources are used during the handoff process.” *Id.* In hard handoffs (also referred to as “break before make” connections), the base station hands off the mobile station’s call to the base station of another cell and then drops the call “[u]nder the control of the MSC.”²⁰ *Id.* at 2.

Zeng further describes various handoff initiation techniques, including the “Relative Signal Strength” technique in which the strongest base station is selected at all times. Ex. 1006, 2. In the “Relative Signal Strength with Threshold” technique, handoff is allowed “only if the current signal is sufficiently weak (less than [a] threshold) and the other is the stronger of the two.” *Id.* In this technique, “[t]he effect of the threshold depends on its relative value as compared to the signal strengths of the two [base stations] at the point at which they are equal.” *Id.*

3. *Spain (Exhibit 1007)*

Spain generally relates to “a technique for estimating the location of a wireless terminal and using the estimate of the location in a location-based application.” Ex. 1007, code (54), ¶ 1. Spain’s wireless telecommunications system 200 includes wireless terminal 201, base stations 202-1, 202-2, and 202-3, wireless switching center 211, and location server 214, to provides wireless telecommunications service to geographic region 220. *Id.* ¶ 41. “Location server 214 comprises: processor 301, memory 302, and local-area

²⁰ According to Petitioner and Dr. Sundaresan, one of ordinary skill in the art would have understood that, in Zeng, “MSC” refers to a “mobile switching center.” Pet. 21–22; Ex. 1003 ¶ 59.

network transceiver 303,” wherein processor 301 executes operating system 311 and application software 312, and populates, amends, uses, and manages Location-Trait Database 313 and Trait-Correction Database 314. *Id.* ¶¶ 57–58. An exemplary operation of Spain’s technique is depicted in Figure 4, reproduced below.

Figure 4

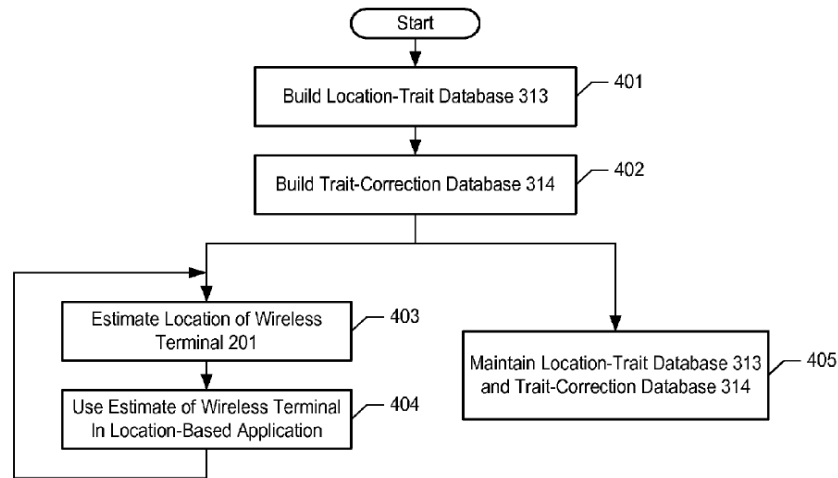


Figure 4 depicts a flowchart of the processes performed in accordance with an illustrative embodiment. *Id.* ¶ 18. At process 401, Location-Trait Database 313 is built, wherein the “Location-Trait Database” is defined as “a database that maps each of a plurality of locations to one or more expected traits associated with a wireless terminal at that location.” *Id.* ¶ 66. To build Location-Trait Database 313, geographic region 220 is partitioned into B(T,N) locations. *Id.* ¶ 72. Each location is described by various traits, including “a unique identifier,” “the coordinates (e.g., latitude, longitude, altitude, etc.) that define its scope (e.g., position, area, volume, etc.),” and “the identities of its adjacent locations.” *Id.* ¶¶ 76–82. Spain explains that geographic region 220 may be partitioned “into any number of locations of any size and shape.” *Id.* ¶ 99.

B. Asserted Unpatentability Grounds

*1. Asserted Unpatentability over Bhattacharya and Zeng
(Ground 1)*

Petitioner asserts that claims 1, 3, 4, and 6–11 are unpatentable under 35 U.S.C. § 103(a) as obvious over Bhattacharya in view of Zeng. Pet. 1, 5–54 (Petitioner’s Ground 1A). To support its contentions, Petitioner provides explanations as to how the combined teachings of Bhattacharya and Zeng (the “Bhattacharya-Zeng” apparatus) renders obvious the claim limitations. *Id.* Petitioner also relies upon the Sundaresan Declaration (Ex. 1003) and Supplemental Sundaresan Declaration (Ex. 1055) to support its positions.

Patent Owner does not offer any arguments specifically addressing the limitations of claims 4 and 6–10. PO Resp. 44–52. Rather, Patent Owner asserts: 1). “A POSITA as defined by Petitioner’s attorneys lacks the background to combine Bhattacharya with Zeng”; 2). “Petitioner’s proposed combination misinterprets Bhattacharya and Zeng”; and 3). “Petitioner fails to show a reasonable expectation of success.” *Id.* We address Petitioner’s arguments for reaching an apparatus reflecting the combined teachings of the Bhattacharya-Zeng apparatus and address Patent Owner’s arguments below.

a. Combining Bhattacharya and Zeng

Petitioner argues that “Bhattacharya references the ‘mobile-assisted hand-off process,’” which a person having ordinary skill in the art “would have understood and found obvious to be implemented by wireless switching center 211.” Pet. 24 (citing Ex. 1005 ¶ 95). Petitioner states that “[w]hile lacking specific handoff operations performed by the wireless switching center 211, Bhattacharya acknowledges that such operations are performed in a ‘well-known fashion.’” *Id.* (citing Ex. 1005 ¶ 95). Petitioner

argues that a person having ordinary skill in the art would thus look to Bhattacharya for the motivation “to seek well-known handoff functionality beyond its disclosure given recognition that such functionality enables location estimation ‘when a wireless terminal is near the boundary of one or more systems.’” *Id.* (citing Ex. 1005 ¶ 54).

Petitioner argues that Zeng describes “‘mobile assisted handoff’ as one type of handoff decision-making, and further describes that a network element other than the mobile station is ‘in charge of the radio interface management,’ including ‘handoff management.’” *Id.* at 24–25 (citing Ex. 1006, 4). Petitioner argues that a person having ordinary skill in the art “‘would have perceived this teaching [from Zeng] to be relevant to Bhattacharya’s wireless switching center 211, which is ‘capable of relaying [] packet data’ and implements the mobile-assisted hand-off process.” *Id.* at 25 (citing Ex. 1005 ¶ 95). To emphasize this point, Petitioner asserts “‘Bhattacharya states that wireless switching center 211 can be ‘known by other names, such as, for example, **mobile switching center**, mobile telephone switching offices, etc.[,]’” which “coincides with Zeng’s disclosure of an ‘MSC’ controlling handoff.” *Id.* (citing Ex. 1005 ¶ 53; Ex. 1006, 2; Ex. 1003 ¶ 67).²¹

Petitioner argues the combined teachings of Bhattacharya-Zeng “‘would have enabled an improved wireless switching center that incorporates the handoff functionality described in Zeng to thereby improve service ‘when a wireless terminal is near the boundary of one or more systems’ (as described in Bhattacharya).” *Id.* (citing Ex. 1005 ¶ 54).

²¹ According to Petitioner and Dr. Sundaresan, one of ordinary skill in the art would have understood that, in Zeng, “MSC” refers to a “mobile switching center.” Pet. 21–22; Ex. 1003 ¶ 59.

Petitioner further argues that “[t]he improved wireless switching center would have performed one of the handoff initiation techniques described in Zeng, such as a handoff determination ‘only if [a] current signal is sufficiently weak (less than threshold) and the other is the stronger of the two.’” *Id.* (citing Ex. 1006, 2–3; Ex. 1003 ¶ 68).

Petitioner argues that such an implementation would “preserve[] other functionality described in Bhattacharya, such as ‘forward[ing] the [Signal-Strength Measurement Reports (SSMR)] to location system 212.’” *Id.* at 25–26 (citing Ex. 1005 ¶ 95); *see also id.* at 26–27 (Petitioner stating that “[the handoff] functionality may be incorporated into the improving wireless switching center without disturbing Bhattacharya’s established teaching of forwarding the SSMR to the location system 212 in estimating a location of wireless terminal 201.”) (citing Ex. 1003 ¶ 73; Ex. 1005 ¶ 95; Ex. 1006, 2–3). Petitioner also provides reasoning and supporting evidence as to why a person of ordinary skill in the art would have had a reasonable expectation of success in combining Bhattacharya’s and Zeng’s teachings. *Id.* at 29.

Based on the evidence presented, Petitioner adequately establishes by a preponderance of the evidence that a person having ordinary skill in the art would have had reason to reach the Bhattacharya-Zeng combination with a reasonable expectation of success.

b. Claim 1

Patent Owner disclaimed claim 1. Ex. 2021. We, nonetheless, address claim 1 because claims 4 and 6–10 depend from claim 1.

Petitioner contends that Bhattacharya discloses many of the limitations of claim 1. Pet. 29–50. To support its arguments, Petitioner identifies certain passages in the cited reference and explains the

significance of each passage with respect to the corresponding claim limitation. *Id.* For instance, regarding the limitation “a database of previously-gathered calibration data for a predetermined region in a wireless network,” Petitioner argues that Bhattacharya discloses “previously-gathered calibration data.” Pet. 35. Bhattacharya’s Figure 4 depicts

the expected signal-strength database is populated (i.e., data is stored in the database) at task 401, prior to the generation of signal-strength measurements by wireless terminal 201 and/or the collection of an SSMR (which includes the signal-strength measurements) by the location system 212.

Id. (citing Ex. 1005, Fig. 4).

Additionally, regarding the limitation “determining which of said first and second signal characteristics has a greater magnitude,” Petitioner argues that, based on the teachings of Bhattacharya and Zeng, a person having ordinary skill in the art would have understood that

[the Bhattacharya-Zeng apparatus] would have provided an improved wireless switching center configured to implement handoff functionality involved in the “mobile-assisted hand-off process,” such as a handoff initiation technique in Zeng where a handoff determination is made “only if [a] current signal is sufficiently weak (less than threshold) and the other is the stronger of the two.”

Id. at 41–42 (citing Ex. 1005 ¶ 95; Ex. 1006, 2–3).

More specifically, Petitioner contends that to determine whether handoff should be initiated, “the improved wireless switching center of [the Bhattacharya-Zeng apparatus] would have determined whether a value of ‘R(2,1)’ (signal-strength signal of the serving base station) is less than a specified threshold, and is also less than either of the values of ‘R(1,1)’ or ‘R(3,1)’ (signal-strength signals of neighboring base stations)” and that “[t]his process involves evaluating signal-strength measurement values

included in the SSMR in determining whether to initiate handoff, and thus, the improved switching center would have determined which of “R(2,1)” and “R(1,1)” has a greater magnitude.” *Id.* at 42 (citing Ex. 1003 ¶ 93).

Patent Owner does not offer any arguments specifically addressing the limitations of claim 1. PO Resp. 44–52. Instead, Patent Owner argues that a person of ordinary skill in the art “as defined by Petitioner’s attorneys lacks the background to combine Bhattacharya with Zeng.” *See* PO Resp. 44–48; *see also* PO Sur-Reply 25–26. As noted above, we adopt Patent Owner’s proposed qualifications for a person of ordinary skill in the art. *See* Section III(B)(1), *supra*. As further noted above, Petitioner asserts that “[t]he Petition demonstrates unpatentability irrespective of the dispute regarding the POSITA definition because the asserted prior art is nonetheless pertinent to each definition.” *See id.*; *see also* Pet. Reply 17 (citing PO Resp. 22–23)

Additionally, Patent Owner asserts that a person of ordinary skill in the art under Petitioner’s definition of one of skill has “a background in geolocation [but] does not necessarily know anything about cellular technologies.” PO Sur-Reply 25; *see also* PO Resp. 44–48. As discussed *supra*, Section III(B)(1), we have adopted Patent Owner’s proposed level of skill and Dr. Sundaresan has the requisite qualifications under that definition. Further, a person of ordinary skill understands the art of which the applied reference is representative, and such understanding is not limited to the four corners of the document applied. *See In re Jacoby*, 309 F.2d 513, 516 (CCPA 1962) (an artisan must be presumed to know something about the art apart from what the references disclose); *Custom Accessories, Inc. v. Jeffrey-Allan Industries, Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986) (“The person of ordinary skill is a hypothetical person who is presumed to be aware of all the pertinent prior art.”).

In that regard, we agree with Petitioner that Bhattacharya “describes its invention as relating to ‘wireless networks, cellular radio systems, mobile communication devices, and radio navigation systems.’” (Pet. Reply 17 (citing Ex. 1005 ¶¶ 1, 2, Fig. 1)) and “is focused on estimating the location of a wireless terminal.” (Pet. 5 (citing Ex. 1005, Abstract)). We further agree with Petitioner that “[l]ike Bhattacharya, Zeng focuses on wireless cellular communication systems, and emphasizes that ‘[m]obility is the most important feature of a wireless cellular communication system’” and that “[a]s a mobile device [described in Zeng] moves within a location, ‘continuous service is achieved by supporting handoff (or handover) from one cell to another.’” Pet. 20 (citing Ex. 1006, 1). Consequently, we agree with Petitioner that “[e]xperience working with ‘navigation and/or geolocation systems’ would have encompassed knowledge of ‘radio frequency and cellular technologies,’ as demonstrated by [the] asserted prior art.” Pet. Reply 15. We further agree with Petitioner that “Bhattacharya-Zeng involves conventional aspects of handoff functionality known to be used in geolocation systems” and that “[t]hese aspects were within the skill level of a POSITA.” *Id.* at 23.

Patent Owner contends that “Petitioner’s proposed combination misinterprets Bhattacharya and Zeng.” PO Resp. 48–51; *see also* PO Sur-Reply 25–26. According to Patent Owner, as Bhattacharya “is concerned with obtaining another signal for location determination” and “[is] not concerned with handoffs between two systems in wireless mobile networks,” a person of ordinary skill in the art, “would have no reason to look to Zeng to solve a cellular network handover problem that Bhattacharya does not mention.” PO Resp. 48–51; *see also* PO Sur-Reply 25–26.

We agree with Petitioner that Bhattacharya suggests handoff functionality to improve “location estimation ‘when a wireless terminal is near the boundary of one or more systems.’” Pet. Reply 21 (citing Pet. 24 (citing Ex. 1005 ¶ 95)). We also agree with Petitioner that “Bhattacharya states that wireless switching center 211 can be ‘known by other names, such as, for example, mobile switching center, mobile telephone switching offices, etc.[,]’ which ‘coincides with Zeng’s disclosure of an ‘MSC’ controlling handoff.” Pet. 25 (citing Ex. 1005 ¶ 53; Ex. 1006, 2; Ex. 1003 ¶ 67).²² Petitioner’s proposed modification of the configurations of the wireless switching center 211 of Bhattacharya to include the handoff operations of Zeng is no more than “the mere application of a known technique to a piece of prior art ready for improvement.” *KSR Int’l. Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007); *see also* Pet. Reply 23. As such, we further agree with Petitioner that “Zeng’s hand-off functionality (known technique) is applied to Bhattacharya’s wireless switching center 211 (known device ready for improvement) to yield a predictable improvement in performing location estimation near boundary conditions (as suggested in Bhattacharya).” Pet. Reply 23 (citing Ex. 1003 ¶¶ 66–76; Ex. 1055 ¶¶ 55–64). We determine that Dr. Sundaresan’s testimony in this regard is consistent with the teachings of Bhattacharya and Zeng and is credible. Ex. 1003 ¶¶ 66–76; Ex. 1055 ¶¶ 55–64.

Patent Owner argues that Petitioner fails to show a reasonable expectation of success. PO Resp. 51–52. Patent Owner argues that “a POSITA as defined by Petitioner[] . . . has no experience with cellular

²² According to Petitioner and Dr. Sundaresan, one of ordinary skill in the art would have understood that, in Zeng, “MSC” refers to a “mobile switching center.” Pet. 21–22; Ex. 1003 ¶ 59.

technology” and that “[e]ven if Zeng’s handoff functionality were routine knowledge in cellular technologies, a person with experience in navigation and geolocation does not have knowledge of cellular technologies or how handoffs function in cellular technologies.” *Id.* (citing Ex. 2018 ¶ 126).

As noted above, we adopt Patent Owner’s proposed qualifications for a person of ordinary skill in the art. *See* Section III(B)(1), *supra*. Additionally, we agree with Petitioner that “Bhattacharya-Zeng involves conventional aspects of handoff functionality known to be used in geolocation systems” and that “[t]hese aspects were within the skill level of a POSITA—whether as defined based on the Sundaresan Declaration or instead on Geoscope’s alternative POSITA definition.” Pet. Resp. 23 (citing Ex. 1055 ¶¶ 65–70). We determine that Dr. Sundaresan’s testimony in this regard is consistent with the teachings of Bhattacharya and Zeng and is credible. Ex. 1055 ¶¶ 65–70.

Based on the entire trial record and for the reasons explained above, we agree with Petitioner’s analysis and supporting evidence regarding obviousness of claim 1 and we credit Dr. Sundaresan’s testimony supporting Petitioner’s position. Thus, we find that the proposed Bhattacharya-Zeng combination discloses or suggests the recitations of claim 1 by a preponderance of the evidence, and we determine that a preponderance of the evidence supports that claim 1 would have been obvious over the combined teachings of Bhattacharya and Zeng.

c. Remaining Claims 4 and 6–10

Claims 4 and 6–10 ultimately depend from claim 1. Ex. 1001, 12:22–26, 12:30–44. Petitioner accounts for the limitations recited in each of claims 4 and 6–10. Pet. 72–74. Patent Owner does not offer any arguments

specifically addressing the limitations of claims 4 and 6–10. *See* PO Resp. *passim*.

Based on the entire trial record, we agree with Petitioner’s analysis and supporting evidence and credit Dr. Sundaresan’s testimony supporting Petitioner’s position. Thus, we find that the Bhattacharya-Zeng combination discloses or suggests the recitations of claims 4 and 6–10 by a preponderance of the evidence, and we determine that a preponderance of the evidence supports that claims 4 and 6–10 would have been obvious over the combined teachings of Bhattacharya and Zeng.

2 *Asserted Unpatentability over Bhattacharya and Spain
(Ground 2)*

Petitioner asserts that claims 1–4 and 6–11 would have been unpatentable under 35 U.S.C. § 103(a) as obvious over Bhattacharya in view of Zeng and Spain. Pet. 1, 54–75 (citing Ex. 1003) (Petitioner’s Ground 1B). Patent Owner does not offer any arguments specifically addressing the limitations of claims 2, 4, and 6–10 except for disputing that Spain teaches the non-uniform grid point recited by claim 2. PO Resp. 59–66. We address Petitioner’s arguments for reaching an apparatus reflecting the combined teachings of Bhattacharya, Zeng, and Spain (the “Bhattacharya-Zeng-Spain” apparatus) and address Patent Owner’s arguments below.

a. *Combining Bhattacharya, Zeng, and Spain*

Petitioner argues that Bhattacharya teaches leveraging signal-strength functions that are “a function of time” to account for time-dependent changes based on “atmospheric and meteorological conditions” and also describes pattern matching calibrated measurements against expected functions that correspond in time. Pet. 56–57 (citing Ex. 1005 ¶¶ 114, 127). Petitioner states, however, that Bhattacharya does not specifically address

how its expected signal-strength database is populated to account for time-dependent changes based on “atmospheric and meteorological conditions.” *Id.* at 57 (citing Ex. 1003 ¶ 113). Petitioner argues that a person having ordinary skill in the art would thus look to known techniques for generating and using expected values to account for time-dependent changes based on atmospheric and meteorological conditions. *Id.*

Petitioner argues that Spain describes implementation details for expected values stored in a database and used for pattern matching in location estimation. *Id.* (citing Ex. 1007 ¶¶ 6, 72, 76). Petitioner argues it would have been obvious that Bhattacharya’s expected signal-strength measurements correspond to Spain’s expected values. *Id.* at 58 (citing Ex. 1003 ¶ 115). Petitioner contends that a person having ordinary skill in the art would have implemented a Bhattacharya-Zeng-Spain database involving collected expected values and populating the database during a pre-processing step. *Id.* at 58–59 (citing Ex. 1003 ¶ 116). Petitioner argues that such an implementation would be recognized based on the teachings of Bhattacharya, Zeng, and Spain and would ensure the location system is not slow. *Id.* (citing Ex. 1003 ¶ 116). Petitioner also provides reasoning and supporting evidence as to why a person of ordinary skill in the art would have had a reasonable expectation of success in combining Bhattacharya’s and Spain’s teachings. *Id.* at 61–62.

For the reasons explained above, we find that the proposed Bhattacharya-Zeng combination discloses or suggests the recitations of claim 1 by a preponderance of the evidence, and we determine that a preponderance of the evidence supports that claim 1 would have been obvious over the combined teachings of Bhattacharya and Zeng. In addition, based on the evidence presented, Petitioner adequately establishes by a

preponderance of the evidence that a person having ordinary skill in the art would have had reason to reach the Bhattacharya-Zeng-Spain combination with a reasonable expectation of success.

b. Claim 1

Petitioner relies on Bhattacharya-Zeng for many of claim 1's recitations and refers back to its arguments and evidence of Ground One. Pet. 62–68. Additionally, Petitioner argues that, based on the teachings of Bhattacharya, Zeng, and Spain, a person having ordinary skill in the art would have understood that data representing expected values in the expected signal-strength database represents previously-gathered data and would have understood the Bhattacharya-Zeng-Spain database is populated with previously-gathered calibration data. *Id.* at 64–67.

Patent Owner does not offer any arguments specifically addressing the limitations of claim 1. *See* PO Resp. *passim*. Based on the entire trial record, we agree with Petitioner's analysis and supporting evidence and credit Dr. Sundaresan's testimony supporting Petitioner's position. Thus, we find that the Bhattacharya-Zeng-Spain combination discloses or suggests the recitations of claim 1.

c. Claim 2

Claim 2 recites, “[t]he method of claim 1 wherein said database comprises previously-gathered calibration data for one or more non-uniform grid points within said region.” Ex. 1001, 12:16–18.

For the reasons we explain in Section III(C), *supra*, we construe “calibration data” as “modified or unmodified network measurement data associated with a geographic location,” we construe “grid point” as “a point associated with representative calibration data for an area,” and we construe

“non-uniform grid points” as “grid points that are non-uniformly spaced throughout a geographic region.”

Regarding claim 2, Petitioner argues that based on the disclosures in Bhattacharya, Zeng, and Spain a person of ordinary skill in the art “would have understood and found obvious that data representing expected values stored in the expected signal-strength database represents ‘**previously-gathered**’ data.” Pet. 65 (citing Ex. 1003 ¶ 125; 1005 ¶¶ 89–90). Petitioner further argues a person having ordinary skill in the art “would have implemented Bhattacharya-Zeng-Spain such that expected values are collected and populated in a database as a calibration data gathering step that occurs prior to wireless terminals later measuring values for comparison to this previously gathered calibration data for location estimation.” *Id.* (citing Ex. 1003 ¶ 125; 1005 ¶ 87; 1007 ¶¶ 105, 215). Petitioner also argues that “the Bhattacharya-Zeng-Spain database is populated with ‘previously-gathered calibration data’ insofar as the stored data was collected and populated in the database during a pre-processing step that occurs prior to measurement of values by wireless terminals for comparison to the stored expected values as part of location estimation.” *Id.* at 66 (citing Ex. 1007 ¶ 202, Ex. 1003 ¶ 126).

Petitioner argues that “implementation of Bhattacharya-Zeng-Spain to collect and store expected values in a database prior to a wireless terminal later measuring values for comparison for location estimation, as discussed above, is consistent with disclosure in the ’104 patent specification corresponding to the ‘previously-gathered calibration data.’” *Id.* at 67 (citing Ex. 1003 ¶ 128). Petitioner further argues that in the ’104 patent specification (1) “calibration data may be obtained from data collection devices during field test operations, and/or from [mobile stations] or other

communication devices within the general area of the [non-uniform()] grid points”; and (2) the term “‘non-uniform grid point’ can ‘represent the signal characteristics and/or calibration data over a given region.’” *Id.* at 67–68 (citing Ex. 1001 3:50–4:6).

Petitioner argues that “Bhattacharya-Zeng-Spain renders [the non-uniform grid point] feature obvious through Spain’s techniques for partitioning a geographic region.” *Id.* at 68 (citing Ex. 1003 ¶ 139). Specifically, Petitioner argues that “a location system of Bhattacharya-Zeng-Spain includes requisite hardware for ‘populating, amending, using, and managing Location-Trait Database 313,’” which is “a database that maps each of a plurality of locations to one or more expected traits associated with a wireless terminal at that location.” *Id.* (citing Ex. 1007 ¶¶ 58, 66). Petitioner further argues that “in generating the Location-Trait Database 313, the location system [of Bhattacharya-Zeng-Spain] partitions a geographic region 220 ‘into B(T,N) locations,’” that “[r]egion 220 can be partitioned into ‘any number of locations of any size and shape,’” and that “region 220 is partitioned such that the locations represent ‘one or more non-uniform grid points within said region.’” *Id.* at 68–71 (citing Ex. 1007 ¶¶ 72, 99; Ex. 1003 ¶ 142).

Patent Owner argues that Petitioner relies on Spain for the “non-uniform grid point” recitation of claim 2 and that Spain “does not teach this limitation under the proper [claim] construction.” PO Resp. 59–60. Patent Owner argues that the partitioned locations of Spain are fundamentally different from the non-uniform grid points of the ’104 Patent “because they are not based on analysis of calibration data.” *Id.* at 60. This argument does not undermine Petitioner’s showing because we reject Patent Owner’s

proposed claim construction of “non-uniform grid points” for the reasons explained in Section III(C), *supra*.

Patent Owner further argues that Spain explains that “the boundaries of each location are based, at least in part, on” factors that are not calibration data (such as “natural and man-made physical attributes of [the] geographic region,” “legal laws governing geographic region 220,” or “data regarding the location and movement of individuals ... and vehicles in geographic region 220”). PO Resp. 60–61 (citing Ex. 1006 ¶¶ 86–93). Patent Owner further argues that partitioning may be based on considerations such as accuracy, computational burden, and the ability of the server to determine location. *Id.* at 61–62 (citing Ex. 1006 ¶¶ 94–96).

These arguments also do not undermine Petitioner’s showing. Petitioner persuasively argues that the ’104 patent is similar to Spain in that it also indicates that non-uniform grid points may be defined by parameters other than evaluation of calibration data. Pet. Reply 12–13, 20–21. The ’104 patent indicates, for example, that “geographical areas (e.g., mountains, buildings, roads)” and “varying concentrations of [mobile stations (MSs)]” may be used to define non-uniform grid points. Ex. 1001, 4:1–6.

Under the claim construction we adopt, claim 2 does not require that non-uniform grid points be constructed only by evaluating calibration data. Rather, claim 2 requires “calibration data for one or more non-uniform grid points within said region.” Ex. 1001, 12:16–18. Both Spain and the ’104 patent are consistent with, for example, geographic boundaries being a factor in deciding the boundaries of a non-uniform grid point. Pet. Reply 13 (citing, e.g., Ex. 1001, 3:61–4:6; Ex. 1007 ¶ 86). As we explain above, Petitioner establishes, by a preponderance of the evidence, that the Bhattacharya-Zeng-Spain combination would create Location-Trait

Database 313 which includes calibration data associated with a given region (i.e., for a non-uniform grid point). Pet. 68–71. We determine that Dr. Sundaresan’s testimony in this regard is consistent with the teachings of Bhattacharya, Zeng, and Spain and is credible. Ex. 1003 ¶¶ 122–128, 139–143; Ex. 1055 ¶¶ 71–73.

Patent Owner further argues that “Spain’s figures show that the partitioning is merely an overlay on a geographic region that is independent of any calibration data” and argues that Spain’s flowchart in Figure 5 confirms “partitioning is not based on analysis of calibration data.” PO Resp. 62–66; *see also* PO Sur-Reply 17–18 (making similar arguments). Again, Patent Owner’s argument relies on Patent Owner’s claim construction of non-uniform grid point, which we reject. Claim 2, properly construed, does not require partitioning based on calibration data. Patent Owner’s explanation of Spain’s partitioning does not undermine Petitioner’s showing that Spain teaches calibration data for one or more non-uniform grid points within said region. PO Resp. 59–66.

In its Sur-Reply, Patent Owner argues that Petitioner does not establish that Spain teaches a non-uniform grid point whether under Patent Owner’s “alternative construction” (which we understand as being the construction Patent Owner argued in Patent Owner’s response) or under “the district court construction.” PO Sur-Reply 17–18. Patent Owner argues that the district court construction requires that “the system must evaluate adjacent calibration data to form the NUG”—just like Patent Owner’s proposed construction. *Id.* at 18. As we explain in Section III(C), *supra*, we reject that “grid point” or “non-uniform grid point” requires such an evaluation. We thus reject both of Patent Owner’s proposed constructions

and we likewise reject Patent Owner's allegations of the understanding of the district court construction.

Based on the entire trial record and for the reasons explained above, we agree with Petitioner's analysis and supporting evidence regarding obviousness of claim 2 and we credit Dr. Sundaresan's testimony in support of Petitioner's arguments and evidence. Thus, we find that the proposed Bhattacharya-Zeng-Spain combination discloses or suggests the recitations of claim 2 by a preponderance of the evidence, and we determine that a preponderance of the evidence supports that claim 2 would have been obvious over the combined teachings of Bhattacharya, Zeng, and Spain.

d. Remaining Claims 4 and 6–10

Claims 4 and 6–10 ultimately depend from claim 1. Ex. 1001, 12:22–26, 12:30–44. Petitioner accounts for the limitation recited in each of claims 4 and 6–10. Pet. 72–74. Patent Owner does not dispute Petitioner's position with respect to any of these claims. *See* PO Resp. *passim*.

Based on the entire trial record, we agree with Petitioner's analysis and supporting evidence and credit Dr. Sundaresan's testimony supporting Petitioner's position. Thus, we find that the Bhattacharya-Zeng-Spain combination discloses or suggests the recitations of claims 4 and 6–10 by a preponderance of the evidence, and we determine that a preponderance of the evidence supports that claims 4 and 6–10 would have been obvious over the combined teachings of Bhattacharya, Zeng, and Spain.

II. CONCLUSION²³

For the reasons above, we determine that Petitioner has proven, by a preponderance of the evidence, that claims 2, 4, and 6–10 of the '104 patent are unpatentable as summarized in the following table.

Claim(s) ²⁴	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 3, 4, 6–11	103	Bhattacharya, Zeng	4, 6–10	
1–4, 6–11	103	Bhattacharya, Zeng, Spain	2, 4, 6–10	
Overall Outcome			2, 4, 6–10	

IV. ORDER

For the foregoing reasons, it is

ORDERED that Petitioner has demonstrated by a preponderance of the evidence that claims 2, 4, 6–10 of the '104 patent are unpatentable; and

²³ 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*, 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).

²⁴ We do not address the unpatentability of claims 1, 3, and 11 because Patent Owner disclaimed those claims. Ex. 2021.

FURTHER ORDERED that, because this is a Final Written Decision, 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.

IPR2024-00255
Patent 7,561,104 B2

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