

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

GEOSCOPE TECHNOLOGIES PTE. LTD.,
Patent Owner.

IPR2024-00259
Patent 8,406,753 B2

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

McSHANE, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Apple Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1, 7, 9, 32, 38, and 40 (the “challenged claims”) of U.S. Patent No. 8,406,753 B2 (Ex. 1001, “the ’753 patent”), along with the Declaration of Dr. Karthikeyan Sundaresan (Ex. 1003). Geoscope Technologies Pte. Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 10.

On May 10, 2024, the Board instituted an *inter partes* review of the challenged claims pursuant to 35 U.S.C. § 314. Paper 11 (“Dec.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 21, “PO Resp.”), along with the Declaration of Mr. Mark Alan Sturza (Ex. 2018). Petitioner filed a Reply (Paper 23, “Pet. Reply”), along with the Supplemental Declaration of Dr. Sundaresan (Ex. 1027), and Patent Owner filed a Sur-reply (Paper 24, “PO Sur-reply”). The parties presented oral arguments at a February 7, 2025 hearing and a hearing transcript has been entered into the record (Paper 31, “Tr.”).

For the reasons set forth in this Final Written Decision pursuant to 35 U.S.C. § 318(a), we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1, 7, 9, 32, 38, and 40 of the ’753 patent are unpatentable.

B. Real Party-in-Interest

Petitioner Apple Inc. identifies itself as the sole real party-in-interest. Pet. 62. Patent Owner Geoscope Technologies Pte. Ltd. identifies itself as the sole real party-in-interest. Paper 4 (Patent Owner Mandatory Notices), 2.

C. 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);

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

Google LLC v. Geoscope Technologies Pte. Ltd., IPR2023-01212 (PTAB) (“Google IPR”).

See Pet. 62–63; Paper 7, 2. Patent Owner additionally identifies the following matters as related to this proceeding:

Google LLC v. Geoscope Technologies Pte. Ltd., IPR2023-01209, IPR2023-01210, and IPR2023-01211 (PTAB) (filed Aug. 10, 2023);

Google LLC v. Geoscope Technologies Pte. Ltd., IPR2023-01213 (PTAB) (filed Aug. 9, 2023);

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);

Apple Inc. v. Geoscope Technologies Pte. Ltd., IPR2024-00031 and IPR2024-00032 (filed Oct. 31, 2023); and

Apple Inc. v. Geoscope Technologies Pte. Ltd., IPR2024-00255 (PTAB) (filed December 1, 2023).

Paper 7, 2–3.

D. The ‘753 Patent

The ’753 patent, titled “System and Method for Generating a Location Estimate Using Uniform and Non-Uniform Grid Points,” issued March 26, 2013. Ex. 1001, codes (45), (54). The ’753 patent “relates to the problem of estimating the location of a wireless mobile device using information from

one or more Network Measurement Reports (‘NMRs’) . . . generated by a wireless communications network or the mobile device.” *Id.* at 1:15–23.

As background, the ’753 patent describes “a need to streamline the [location determination] process in order to efficiently and effectively handle the vast amount of data being sent between the wireless communications network and the large number of mobile devices for which locations are to be determined.” Ex. 1001, 2:22–26. Accordingly, the ’753 patent aims to “overcome[] the limitations of the prior art by estimating the location of a wireless mobile device using . . . one or more pre-existing . . . NMRs. . . [,] which include calibration data for a number of locations within a geographic region.” *Id.* at 2:25–31.

The ’753 patent explains that the method of the invention includes providing calibration data for points in a geographic region, with the calibration data including characterizing parameters such as a signal strength measurement. Ex. 1001, 51:16–19, 9:59–63. The method further includes receiving at least one NMR from a mobile device at an unknown location, generating “sets of grid points for the calibration data,” and evaluating the NMRs “with each of the sets of grid points as a function of select ones of the characterizing parameters.” *Id.* at 51:19–27. In the method, “[a] set of grid points . . . as a function of a predetermined criteria” may be selected and the location of the mobile device in the geographic region is determined “as a function of the selected set of grid points.” *Id.* at 51:27–31. Figure 67 of the ’753 patent, reproduced below, depicts this process:

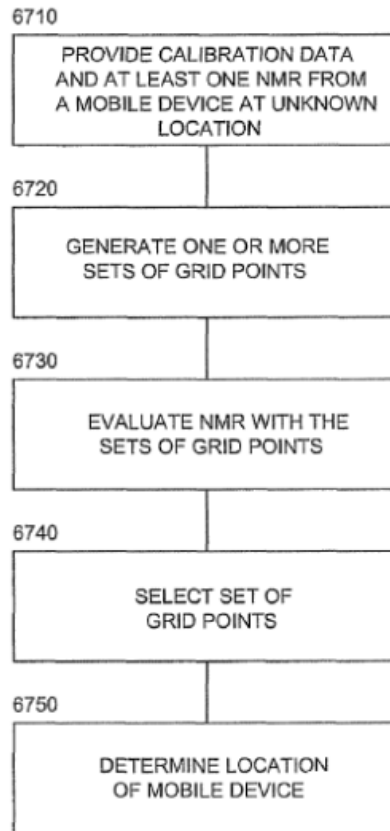


FIG. 67

Figure 67, above, depicts “a flow chart for a method of determining the location of a mobile device in a geographic region according to one embodiment.” Ex. 1001, 51:13–15.

E. Claims

Petitioner challenges claims 1, 7, 9, 32, 38, and 40 of the ’753 patent. Pet. 6. Claims 1 and 32 are independent claims. Claim 1 is illustrative of the claimed subject matter and is reproduced below, with bracketed designations added for reference purposes.

1. [1pre] A method of determining the location of a mobile device in a geographic region comprising the steps of:

[1a] providing calibration data for each of one or more calibration points in a geographic region, said calibration data having one or more characterizing parameters;

[1b] generating one or more sets of grid points for said calibration data;

[1c] receiving at least one network measurement report from a mobile device at an unknown location in said geographic region;

[1d] evaluating said at least one network measurement report with each of said sets of grid points as a function of select ones of said characterizing parameters;

[1e] selecting a set of grid points as a function of a predetermined criteria; and

[1f] determining the location of a mobile device in said geographic region as a function of said selected set of grid points.

Ex. 1001, 59:14–31.

F. Asserted Grounds of Unpatentability

Claims Challenged	35 U.S.C. § ¹	Reference(s)
1, 7, 9, 32, 38, 40	103(a)	Bhattacharya ² , Yost ³

Pet. 1.

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application and provisional application for the ’753 patent were filed before this date, the pre-AIA version of § 103 applies. *See* Ex. 1001, codes (22), (60). Petitioner does not dispute that the filing date of the provisional application filing date applies. *See* Pet. 1–2; *see also generally* Pet. Reply.

² U.S. Publication No. 2006/0211376 A1, published September 21, 2006 (Ex. 1004).

³ U.S. Patent No. 6,560,442 B1, issued May 6, 2003 (Ex. 1008).

II. ANALYSIS

A. Issues Related to Ordinary Skill in the Art

1. Determination of Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art:

would have 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.

Pet. 6–7 (citing Ex. 1003 ¶ 8). Petitioner also contends that additional education could compensate for less work experience and *vice versa*. *Id.* at 7.

Patent Owner does not dispute that a bachelor's degree in computer science or a similar discipline would be acceptable as an alternative to electrical engineering, and that superior education could compensate for a deficiency in work experience, and vice versa. PO Resp. 23. Patent Owner, however, asserts that the Board should adopt the definition proposed by another petitioner in the related Google IPR:

A POSITA [person of ordinary skill in the art] 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.

PO Resp. 23 (citing *Google LLC v. Geoscope Technologies Pte. Ltd.*, IPR2023-01212⁴, Paper 2 at 18). Patent Owner contends that the level of

⁴ Patent Owner refers to IPR2024-01212, but the correct citation is IPR2023-01212. See PO Resp. 23.

qualifications proposed in the cited related proceeding is appropriate here because the '753 patent and the asserted references in this proceeding relate to the field of cellular technology. *Id.*; Ex. 2018 ¶¶ 46–47.

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted).

The key difference between Petitioner’s and Patent Owner’s proposed qualifications for a person of ordinary skill at the time of the invention is that Patent Owner asserts that experience in “wireless networks, cellular radio systems, mobile communication devices and radio navigation systems,” 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. 23.

The '753 patent is directed to locating a wireless mobile device in a geographic region. Ex. 1001, 1:15–23. Bhattacharya is directed to estimating the geographic location of a wireless terminal. Ex. 1004, code (57), ¶¶ 1, 13. Yost is directed to a method for locating the concentration of mobile radio traffic in a coverage area. Ex. 1008, code (57), 2:17–19. We find that there is support in the '753 patent and prior art consistent with Patent Owner’s assertion that the qualifications of a person of skill would include knowledge of radio navigation and mobile communications technology. Accordingly, we adopt Patent Owner’s proposed qualifications for a person of ordinary skill.

Patent Owner does not argue that the obviousness evaluation would vary depending on the level of qualifications adopted. *See generally* PO Resp.; PO Sur-reply. Dr. Sundaresan testifies that his prior art analysis would be the same whether Petitioner’s or Patent Owner’s proposed definition of a person of ordinary skill in the art were adopted. Ex. 1027 ¶ 26. 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

Patent Owner asserts that Petitioner’s expert declaration from Dr. Sundaresan is deficient and should not be afforded weight.⁵ *See* PO Resp. 47–54. Specifically, Patent Owner argues that Dr. Sundaresan does not provide an opinion on the level of ordinary skill because Dr. Sundaresan testified that he had only been informed of the level of ordinary skill. *Id.* at 48; Ex. 1003 ¶ 8 (“I have been informed that a person of ordinary skill in the art . . . had at least a Bachelor’s degree in electrical engineering . . .”). Patent Owner contends that such a “conclusory statement” must be

⁵ 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.

held to have little or no weight. PO Resp. 48 (citing *Xerox Corp. et al. v. Bytemark, Inc.*, IPR2022-00624, Paper 12 at 5 (PTAB Director Review Decision, Feb. 10, 2023)).

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. 49. 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 ¶¶ 25–28; Consolidated Trial Practice Guide,⁶ 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 50–51 (citing Ex. 2035, 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 ’753 patent. PO Resp. 51. 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 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

⁶ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

wasn't part of the analysis then.” *Id.* at 52 (citing Ex. 2035, 59:16–18, 60:6–8). Patent Owner also alleges that “Dr. Sundaresan’s review 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.* at 52 (citing Ex. 1033 ¶ 20; Ex. 2035, 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 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. 53 (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 53–54. Patent Owner also asserts that Dr. Sundaresan’s omissions prejudice Patent Owner and Petitioner will likely attempt to introduce new evidence that should have been included with the Petition. *Id.* at 54.

We do not agree with Patent Owner that Dr. Sundaresan’s declaration is substantively deficient and therefore should not be afforded weight. 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. 47–28. 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 '753 patent and the prior art analyzed in the Declaration.

Ex. 1027 ¶ 14. 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.* ¶ 15. 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. 6–7.

Further, 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. 49–51. A petition need only include how the challenged claims are to be construed. 37 C.F.R. § 42.104(b)((3)).⁷ Here, Petitioner met this requirement by identifying the proposed interpretations of the claim terms (Pet. 7–9) and Dr. Sundaresan indicated that he used these interpretations in forming his opinions on obviousness (Ex. 1003 ¶¶ 31–32). We discern no requirement for more from an expert in this regard. Further, as discussed,

⁷ 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 II.B.

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

Finally, Patent Owner asserts that Dr. Sundaresan’s declaration should not be afforded weight because he did not consider some of the intrinsic evidence of record. PO Resp. 51–52. We do not agree. Instead, 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).

B. Claim Construction

In this *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (2022). Under the principles set forth by our reviewing court, the “words of a claim ‘are generally given their ordinary and customary meaning,’” as would be understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips*, 415 F.3d at 1312 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc.*

v. Medtronic Sofamor Danek, Inc., 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner proposes claim constructions for several claim terms listed below. Pet. 7–9. These proposed constructions are based on the claim constructions issued in the related district court Apple action involving the ’753 patent (Ex. 1020) or are constructions to which the parties stipulated (Ex. 1025):

Claim Term	Petitioner’s Proposed Construction
calibration data	“modified or unmodified network measurement data associated with a geographic location”
calibration points	“geographic points with which calibration data is associated”
grid point	“a point associated with representative calibration data for an area”
network measurement report	“a report used in cellular networks which provides the results of a measurement from a mobile device on one or more cells”
order of “providing,” “generating,” “evaluating,” and “selecting” steps	“construed as ‘providing has to occur before generating, and generating has to occur before both evaluating and selecting.’”
“evaluating said at least one network measurement report with each of said sets of grid points as a function of select ones of said characterizing parameters;” “evaluate said at least one network measurement report with each of said sets of grid points as a function of select ones of said	Plain and ordinary meaning

characterizing parameters”	
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Pet. 7–9 (citing Ex. 1025, 2; Ex. 1020, 6–8, 17–24).

In its Response, Patent Owner only disputes the construction of the term “grid point.” PO Resp. 26. Specifically, Patent Owner proposes the Board construe “grid point” as “a point associated with representative calibration data for an area whose boundaries are determined from evaluation of calibration data.” *Id.*

In support of its proposed construction, Patent Owner points to the claim language, the specification, and the claim construction issued by the district court. *See* PO Resp. 26–35. Petitioner contends that Patent Owner’s proposed construction is inconsistent with both the intrinsic record and with the district court’s construction and improperly imports additional limitations into the term. *See* Pet. Reply 1–14.

We agree with Petitioner that Patent Owner’s additional requirements of evaluating the calibration data to determine the boundaries of the area should not be included in the interpretation of the term “grid point.” Instead, based on the full record, and for the reasons explained below, we find that the construction of a “grid point” is “a point associated with representative calibration data for an area.”

We begin by addressing Patent Owner’s reliance on the claim language of independent claims 1 and 32 to support its proposed construction. Patent Owner contends that the claim language supports its construction because the independent claims require “[providing/receiving] calibration data for each of one or more calibration points in a geographic region” and “generat[ing] one or more sets of grid points for said calibration

data.” PO Resp. 27 (quoting Ex. 1001, 59:14–31, 32:49–67). Thus, Patent Owner contends, the “the claims require generating grid points—including the boundaries of the areas they represent—based on an evaluation of calibration data.” *Id.* (citing Ex. 2018 ¶ 80). Mr. Sturza testifies that, based on the language of the claims, “the claims require [that] the grid points are generated for calibration data.” Ex. 2018 ¶ 81.

We do not find Patent Owner’s arguments on this issue to be persuasive. Patent Owner seeks to add the limitation that the generation of the grid points be done by an evaluation of the calibration data. But the claims do not say that. Instead, the claims state only that the “grid points for said calibration data.” As discussed in greater detail below, the ’753 patent Specification discloses that grid points may be “fixed” prior to calibration data being “assigned to the fixed grid points by some rule.” Ex. 1001, 10:29–38. This supports that grid points are associated with calibration data, which is consistent with Petitioner’s and the district court’s interpretation of the term “grid point.” *See* Pet. 8; Ex. 1020, 19–20. Thus, we do not agree that the claim language on its face supports Patent Owner’s construction.

Next, we consider Patent Owner’s arguments on the Specification of the ’753 patent to support its proposed construction. PO Resp. 27–32. Patent Owner relies on certain disclosures in the Specification of the ’753 patent to support its proposed construction. *Id.* For example, Patent Owner notes that the Specification states:

calibration data for these locations must be gathered and analyzed so that particular points (e.g., ‘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 NMR’s.

PO Resp. 27–28 (quoting Ex. 1001, 2:31–25; citing *id.*, code (57), 9:34–39; Ex. 2018 ¶ 81). Patent Owner contends that “the specification [] teaches that grid points must be determined based on an analysis of calibration data.” *Id.* at 28 (citing Ex. 2018 ¶ 81).

Patent Owner further argues that the boundaries resulting from these analyses are variable because the specification indicates that the grid points are based on evaluations of statistical similarities across the gathered calibration data. PO Resp. 28 (citing Ex. 1001, 12:7–1; Ex. 2029, 7; Ex. 2018 ¶ 82). Patent Owner contends that these statistical similarities are evaluated to generate a grid point, which includes defining the area it represents and associating it with calibration data that is representative of that area. *Id.* at 30–31 (citing Ex. 1001, 10:44–11:6, 12:4–14; Ex. 2029, 6–7; Ex. 2018 ¶ 86). Thus, Patent Owner argues that the geometrical shape (i.e., boundaries) of the area represented by a particular 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 31–32 (citing Ex. 1001, 12:4–14; Ex. 2029, 7; Ex. 2018 ¶ 87).

Patent Owner likens the evaluation above to the generation of non-uniform grid points (“NUGs”) in U.S. Patent No. 9,097,784 B2 (“the ’784 patent”), where each NUG corresponds to an area that is part of a broader region. PO Resp. 28–29 (citing Ex. 2017, Fig. 6, 6:21–34; Ex. 2018 ¶ 83). Referring to the ’784 patent, Patent Owner asserts that the calibration data is gathered at different locations in a broader region and is analyzed to define grid points that divide the region into different areas represented by each grid point. *Id.* at 29–30. To further support its argument, Patent Owner refers to the ’379 provisional application, which is incorporated by reference

in the '753 patent and states: “the root of the NUG is the calibration data vector” and the evaluation of the calibration data vector is “of great importance since it is fundamental to the method” of generating grid points. *Id.* at 30 (citing Ex. 2029, 6; Ex. 2018 ¶ 84).

Patent Owner also contends that the '753 patent “refers to a ‘predetermined fixed uniform grid’ but the generated grid points are not necessarily part of this grid—indeed, this grid is a distinct concept from the generated grid points.” PO Resp. 16 (citing Ex. 1001, claim 4, 13:13–20, 15:57–67, 18:13–26; Ex. 2018 ¶ 65). Patent Owner asserts that, even with a “uniform grid,” “the generated grid points may be non-uniformly distributed.” *Id.* (citing Ex. 2018 ¶ 65). Mr. Sturza testifies that in the '753 patent “a ‘uniform grid’ may be defined over a region to assign locations and data that form the ‘root’ of a first generated grid point.” Ex. 2018 ¶ 65 (citing Ex. 1001, 10:29–43). Mr. Sturza testifies that subsequent grid points “are generated by evaluating this assigned data and may have different roots that are not part of this uniform grid” and “a single generated grid point may be anchored to a point on this uniform grid while the other generated grid points are not, and are non-uniformly distributed.” *Id.* (citing Ex. 1001, 10:44–65). Mr. Sturza also refers to Figure 17 of the '753 patent and testifies that it shows the distinction between the generated grid points and the nodes of the uniform grid, and “[a]lthough some of the generated grid points may overlap these nodes under certain circumstances, they are still distinct elements.” *Id.* (citing Ex. 1001, Fig. 17, 15:57–67).

Thus, in view of the above assertions, Patent Owner contends that its proposed construction is confirmed by the intrinsic evidence. PO Resp. 31.

In its Reply, Petitioner contends that Patent Owner’s construction attempts to rewrite the district court’s construction to include additional limitations specific to the cited embodiments and impermissibly reads out other embodiments in the ‘753 patent. Pet. Reply 1.

Petitioner further argues that, contrary to Patent Owner’s position, the disclosures of the ’753 patent Specification to which Patent Owner cites exclusively relate to NUGs. Pet. Reply 6–7 (citing Ex. 1001, 12:7–14, 10:44–11:6). For example, Petitioner notes that Patent Owner’s response containing “the prominent block quotation from column 12 of the ’753 Patent clearly states that the ‘NUGs may fully cover the region R and each *NUG* may have statistically similar data accumulated into itself.’” *Id.* at 6 (quoting PO Resp. 28 (citing Ex. 1001, 12:7–14)). Petitioner refers to Patent Owner’s annotation of Figure 6 of the related ’784 patent shows “a geographical region (R) having NUGs represented by NUG1, NUG2, and NUG3.” *Id.* (quoting PO Resp. 28–29 (citing Ex. 2017, 6:21–34, Fig. 6)). Petitioner also asserts that Patent Owner’s reference in the ’753 patent regarding the need to evaluate the calibration data for “statistical similarity” is describing the operation of “the NUG generator.” *Id.* at 6–7 (citing PO Resp. 30–31 (citing Ex. 1001, 10:44–11:6); Ex. 1027 ¶ 33. Thus, Petitioner contends that even if all of the unclaimed limitations on which Patent Owner focuses for its construction were properly attributable to a term—which, according to Petitioner, they are not—that term would be “non-uniform grid point.” *Id.* at 7. In contrast, Petitioner contends that the challenged claims more generally recite the term “grid point,” and the Specification discloses embodiments involving both uniform and non-uniform grid points and both uniform and non-uniform grid points are “grid points.” Pet. Reply 7–13.

More specifically, Petitioner asserts that the Specification of the '753 patent includes both uniform and non-uniform grids points as “grid points.” Pet. Reply 8–13. Petitioner refers to the descriptions of “grid points” as “NUGS or UGs [uniform grid points].” *Id.* at 8–9 (citing Ex. 1001, 25:31–34 (“a set ‘S’ of grid points (NUGs or UGs)”), 26:32–35 (“the set of available grid points (NUGs or UGs)”). Petitioner asserts that the '753 patent teaches that that “a NUG is just one example of a ‘grid point.’” *Id.* at 9 (citing Ex. 1001, 13:7–8⁸ (“such as a NUG”); Ex. 1027 ¶ 36).

Petitioner also points to the '753 patent Specification’s disclosure that the process of location estimation may be based on “NUGs or UGs [uniform grid].” Pet. Reply 9 (citing Ex. 1001, 25:31–34, 26:32–35; Ex. 1027 ¶ 36). Petitioner refers to the '753 description that discloses that “a fixed uniform grid (‘UG’) [is] defined over the region R with the calibration point data being assigned to the fixed grid points by some rule (e.g., allocated by closest fixed grid point, a centroid of a set of fixed grid points, etc.)” and “one or more of the grid points may be located on a predetermined fixed uniform grid defined over the geographic region.” *Id.* at 9–10 (citing Ex. 1001, 13:1–20, 35:41–45; Ex. 1027 ¶ 37). Petitioner refers to dependent claims 4 and 35, which recite “one of said grid points is located on a predetermined fixed uniform grid defined over said geographic region,” which is argued to serve to confirm that “‘grid point’ is broad enough to encompass a uniform grid point located on a predetermined fixed uniform grid.” *Id.* at 10 (citing Ex. 1001, 59:38–40, 64:8–10, Ex. 1027 ¶ 37). Petitioner also refers to the disclosure in the '753 patent that states that

⁸ Petitioner cites to column 13, lines 11 to 12, but the text cited is at column 13, lines 7 to 8.

uniform grid points “may serve as the root of a first NUG,” so, Petitioner argues, the generation of NUGs are an optional feature. *Id.* (citing Ex. 1001, 10:39–43(emphasis omitted)). Petitioner also contends that the generation of NUGs may be based on uniform grid points, but “[t]here is no requirement in the ’753 Patent—and certainly not in the claim language itself—that the grid points upon which location estimation is based are NUGs.” *Id.* (citing Ex. 1027 ¶ 38).

Petitioner asserts that Patent Owner’s proposed construction of the term “grid point” would impermissibly read out certain embodiments disclosed in the Specification. Pet. Reply 13. Specifically, Petitioner argues that Patent Owner’s proposed construction would be inconsistent with how uniform grid points are defined, because the ’753 Patent discloses that grid points may be located on a predetermined fixed uniform grid defined over the geographic region, which would not have variable boundaries determined by the evaluation of calibration data and instead would have boundaries that are predetermined, fixed, and uniform. *Id.* (citing Ex. 1001, 10:29–35, 35:41–45).

In its Response and Sur-reply, Patent Owner contends that its proposed construction is consistent with the district court’s construction. PO Resp. 32–36; PO Sur-Reply 9–12. Patent Owner contends that “the district court adopted the phrase ‘representative calibration data for an area’ in its construction [] 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.” PO Resp. 32 (citing Ex. 2012, 20). Patent Owner argues that the district court similarly relied on descriptions of NUGs for its construction of

“grid point.” PO Sur-reply 9. Patent Owner further asserts that the district court unambiguously rejected Petitioner’s contention that grid points and NUGs are different, based on the following statement:

The specification of the ’104 Patent, sibling to the ’753 Patent, does provide a clear indication of the meaning of “grid point”—or a Non-uniform grid point (“NUG”): “NUGs represent an area of collected calibration data.”

PO Sur-reply 9 (quoting Ex. 1020, 19 (citation omitted)). Patent Owner also contends that “[e]ither the district court construction of ‘grid point’ the Petition purportedly adopted is correct where NUGs and grid points are the same, or the district court construction is incorrect and ‘NUGs’ and ‘grid points’ needs to be reconstrued separately across each patent.” *Id.* at 11.

Patent Owner also contends that its construction is consistent with the district court’s construction because the district court was directed to resolve a different issue and Patent Owner’s construction attempts to clarify any potential ambiguity in the district court’s construction. PO Sur-reply 6, 8. Specifically, Patent Owner contends that the issue faced before the district court was whether a “grid point” is an area or location, or a point, while here the issue is how the claimed “grid points” are different than the claimed “calibration points.” *Id.* at 6. Thus, Patent Owner contends, the district court’s statement is directed only to answering whether a grid point is an area or location, or point, and not what must be done to arrive at a grid point. *Id.* at 7.

Patent Owner further contends that its proposed construction does not read out embodiments as the ’753 Specification refers to grid points as non-uniform grid points. PO Sur-reply 12. In particular, Patent Owner notes that

'753 patent Specification discloses that “[t]he grid points may be nonuniformly spaced throughout the geographic region and hence may be referred to as non-uniform grid points (‘NUGs’).” *Id.* (quoting Ex. 1001, 9:40–43).

We agree with Petitioner that Patent Owner’s proposed additional requirements of determining the boundaries of the area from an evaluation of calibration data should not be imported into the construction of “grid point.” *See* Pet. Reply 1, 5. The construction of “grid point” we adopt is supported by the disclosures of the '753 patent. Patent Owner’s support and arguments for its proposed construction rely, in large part, on specific example methods of generating non-uniform grid points (NUGs). *See* PO Resp. 27–32. We agree with Petitioner, however, that the intrinsic record supports that the term “grid point” encompasses both uniform and non-uniform grid points. *See* Pet. 8–13. The '753 patent Specification identifies “grid points” as “NUGs or UGs” and further indicates that a “NUG” is a type of a grid point. Ex. 1001, 25:31–34, 26:32–35, 13:7–8 (“a grid point, such as a NUG”). Accordingly, the claims and Specification disclose embodiments where grid points are not limited to non-uniform grid points, and they may be uniform grid points.⁹ Patent Owner’s proposed construction would impermissibly read out embodiments of the '753 patent that use uniform grid points rather than non-uniform grid points.

The Specification also discloses that grid points may have calibration data assigned to them. More specifically, the '753 patent discloses that there

⁹ We note also that the '379 provisional application distinguishes between “NUG – Non-Uniform Grid Point” and “UG-Uniform Grid Point.” *See* Ex. 2029, 5.

may be a “fixed uniform grid” over a region with “fixed grid points,” where “calibration point data” is assigned to “fixed grid points,” and a “NUG generator” may use this “fixed uniform grid”:

A NUG generator or a method to produce NUGs may begin the NUG generation operation using, for example, one [or] more of the following: (a) *a fixed uniform grid (“UG”) defined over the region R with the calibration point data being assigned to the fixed grid points by some rule* (e.g., allocated by closest fixed grid point, a centroid of a set of fixed grid points, etc.); (b) random grid points to define the start of each NUG; (c) combinations of (a) and (b) depending on the characteristics of the calibration data; or (d) some other useful method.

Ex. 1001, 10:29–38 (emphasis added); *see also* Ex. 1001, 51:31–36 (“[A]ny one or plural grid points may be located on a predetermined fixed uniform grid defined over the geographic region or randomly located within the geographic region.”).¹⁰ Thus, grid points may be “fixed” prior to calibration data being “assigned to the fixed grid points by some rule.” Ex. 1001, 10:29–38. Further, the ’753 patent disclosures support that a “fixed grid point” is associated with calibration data, which is consistent with Petitioner’s and the district court’s interpretation of the term “grid point.” Ex. 1001, 10:29–38. Additionally, the ’753 patent discloses that the uniform grid point “may serve as the root of a first NUG.” Ex. 1001, 10:39–43. Therefore, there is no requirements that the grid points used for location estimation are based on NUGs. And notably, under the ’753 patent’s disclosures cited above, there is no requirement that a grid point be a point

¹⁰ Claim 4, which depends from claim 1, also recites that the “grid point[] is located on a predetermined fixed grid.” Ex. 1001, 59:38–39.

associated with calibration data for an area whose boundaries are determined from evaluation of the calibration data, as Patent Owner argues.

Turning to Patent Owner's other specific 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 have to be generated after the calibration data is gathered and analyzed. *See* PO Resp. 32–35. This contention is not correct because it is 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.”); *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.”).

Similarly unpersuasive is 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. *See* PO Resp. 30. 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. *See id.* at 5–39. Describing evaluation as being “of great importance” is an insufficient basis to import a requirement for evaluation; particularly when it only applies to one

embodiment in the provisional application, much less the embodiments discussed above in the '753 patent disclosures. *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.”). Further, Patent Owner’s contention is unpersuasive because, as discussed above, the '753 patent does not disclose that uniform grid points are generated from calibration data—instead, for instance, grid points may be “fixed” prior to calibration data being “assigned to the fixed grid points by some rule.” Ex. 1001, 10:29–38.

Additionally, we disagree with Patent Owner’s argument that the '753 patent disclosure of gathering and analyzing calibration data demonstrates what must be done to arrive at a grid point or set of grid points based on the district court’s use of the phrase “representative calibration data for an area” in its construction. PO Sur-reply 6, 8. As discussed in the Institution Decision (Dec. 6), Patent Owner mischaracterizes the district court’s claim construction order. Instead of concluding that a “grid point” must be generated based on analysis of calibration data, the district court was providing explanation in its discussion of why it declined to adopt Patent Owner’s proposed construction. Ex. 1020, 19. That is, after noting that Patent Owner cited language from the '753 patent in support of its proposed claim construction, the district court stated, “[b]ut the [cited] language is drawn . . . 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.* Accordingly, the district court was providing explanation of why the cited language was not pertinent to the meaning of “grid point,” rather than indicating that grid points must be

generated based on the measured calibration data. The district court instead determined that the claim term “grid point” should be construed as “a point associated with representative calibration data for an area.” *Id.* at 20. Patent Owner’s argument is an attempt to introduce additional requirements that are not part of the claim construction. For these reasons, we do not find Patent Owner’s argument on this point persuasive.

Additionally, we disagree with Patent Owner’s assertion that the district court’s order rejected Petitioner’s contention that grid points and NUGs are different. PO Sur-reply 9; Ex. 1020, 19 (“The specification of the ’104 Patent . . . does provide a clear indication of the meaning of “grid point”—or a Non-uniform grid point (‘NUG’)”). We agree with Petitioner that the district court’s statement is imprecise. *See* Tr. 33:20–34:8, 34:18–35:13. While this statement can be read to mean that a NUG may be a “grid point,” as discussed above, there is ample support also demonstrating that the term “grid point” may also encompass uniform grid points. *See e.g.*, Ex. 1001, 25:31–34, 26:32–35, 10:29–38, 51:31–36. Accordingly, we take the district court’s statement to be consistent with an interpretation, as discussed above, where a “grid point” may be a uniform or non-uniform grid point.

We also find unpersuasive Patent Owner’s contentions that a “predetermined fixed uniform grid” is distinct from “grid points” and that a single generated grid point may be anchored to a point on the uniform grid while the other generated non-uniformed grid points are not. PO Resp. 16 (citing, *inter alia*, Ex. 1001, 10:29–43). Again, as discussed above, the ’753 patent discloses that grid points can be uniform or nonuniform (*id.* at 25:31–34, 26:32–35) and further, that “*one or plural grid points* may be located on a predetermined uniform grid” (*id.* at 51:31–36 (emphasis added)). Thus,

the '753 patent discloses embodiments that include both uniform and non-uniform grid points where the uniform grid points may be located on a predetermined uniform grid. In light of this, we decline to limit claim interpretation to the embodiment that Patent Owner advocates.

Accordingly, in view of the above and based on the full record, the evidence of record provides support that the term “grid point” is construed to be “a point associated with representative calibration data for an area.”

We determine that we need not construe any other claim terms. *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)).

D. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective indicia of nonobviousness.¹¹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

¹¹ No evidence of objective indicia of nonobviousness has been presented in the record. *See generally* Pet.; PO Resp.

D. Obviousness of Claims 1, 7, 9, 32, 38, and 40 over Bhattacharya and Yost

Petitioner contends that claims 1, 7, 9, 32, 38, and 40 would have been obvious over the combination of Bhattacharya and Yost. Pet. 9–54. To support its contentions, Petitioner provides explanations as to how the combination of the prior art discloses each claim limitation and provides a motivation to combine the references. *Id.* Petitioner also relies upon the Sundaresan Declaration (Ex. 1003) and Supplemental Sundaresan Declaration (Ex. 1027) to support its positions.

Patent Owner contends that Bhattacharya and Yost fail to teach certain limitations of the claims. PO Resp. 36–47; PO Sur-reply 2–5, 20–22. Patent Owner relies upon the Sturza Declaration (Ex. 2018) to support its positions.

We begin our discussion with brief summaries of Bhattacharya and Yost, and then address the evidence and arguments presented.

1. Bhattacharya (Ex. 1004)

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. 1004, code (54). Figure 2, reproduced below, is an illustrative embodiment of Bhattacharya’s system. *Id.* ¶ 28.

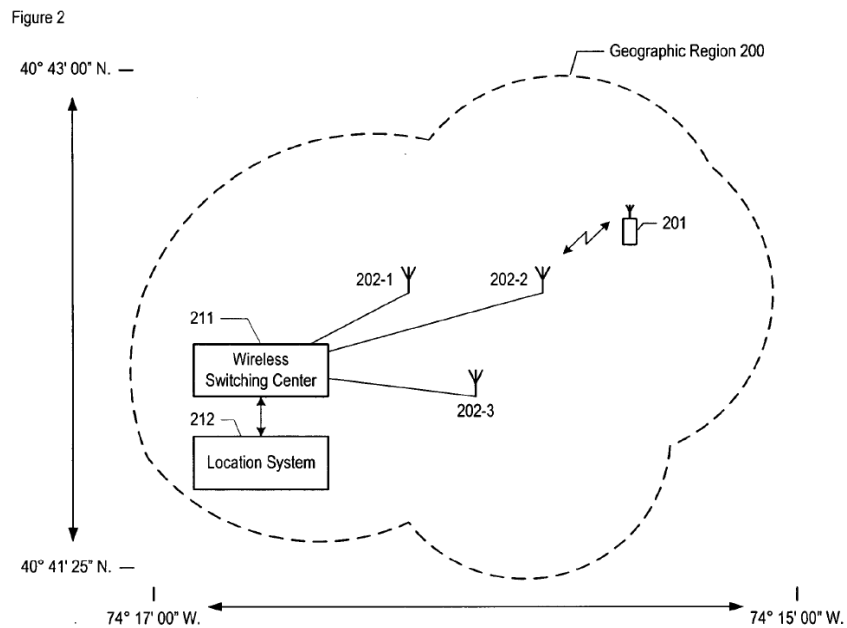


Figure 2, above, depicts a map and shows wireless switching center 211, location system 212, base stations 202-1, 202-2, and 202-3, and wireless terminal 201. Ex. 1004 ¶ 51. Location system 212 is a “data processing system that is capable of estimating the location of wireless terminal 201” that involves receiving reports that “contain 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

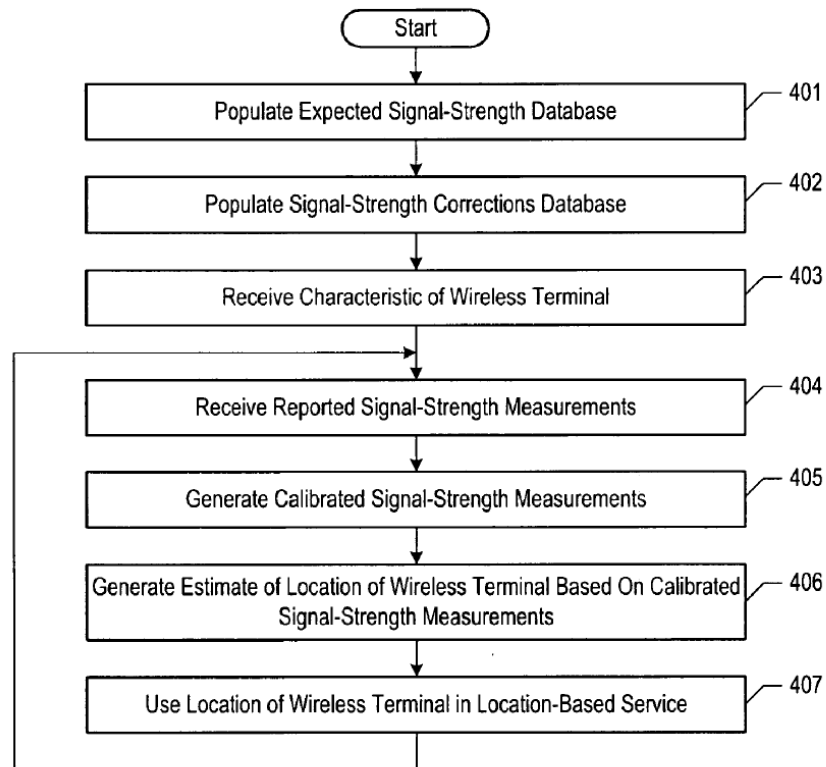


Figure 4, above, depicts the steps performed for estimating the location of wireless terminal 201 by populating an Estimated Signal-Strength Database and Signal-Strength Database; receiving the characteristic of wireless terminal 201; receiving the reported signal-strength of wireless terminal 201; generating 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. Ex. 1004 ¶¶ 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. 1004 ¶¶ 105–106.

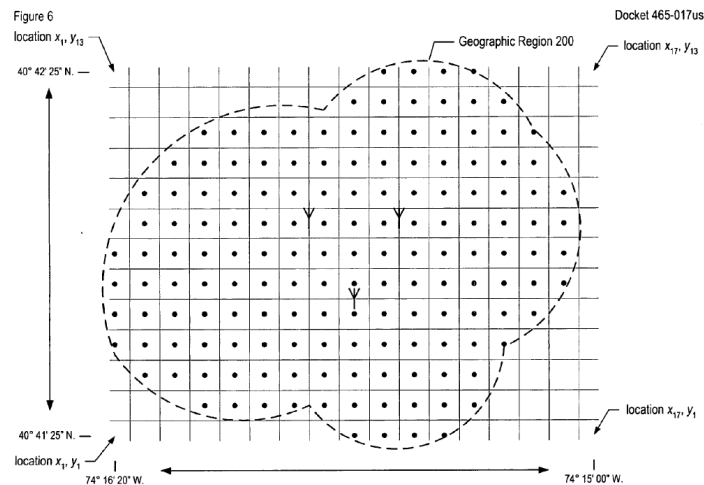


Figure 6, above, depicts a map of how geographic region 200 is partitioned. Ex. 1004 ¶ 30. As depicted in Figure 6, “the center of each square represents a location.” *Id.* ¶ 106. In the system, “expected signal strength functions $E(1,x,y,t)$, $E(2,x,y,t)$, $E(3,x,y,t)$ ” are generated based on a combination 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 alter” 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. Yost (Ex. 1008)

Yost is directed to a method for locating the concentration of mobile radio traffic in a coverage area. Ex. 1008, code (57). In Yost, signal strength measurements are made at test sites within the coverage area and compared with signal strength measurements taken from operating mobile radios. *Id.* There are three phases to the location estimation method: “a

calibration phase, a capture phase and a data analysis phase.” *Id.* at 6:36–40. During the calibration phase, the network manager obtains calibration data for all mobile radio frequencies within the coverage area 50. *Id.* at 6:40–42. During the capture phase, signal strength measurements are made from all mobile radios within the coverage area 50. *Id.* at 6:42–44. In the data analysis phase, there is a comparison of captured data from the mobile radios with the calibration data. *Id.* at 6:45–47. Yost’s method includes determining whether conditions have changed which would require obtaining a new set of calibration data. *Id.* at 7:22–27. The calibration data containing the measured and recorded signal strength measurements are averaged and a standard set of signal strength measurements is determined, “which would apply across the coverage area of interest.” *Id.* at 7:28–33.

3. Discussion

a. Claim 1

Below we consider the claim 1 limitations in turn.

i. Preamble [1pre]

The preamble recites: “[a] method of determining the location of a mobile device in a geographic region comprising the steps of[.]” Petitioner asserts that Bhattacharya discloses “a technique for estimating the location of a wireless terminal.” Pet. 31 (citing Ex. 1004 ¶ 1). Petitioner contends that Bhattacharya’s technique “enables the estimation of the location of a wireless terminal without the addition of hardware to either the wireless terminal or to the telecommunication system’s base stations.” *Id.* (citing Ex. 1004 ¶ 13).

Patent Owner presents no arguments specifically related to the preamble. *See generally* PO Resp. 36–47; PO Sur-reply 2–5, 20–22.

We have reviewed Petitioner’s arguments and evidence on the teaching of the preamble. On this complete record, we agree with Petitioner that Bhattacharya teaches the preamble of claim 1.¹²

ii. Limitation [1a]

Limitation [1a] recites: “providing calibration data for each of one or more calibration points in a geographic region, said calibration data having one or more characterizing parameters.” Petitioner asserts that Bhattacharya and Yost teach this limitation. Pet. 32–35. Petitioner contends that Bhattacharya describes an embodiment where “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.” *Id.* at 32 (citing Ex. 1004 ¶ 14). Petitioner asserts that the referenced database is Bhattacharya’s Expected Signal-Strength Database that “is populated with the expected signal strengths of three signals at each location in geographic region.” *Id.* at 33 (citing Ex. 1004 ¶ 85). Petitioner contends that in Bhattacharya the expected signal strength at each location is generated by taking empirical measurements at various locations, and that Bhattacharya’s empirical measurements taken at various locations and used to generate the expected signal strength at each location is the claimed calibration data for calibration points in a geographic area. *Id.* at 33–34 (citing Ex. 1003 ¶ 74; Ex. 1004 ¶¶ 119–123). Petitioner also refers to Yost as describing a known method of collecting empirical measurements, described by Bhattacharya, that includes transporting testing devices around

¹² We need not determine whether the preamble of claim 1 is limiting because Petitioner has shown that the prior art teaches the preamble.

a geographic area and measuring the signal strength for each. *Id.* at 34 (citing Ex. 1008, 5:12–27, 5:50–60, 7:6–21).

Petitioner asserts that Bhattacharya describes that the empirical measurements may include signal strength measurements at a location. Pet. 34 (citing Ex. 1004 ¶¶ 115–117). Petitioner contends that the signal strength measurement is the claimed characterizing parameter. *Id.* Petitioner also refers to the location where the measurement is taken and the time of the measurement as characterizing parameters. *Id.* at 34–35 (citing Ex. 1004 ¶¶ 115–117).

Patent Owner presents no arguments specifically related to this limitation. *See generally* PO Resp. 36–27; PO Sur-reply 2–5, 20–22.

We have reviewed Petitioner’s arguments and evidence on the teaching of this limitation. On this complete record, we agree with Petitioner that Bhattacharya teaches limitation [1a].

iii. Limitation [1b]

Limitation [1b] recites: “generating one or more sets of grid points for said calibration data.” Petitioner asserts that Bhattacharya and Yost teach this limitation. Pet. 35–38. Petitioner refers to Bhattacharya’s disclosure of empirical data that is used to generate the expected signal-strength functions, as well as its description of a rectangular grid of squares with the center of each square representing a location. *Id.* at 35 (citing Ex. 1004 ¶¶ 106, 115–117). More specifically, Petitioner asserts that “Bhattacharya describes that ‘rectangular grid of X by Y tessellated squares is overlaid onto geographic region 200 (see FIG. 6) and the center of each square represents a location,’” which is consistent with the manner that the ’753 patent describes the generation of grid points. *Id.* (citing Ex. 1003 ¶ 76; Ex. 1004 ¶ 106).

Petitioner asserts Bhattacharya describes associating expected signal-strength functions with each of the grid points and that “once the expected signal-strength functions have been associated with them, the point at the center of each of these grid squares is a ‘grid point.’” *Id.* at 35–36 (citing Ex. 1003 ¶ 77; Ex. 1004 ¶¶ 106–117, 120¹³). Petitioner contends that “[t]he collection of all the generated expected signal-strength functions for each of the grid points makes up the ‘Expected Signal-Strength Database.’” *Id.* at 36 (citing Ex. 1003 ¶ 77; Ex. 1004 ¶¶ 78, 85–86, 105). Petitioner also relies upon Bhattacharya’s description that “the expected signal strength at each location is generated by taking empirical measurements at various locations and by interpolating for the locations in between the sampled locations.” Ex. 1004 ¶ 119; *see also* Pet. 36.

Petitioner refers to Yost as describing a method “of generating expected signal strength for a geographic point [that] would have been to collect multiple empirical measurements within the grid square surrounding the geographic point and average the multiple empirical measurements.” Pet. 37 (citing Pet. 26–30 (Sections V.A.2–3); Ex. 1008, 7:28–44; Ex. 1003 ¶ 79). Dr. Sundaresan further refers to Yost’s descriptions that “the calibration data containing the measured and recorded signal strength measurements are averaged within each of a plurality of small areas (step 82) and a standard set of signal strength measurements is determined (step 84), which would apply across the coverage area of interest” and “[t]he calibration signal strengths measure an average over small areas of a pre-determined size.” Ex. 1003 ¶ 79 (citing Ex. 1008, 7:28–33, 7:50–51). Dr.

¹³ Petitioner refers to paragraph 123 of Exhibit 1004, but the cited quotation appears in paragraph 120.

Sundaresan testifies that a person of ordinary skill in the art would have found that Yost’s small areas of predetermined size are similar to the grids and grid points in Bhattacharya. *Id.* Dr. Sundaresan additionally testifies that, by averaging the multiple empirical measurements in a grid square, some of the effects of fast fading could be removed. *Id.* ¶ 80 (citing Ex. 1008, 7:50–56). Dr. Sundaresan testifies that a person of ordinary skill in the art would have found it obvious that expected signal-strength functions for a given grid point “may represent an average of calibration data from multiple locations within the grid square, and not simply represent the storage of the calibration data itself.” *Id.*

Patent Owner asserts that neither Bhattacharya nor Yost discloses or teaches limitation [1b]. PO Resp. 36–47; PO Sur-reply 2–5, 20–22. Patent Owner argues that neither Bhattacharya nor Yost teach “grid points” under the proper construction of the term. *See* PO Resp. 36–47. Patent Owner asserts that, as confirmed by the district court’s *Markman* order, that “the claimed grid points are generated for ‘representative calibration data’” and “[t]his necessarily requires the grid points to be generated based on an analysis of the calibration data.” *Id.* at 37. Patent Owner asserts that “the district court’s requirement that the claimed grid points be associated with ‘representative calibration data’ necessarily encompasses the requirement to generate the grid points based on analysis of the calibration data.” *Id.* at 37–38. Patent Owner alleges that the district court confirmed this understanding by stating that “representative calibration data” in its construction “reflect[s] 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 38

(citing Ex. 2012, 20). Patent Owner contends that Petitioner offers no explanation for how calibration data could be defined and associated with the grid point without an analysis of the calibration data. *Id.* at 37. Patent Owner contends that “although the district court’s adopted construction (which Petitioner has proposed here) does not expressly use the words ‘analyzing calibration data,’ such analysis is necessarily required by its construction.” *Id.* at 38.

Patent Owner also asserts that the claim language of the ’753 patent requires analysis of the calibration data because “[c]laim 1 recites ‘generating one or more sets of grid points for said calibration data’—that is, the grid points are generated ‘for said calibration data’—i.e., the calibration data collected in the preceding step.” PO Resp. 38. Patent Owner asserts that the ’753 patent disclosures supports its interpretation. *Id.* at 39 (citing Ex. 1001, 2:31–35).

Patent Owner additionally asserts that Bhattacharya “describes a fundamentally different approach than what is claimed in the ’753 Patent.” PO Resp. 39. Patent Owner argues that Petitioner relies on Bhattacharya’s disclosures related to the population of an “Expected Signal-Strength Database” where a grid of squares in overlain onto a geographic area. *Id.* (citing Pet. 35–38, 51–52). Patent Owner contends that the limitation of generating grid points “for said calibration data” “requires more than determining a location or point independent of any calibration data” because “the district court’s construction of ‘grid point’ [] inherently requires determining the grid points from analysis of the collected calibration data.” *Id.* at 39–40. Patent Owner argues that Bhattacharya only discloses overlaying onto a region a predefined grid of squares that is independent of

any calibration data so the grid of squares is not generated “for said calibration data.” *Id.* at 40. Patent Owner contends that Bhattacharya’s grid overlay is done considering resolution, computational burden and error tolerance, so Bhattacharya teaches away from “defining a grid based on the collected calibration data,” as the claim requires. *Id.* at 41–42 (citing Ex. 2018 ¶¶ 102–103). Patent Owner also asserts that Bhattacharya emphasizes the predefined nature of the overlaid grid “without any reference to that overlaying being based on calibration data with similar values.” *Id.* at 42 (citing Ex. 2018 ¶ 111; Ex. 2012, 20). Patent Owner additionally refers to Figure 5 of Bhattacharya, which is alleged to show that the partitioning of the geographic region occurs before the expected signal-strength is generated, so Patent Owner argues “that the overlaid grid of Bhattacharya is not based on an analysis of calibration data.” *Id.* at 43 (citing Ex. 2018 ¶¶ 105–106).

Patent Owner contends that Yost does not remedy the deficiencies of Bhattacharya because the Petition only points to Yost’s collection of empirical data, wherein a person of ordinary skill in the art would have known to average data, and this does not change that Bhattacharya’s overlaid grid is predefined. PO Resp. 45 (citing Pet. 37–38). Patent Owner also asserts that “Petitioner does not explain how Bhattacharya or Yost teaches anything about ‘representative calibration data.’” *Id.* at 46 (citing Ex. 2018 ¶ 110). Patent Owner contends that Petitioner does not point to anything in the prior art that teaches evaluation of statistical similarity, or other commonality, in the calibration data. *Id.* at 46–47 (citing Ex. 2018 ¶ 111).

In its Sur-reply, Patent Owner argues that Petitioner fails to address “how Bhattacharya’s interpolation results in calibration data that is ‘representative’ for an area as required under the district court construction.” PO Sur-reply 20–21. Patent Owner contends that “Bhattacharya’s interpolation is just an estimated signal strength assigned to a pre-defined grid of squares” and “[i]t does not necessarily represent the actual signal strength in the square” because “the interpolated value may be entirely different than the actual (i.e., measured) signal strength” and the actual signal strengths “may also vary significantly depending on which location in the region is measured.” *Id.* at 20–21 (citing Ex. 1004 ¶¶ 106, 107, 119). Patent Owner refers to Petitioner’s arguments and asserts that “Yost is just providing average values of multiple empirical measurements over areas of pre-determined, uniform size” and that “[a]verages are not necessarily representative of the individual calibration data.” *Id.* at 21–22 (citing Pet. Reply 16; Ex. 1008, 7:28–30, 7:50–51).

The evidence supports that Petitioner has sufficiently demonstrated that Bhattacharya and Yost teach limitation [1b]. Bhattacharya discloses that empirical measurement of signal strengths are used to generate “expected signal-strength functions $E(1,x,y,t)$, $E(2,x,y,t)$, and $E(3,x,y,t)$,” with a grid overlaid onto a geographic region where the center of each square represents a location. Ex. 1004 ¶¶ 106, 115–117; *see also* Pet. 35. Petitioner asserts, and we agree, that Bhattacharya discloses associating the expected signal-strength function with locations in a region, and that data is stored in the “Expected Signal-Strength Database.” Pet. 35–36 (citing Ex. 1004 ¶ 85). We also agree that this association of location (point) with

calibration data (signal strength) is sufficient for the teaching of a “grid point,” which is disclosed by Bhattacharya. Pet. 35–36; Ex. 1004 ¶¶ 85, 105–117, 120, 123; Ex. 1003 ¶ 77; Pet. Reply 14–15; Ex. 1027 ¶¶ 44–45. We also agree that Bhattacharya teaches the generation of “grid points” by, at least, populating the Expected Signal-Strength Database with locations and expected signal strength data, which includes interpolating the locations between sampled locations. Ex. 1004 ¶¶ 85, 119, 120, 123; Ex. 1003 ¶¶ 77–78; Ex. 1027 ¶ 45; *see also* Pet. 35–36; Pet. Reply 15–16.

Petitioner further asserts, and we agree, that Yost teaches collecting empirical measurements within the grid square surrounding the geographic point and averaging these measurements. Pet. 37 (citing Sections V.2–3; Ex. 1008, 7:28–44; Ex. 1003 ¶ 79). Further, because it is supported by the teachings of Bhattacharya and Yost, we credit Dr. Sundaresan’s testimony that a person of ordinary skill in the art would have found that Yost’s small areas of predetermined size are similar to the grids and grid points in Bhattacharya. Ex. 1003 ¶ 79; Ex. 1008, 7:50–51; Ex. 1004 ¶ 106, Fig. 6. Yost discloses that by averaging the empirical signal strengths the effects of fast fading can be removed (Ex. 1008, 7:50–56), so we also credit Dr. Sundaresan’s testimony in this regard on the advantages of averaging the multiple empirical measurements in a grid square (Ex. 1003 ¶ 80). Petitioner further asserts, and we agree, that a person of ordinary skill in the art would have found it obvious that expected signal-strength functions of $\{E(1,x,y,t), E(2,x,y,t), \text{ and } E(3,x,y,t)\}$ for a given grid point of Bhattacharya “may represent an average of calibration data from multiple locations within the grid square, and not simply represent the storage of the calibration data itself” in view of Yost because Petitioner’s assertion is supported by the

evidence. Pet. 37–38 (citing Ex. 1008, 7:50–56; Ex. 1003 ¶ 80).

Accordingly, we agree with Petitioner that the combination of Bhattacharya and Yost teaches that the average of the calibration data is “representative calibration data for an area.” See Pet. 37–38; Ex. 1003 ¶¶ 79–80; Pet. Reply 16; Ex. 1027 ¶ 46.

Thus, we agree with Petitioner that the evidence of record supports that Bhattacharya and Yost teach generating sets of grid points for the calibration data, where the grid points are points associated with representative calibration data for an area.

We do not find that Patent Owner’s assertions, listed above, undermine Petitioner’s adequate showing. The majority of Patent Owner’s assertions are based on its proposed construction of “grid point,” which we have not adopted as discussed *supra* Section II.B. Patent Owner presents an additional argument, which is also directed to claim construction, that the claim language of the ’753 patent requires analysis of the calibration data because limitation [1b] requires that the grid points be “generated ‘for said calibration data’—i.e., the calibration data collected in the preceding step.” PO Resp. 38. We do not find this argument persuasive. As discussed *supra* Section II.B, we have determined that the interpretation of “grid points” in limitation [1b] does not require that the grid points be determined by an analysis of the calibration data—and, more specifically, limitation [1a] requires only that calibration data be “provided” for “calibration points in a geographic region,” and limitation [1b] requires only that the grid points be “for the calibration data,” that is, that they be associated with the calibration data.

Patent Owner also argues that Bhattacharya “describes a fundamentally different approach than what is claimed in the ’753 Patent,” with Patent Owner contrasting some Bhattacharya’s teachings on its grid with alleged requirements of limitation [1b]. PO Resp. 39–43. Patent Owner’s argument attempts to embed requirements that a grid has to be “based on calibration data” or “inherently requires determining the grid points from analysis of the collected calibration data,” that we have not adopted in claim construction. *See id.* Similarly, we do not find that “Bhattacharya teaches away from ‘defining a grid based on the collected calibration data,’ as the claim requires,” because the claim does not require that the grid be “based on” calibration data. *See id.* at 41–42.

Finally, Patent Owner asserts that Petitioner does not explain “how Bhattacharya’s interpolation results in calibration data that is representative for an area as required under the district court construction.” PO Sur-reply 20–21. We do not find this argument to be persuasive because Petitioner relies on Bhattacharya in view of Yost for the teaching of this limitation. We also do not find persuasive Patent Owner’s arguments that Yost’s teaching of average values empirical is not sufficient because, as Patent Owner argues, “[a]verages are not necessarily representative of the individual calibration data.” *Id.* at 21–22. Dr. Sundaresan’s testimony, which we credit, is that averaging data would produce “representative” calibration data (Ex. 1003 ¶ 80; Ex. 1027 ¶ 46) and this is consistent with the district court’s determination, with which we agree, that data points that are statistically similar are “representative” (*see* Ex. 1020, 20) as well as Yost’s disclosure that averaged values “apply across the coverage area of interest.” (Ex. 1008, 7:28–33).

On this complete record, we agree with Petitioner that Bhattacharya and Yost teach limitation [1b].

iv. Limitation [1c]

Limitation [1c] recites: “receiving at least one network measurement report from a mobile device at an unknown location in said geographic region.” Petitioner argues that Bhattacharya discloses the “process of estimating the location of wireless terminal 201” which includes “receiving the reported signal-strength measurements from wireless terminal 201.” Pet. 38 (citing Ex. 1004 ¶¶ 77–81). Petitioner asserts that “[b]ecause the received signal-strength measurements are being used to estimate the location of wireless terminal 201,” a person of ordinary skill in the art would have understood that the wireless terminal is at an unknown location in the geographic region. *Id.* (citing Ex. 1003 ¶ 81; Ex. 1004 ¶¶ 58–60). Petitioner also relies on Bhattacharya’s disclosure that at “task 404, location system 212 periodically receives a Signal-Strength Measurement Report from wireless terminal 201 at discrete relative time *n*, wherein *n* is a non-negative integer.” *Id.* (citing Ex. 1004 ¶ 91).

Patent Owner presents no arguments specifically related to this limitation. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s arguments and evidence on the teaching of this limitation. On this complete record, we agree with Petitioner that Bhattacharya teaches limitation [1c].

v. Limitation [1d]

Limitation [1d] recites: “evaluating said at least one network measurement report with each of said sets of grid points as a function of select ones of said characterizing parameters.” Petitioner asserts that in

Bhattacharya the location system calibrates the reported signal-strength measurements based on the “calibration function for the make and model of wireless terminal 201,” to compensate for the signal strength measurement errors made by the wireless terminal, which is an evaluation of a network measurement report. Pet. 40–41 (citing Ex. 1003 ¶ 85; Ex. 1004 ¶¶ 97, 168–169). Petitioner contends that Bhattacharya discloses that its search area reduction, which “reduce[s] the number of candidate locations that must be processed,” serves to teach the evaluation of the network measurement report for grid points for select characterizing parameters, that is, signal strength values. *Id.* at 41–43 (citing Ex. 1003 ¶¶ 86–88; Ex. 1004 ¶¶ 171–178).

Patent Owner presents no arguments specifically related to this limitation. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s arguments and evidence on the teaching of this limitation. On this complete record, we agree with Petitioner that Bhattacharya teaches limitation [1d].

vi. Limitation [1e]

Limitation [1e] recites: “selecting a set of grid points as a function of a predetermined criteria.” Petitioner asserts that Bhattacharya teaches that when it uses its search area reduction it “excludes a candidate location only when the calibrated signal-strength measurements have been substantially different from the expected signal strengths at that location.” Pet. 44 (citing Ex. 1004 ¶ 174). Petitioner asserts that, as part of subtask 1703, where the processor generates expected signal-strength differentials, it does so “for all of the candidate locations not excluded in subtask 1701.” *Id.* at 45 (citing

Ex. 1004 ¶ 188). As such, Petitioner asserts that Bhattacharya teaches the selection of grid points as a function of predetermined criteria. *Id.*

Patent Owner presents no arguments specifically related to this limitation. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s arguments and evidence on the teaching of this limitation. On this complete record, we agree with Petitioner that Bhattacharya teaches limitation [1e].

vii. Limitation [1f]

Limitation [1f] recites: “determining the location of a mobile device in said geographic region as a function of said selected set of grid points.” Petitioner asserts that in Bhattacharya, “once processor 301 reduces the number of candidate locations in subtask 1701, it begins the subtasks related to generating the probability that the received signals are associated with each of the remaining candidate locations within the geographic area.” Pet. 45 (citing Ex. 1003 ¶ 92; Ex. 1004 ¶¶ 179–207). Petitioner relies on the assertion that in Bhattacharya, as part of the processes, the processor converts the received calibrated signal tuple S and the expected signal tuples E for each of the candidate locations into a set of differentials that are comparisons of adjust signals within each tuple. *Id.* at 46 (citing Ex. 1003 ¶ 93; Ex. 1004 ¶¶ 21–23). Petitioner contends that there is a comparison of the differentials at each location to determine the probability of whether the wireless terminal is at the remaining candidate locations. *Id.* at 47 (citing Ex. 1003 ¶ 94; Ex. 1004 ¶¶ 190–193).

Patent Owner presents no arguments specifically related to this limitation. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s arguments and evidence on the teaching of this limitation. On this complete record, we agree with Petitioner that Bhattacharya teaches limitation [1f].

viii. Conclusion

Weighing the record as a whole in view of the findings and analysis above, we conclude that Petitioner has met its burden to show, by a preponderance of the evidence, that claim 1 would have been obvious over Bhattacharya and Yost.

b. Claim 32

Claim 32 is a system claim that recites similar limitations to the limitations of method claim 1. Petitioner relies on similar evidence and argument to that presented for claim 1 in support of the Bhattacharya and Yost teachings of the claim 32 limitations. Pet. 50–53.

Patent Owner presents no additional arguments specifically directed to claim 32 that we have not already addressed. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s showing for this claim on the complete record and find that Petitioner has met its burden to show, by a preponderance of the evidence, that independent claim 32 would have been obvious over Bhattacharya and Yost.

c. Dependent Claims 7 and 38

Claim 7 recites: “[t]he method of claim 1 wherein said calibration data comprises information from a network measurement report.” Ex. 1001, 59:45–46. Petitioner asserts that Bhattacharya discloses that the “expected signal-strength functions $E(1,x,y,t)$, $E(2,x,y,t)$, and $E(3,x,y,t)$ are generated based on a combination of: (i) a plurality of theoretical radio-frequency

propagation models, and (ii) a plurality of empirical signal-strength measurements.” Pet. 47 (quoting Ex. 1004 ¶¶ 115–117 (emphasis omitted)). Petitioner asserts that it was known to a person of ordinary skill in the art that a method of collected empirical data described in Bhattacharya would have been to transport testing devices “and measure the signal strength for each of the three signals received from the three base stations (202-1, 202-2, and 202-3) and the geographic location of the testing device (e.g., using a GPS receiver connected to the testing device) in order to determine the (x,y) associated with each of the three signals.” *Id.* at 48 (citing Ex. 1008, 5:12–27, 5:50–60, 7:6–21; Ex. 1003 ¶ 96). Petitioner asserts that a person of ordinary skill in the art “would have recognized or at least found it obvious that the empirical measurements taken by the testing device would have also been in the form of a Signal-Strength Measurement Report (i.e., Network Measurement Report).” *Id.* (citing Ex. 1003 ¶ 97).

Claim 38 recites a limitation similar to claim 7. Ex. 1001, 64:15–16. In asserting the obviousness of claim 38, Petitioner relies upon similar evidence to its showing for claim 7. Pet. 54.

Patent Owner presents no additional arguments specifically directed to claims 7 and 38 that we have not already addressed. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s showing for these claims on the complete record and find that Petitioner has met its burden to show, by a preponderance of the evidence, that claim 7 and 38 would have been obvious over Bhattacharya and Yost.

c. Dependent Claims 9 and 40

Claim 9 recites:

The method of claim 1 wherein said characterizing parameter is selected from the group consisting of: signal strength for a signal transmitted by a transmitter having a known location as received by a receiver at said grid point; signal strength of a signal transmitted by a transmitter located at said grid point as received by a receiver at a known location; round trip time for a signal traveling between said grid point and a known location; timing advance of a signal received by said mobile device at said grid point; time difference of arrival of plural signals at said grid point with respect to a pair of known locations as measured by a receiver at said grid point or at said known locations; the identification of a serving cell or serving sector of said mobile device located at said grid point; a state of a wireless network serving said mobile device, and combinations thereof.

Ex. 1001, 59:51–65.

Petitioner asserts that Bhattacharya describes that the empirical measurements may include “signal strength measurements” at a given location. Pet. 49 (citing Ex. 1004 ¶¶ 115–117; Ex. 1003 ¶ 98). Petitioner further refers to disclosures in Bhattacharya that at least one characterizing parameter is the signal strength of overhead control channel broadcast signals received from each of the surrounding base stations, which teaches a “signal strength for a signal transmitted by a transmitter having a known location as received by a receiver at said grid point,” as claimed. *Id.* at 49–50 (citing Ex. 1004 ¶¶ 86, 115–117; Ex. 1003 ¶ 99).

Claim 40 recites a limitation similar to claim 9. Ex. 1001, 64:21–35. In asserting the obviousness of claim 9, Petitioner relies upon similar evidence to its showing for claim 9. Pet. 54.

Patent Owner presents no additional arguments specifically directed to claims 7 and 38 that we have not already addressed. *See generally* PO Resp.; PO Sur-reply.

We have reviewed Petitioner’s showing for these claims on the complete record and find that Petitioner has met its burden to show, by a preponderance of the evidence, that claim 9 and 40 would have been obvious over Bhattacharya and Yost.

III. CONCLUSION¹⁴

The outcome for the challenged claims of this Final Written Decision follows. In summary:

¹⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

Claim(s)	35 U.S.C. §	Reference(s) /Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 7, 9, 32, 38, 40	103(a)	Bhattacharya, Yost.	1, 7, 9, 32, 38, 40	
Overall Outcome			1, 7, 9, 32, 38, 40	

IV. ORDER

It is hereby:

ORDERED that claims 1, 7, 9, 32, 38, and 40 of the '753 patent are unpatentable; and

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.

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