

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LYFT, INC.,¹
Petitioner,

v.

AGIS SOFTWARE DEVELOPMENT LLC,
Patent Owner.

IPR2022-00514
Patent 10,299,100 B2

Before CHARLES J. BOUDREAU, DANIEL J. GALLIGAN, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

GALLIGAN, *Administrative Patent Judge*.

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

¹ IPR2022-00515 has been consolidated with the instant proceeding.

I. INTRODUCTION

In this *inter partes* review, Lyft, Inc. (“Petitioner”) challenges the patentability of claims 1–31 of U.S. Patent No. 10,299,100 B2 (Ex. 1001, “the ’100 patent”), which is assigned to AGIS Software Development LLC (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* review. For the reasons discussed below, we determine that Petitioner has proven by a preponderance of the evidence that claims 1–31 of the ’100 patent are unpatentable. *See* 35 U.S.C. § 316(e) (2018) (“In an *inter partes* review instituted under this chapter, the petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence.”).

A. Procedural History

Petitioner filed two petitions challenging claims of the ’100 patent as follows: IPR2022-00514, Paper 2 (“Pet.”) (challenging claims 24–31) and IPR2022-00515, Paper 2 (“515 Pet.”) (challenging claims 1–23). In each proceeding, Patent Owner filed a Preliminary Response. Paper 8 (in each proceeding). We instituted review in each case on all grounds presented, as set forth below.

IPR2022-00514:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
24–29	103(a)	Makoto, ² Konishi, ³ Paul, ⁴ Hamynen ⁵
30, 31	103(a)	Makoto, Konishi, Paul, Hamynen, Agrawal ⁶

Paper 11 (“Inst. Dec.”) at 5, 19.

IPR2022-00515:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–12, 16–19, 23	103(a)	Makoto, Konishi, Paul, Hamynen
13–15	103(a)	Makoto, Konishi, Paul, Hamynen, Agrawal
20–22	103(a)	Makoto, Konishi, Paul, Hamynen, Scaer ⁷

IPR2022-00515, Paper 11 at 4–5, 18.

After institution, we consolidated IPR2022-00515 with IPR2022-00514 and terminated IPR2022-00515. Paper 13.

During the trial, Patent Owner filed a Response (Paper 18, “PO Resp.”), Petitioner filed a Reply (Paper 19, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 23, “PO Sur-reply”).

² JP 2002-199433 A, published July 12, 2002 (Ex. 1005). Exhibit 1005 contains the Japanese language document and a translation to English.

³ JP 2002-352388 A, published Dec. 6, 2002 (Ex. 1008). Exhibit 1008 contains the Japanese language document and a translation to English.

⁴ US 6,356,838 B1, issued Mar. 12, 2002 (Ex. 1006).

⁵ US 2005/0228860 A1, published Oct. 13, 2005 (Ex. 1007).

⁶ US 2003/0142642 A1, published July 31, 2003 (Ex. 1009).

⁷ US 2004/0243299 A1, published Dec. 2, 2004 (Ex. 1010).

An oral hearing was held on March 2, 2023, a transcript of which appears in the record. Paper 26 (“Tr.”).

Petitioner relies on testimony from Sandeep Chatterjee, Ph.D. Exs. 1002 (Declaration), 1033 (Reply Declaration). Patent Owner relies on testimony from Loren Terveen, Ph.D. Ex. 2004. Patent Owner has entered in the record a transcript of the deposition of Dr. Chatterjee. Ex. 2005.

B. Real Parties in Interest

The parties identify themselves as the real parties in interest. Pet. 1; Paper 5 at 2.

C. Related Matters

As required by 37 C.F.R. § 42.8(b)(2), the parties identify various related matters. Pet. 1–2; Paper 5 at 2–7; Paper 7 at 1–2. We are concurrently issuing a final written decision in IPR2022-00513, involving related U.S. Patent 10,341,838 B2, which is a continuation of the ’100 patent.

D. The ’100 Patent and Illustrative Claim

The ’100 patent is generally directed to location-based communications among mobile devices. Ex. 1001, code (57), 1:37–1:54.

As noted above, Petitioner challenges all 31 claims of the ’100 patent. Claims 1 and 24 are independent, and claim 24 is reproduced below with Petitioner’s identifiers for the claim recitations in brackets.

24. [a] A system comprising a mobile device contained in a portable housing, the mobile device comprising:

[b] a touch screen display, non-transitory computer-readable media, and a central processing unit (CPU);

[c] a mobile device transmitter communicatively coupled to the CPU;

[d] a mobile device receiver communicatively coupled to the CPU;

[e] a global positioning system (GPS) receiver, communicatively coupled to the CPU, configured to obtain geographical coordinates corresponding to a geographical location of the mobile device;

[f] the CPU configured to execute instructions to perform operations comprising:

[g] associating the mobile device with an identifier, wherein the identifier corresponds to a network participant;

[h] determining, by the CPU, a device location corresponding to the geographical location of the mobile device based on the geographical coordinates obtained by the GPS receiver located within the mobile device;

[i] receiving, from a server, mapping data including a map and coordinate translation data correlating coordinates of positions on the map with corresponding coordinates of geographical locations;

[j] receiving, from a server, location data indicating vehicle locations of one or more vehicles;

[k] marking the map with a plurality of symbols comprising: a participant symbol corresponding to the device location, one or more facility symbols corresponding to respective facility locations of one or more facilities, and one or more vehicle symbols corresponding to respective vehicle locations of the one or more vehicles, wherein marking the map comprises:

[l] determining, based at least in part on the vehicle locations and the coordinate translation data, positions on the map corresponding to the vehicle locations,

[m] displaying the map on the display of the mobile device, and

[n] placing the vehicle symbols on the map at the determined positions corresponding to the vehicle locations;

[o] responsive to user selection of a portion of the display corresponding to a position on the map, identifying a selected facility symbol based on the selected position, comprising: initiating a search of a set of symbols including the facility symbols for a symbol located nearest to the selected position and, based on a result of the search, identifying the selected facility symbol as the symbol located nearest to the selected position;

[p] after receiving user input on the touch screen display, transmitting, by the mobile device transmitter, first information to a first vehicle of the one or more vehicles; and

[q] after transmitting the first information to the first vehicle, receiving, at the mobile device receiver, second information corresponding to the first vehicle and displaying the received second information on the touch screen display of the mobile device,

[r] wherein the mobile device does not have access to a phone number associated with a computing device corresponding to the first vehicle, an Internet Protocol (IP) address associated with the computing device corresponding to the first vehicle, and an e-mail address associated with the computing device corresponding to the first vehicle.

II. ANALYSIS

A. *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) any secondary considerations, if in evidence.⁸ *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966).

⁸ Patent Owner does not present any objective evidence of nonobviousness (i.e., secondary considerations) as to any of the challenged claims.

B. Level of Ordinary Skill in the Art

Citing the testimony of its declarant, Dr. Sandeep Chatterjee, Petitioner contends that a person of ordinary skill in the art “would have had at least a bachelor’s degree in computer science, software engineering, electrical engineering, or the equivalent and at least two years of experience in the relevant field, e.g., electronic communications systems.” Pet. 5–6 (citing Ex. 1002 ¶¶ 18–20); 515 Pet. 9–10. Petitioner further argues that “[m]ore education can substitute for practical experience and vice versa.” Pet. 6; 515 Pet. 10.

Patent Owner does not dispute this assessment or offer its own assessment. *See* PO Resp. In his declaration, Dr. Terveen testifies that “a person of ordinary skill in the art would have a bachelor’s degree in computer science or computer engineering with one to two years of experience in the field of computer programming for communications system, or the equivalent education and work experience.” Ex. 2004 ¶ 27.

We determine that the level of ordinary skill proposed by Dr. Terveen is not significantly different from that proposed by Petitioner and that Petitioner’s proposed level of ordinary skill is consistent with the ’100 patent and the asserted prior art. *See In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). We accept Petitioner’s assessment, except that we delete the qualifier “at least” to eliminate vagueness as to the amount of education and experience. The qualifier expands the range indefinitely without an upper bound, and thus precludes a meaningful indication of the level of ordinary skill in the art. We otherwise adopt Petitioner’s proposed level in deciding the patentability of the challenged claims.

C. Claim Construction

We interpret claim terms using “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b).

Neither party proposes express constructions for any claim term. *See* Pet.; 515 Pet.; PO Resp.

We do not need to construe expressly any claim terms to resolve the patentability issues before us. *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. Obviousness over Makoto, Konishi, Paul, and Hamynen (Claims 1–12, 16–19, 23–29)

Petitioner asserts that claims 1–12, 16–19, and 23–29 would have been obvious over the combined teachings of Makoto, Konishi, Paul, and Hamynen. Pet. 8–61; 515 Pet. 11–60. Patent Owner opposes. PO Resp. 1–31; PO Sur-reply 1–11.

1. Overview of the Prior Art

Makoto discloses “communication methods that can provide location information of other mobile terminal devices to a mobile terminal device without violating one’s privacy.” Ex. 1005, code (57). Additional pertinent details of Makoto and the other applied references are discussed below.

2. Claim 24

a) Preamble

Claim 24 is directed to a “system comprising a mobile device contained in a portable housing.” Petitioner argues that Makoto’s fourth

embodiment is a system having mobile devices, which a person of ordinary skill in the art would have understood are contained in a portable housing. Pet. 8–9 (citing Ex. 1005 ¶ 97, Fig. 16; Ex. 1002 ¶¶ 36–40, 201–202).⁹

Patent Owner does not dispute Petitioner’s contentions for the preamble. *See* PO Resp.

Petitioner’s contentions are persuasive. Makoto discloses communication system 301 in Figure 16 having mobile phone devices 304₁ and 304₂, which Makoto also refers to as “mobile communication devices 304₁ and 304₂.” Ex. 1005 ¶ 97, Fig. 16. We agree with Petitioner that each of mobile communication devices 304₁ and 304₂ would be contained in a portable housing. Ex. 1002 ¶ 202. Thus, we find that Makoto teaches a “system comprising a mobile device contained in a portable housing.”¹⁰

b) Recitations 24b–d

Claim 24 recites that the mobile device comprises “[b] a touch screen display, non-transitory computer-readable media, and a central processing unit (CPU),” “[c] a mobile device transmitter communicatively coupled to the CPU,” and “[d] a mobile device receiver communicatively coupled to the CPU.”

For recitation 24b, Petitioner contends that Makoto’s mobile device has a storage unit and a processing unit (CPU) and argues that it would have been obvious to include a touch screen display based on Hamynen because a

⁹ Petitioner and Dr. Chatterjee italicize the names of references. We omit this emphasis when quoting Petitioner’s arguments and Dr. Chatterjee’s testimony.

¹⁰ We need not decide whether the preamble is limiting for purposes of this Decision because we determine that, on the record before us, the cited evidence sufficiently supports Petitioner’s undisputed contentions regarding the preamble.

touch screen “would have provided a simpler mechanism for performing certain user actions, such as selecting a location on a displayed map.”

Pet. 10–12 (citing Ex. 1002 ¶¶ 46, 109–111, 203–207, 219; Ex. 1005 ¶¶ 100, 102, Fig. 17; Ex. 1007 ¶¶ 55, 86, Fig. 4; Ex. 1012, 1:20–21, 1:25–2:44).

For recitations 24c and 24d, Petitioner argues that Makoto’s mobile device has a communication transceiver, which a person of ordinary skill in the art would have understood is communicatively coupled to the CPU.

Pet. 12–13 (citing Ex. 1005 ¶ 100, Fig. 17; Ex. 1002 ¶¶ 208–210).

Except for the “touch screen display” discussed below, Patent Owner does not dispute Petitioner’s contentions for recitations 24b–d. *See* PO Resp. 26–27.

Petitioner’s contentions are persuasive. Makoto discloses that each of mobile communication devices 304₁ and 304₂ has communication transceiver 311 (“transmitter” and “receiver”), storage unit 313 (“non-transitory computer-readable media”), processing unit 314 (“central processing unit (CPU)”), and display unit 315 (“display”). Ex. 1005 ¶ 100, Fig. 17. Makoto discloses that “[t]he information transmitted and received by the communication transceiver 311 is outputted and inputted by the processing unit 314” (Ex. 1005 ¶ 100), which demonstrates that the transmitter and receiver are “communicatively coupled to the CPU.”

Regarding the “touch screen display,” Patent Owner argues that, although “Hamynen discloses ‘displaying a map’ and ‘us[ing] a pointing device,’ it does not disclose that the display is a touch screen display, as required by Claim 24.” PO Resp. 26–27 (citing Ex. 2004 ¶ 51). We disagree. Hamynen discloses that a mobile terminal’s user interface may be a “touch pad/screen.” Ex. 1007 ¶ 86; *see also* Ex. 1007 ¶ 55 (“Once map 500 has been displayed, the user of mobile terminal 402 may then use a

pointing device, e.g., stylus or cursor, available on mobile terminal 402 to select his approximate location 502 on map 500.”). Thus, we find that Hamynen discloses a touch screen display. We also find that a person of ordinary skill in the art would have combined Hamynen’s touch screen teachings with Makoto’s display teachings for the reasons articulated by Petitioner. *See* Ex. 1002 ¶ 110 (“[I]ncorporating a touch screen would have provided a simpler mechanism for performing certain user actions, such as selecting a location on a displayed map, as described in Hamynen.”).

c) Recitation 24e

Claim 24 recites that the mobile device comprises “a global positioning system (GPS) receiver, communicatively coupled to the CPU, configured to obtain geographical coordinates corresponding to a geographical location of the mobile device” (recitation 24e). Petitioner relies on Makoto’s disclosure that its mobile communication devices 304₁ and 304₂ include GPS receiver 310. Pet. 13 (citing Ex. 1005 ¶ 100, Fig. 17). Petitioner argues that a person of ordinary skill in the art “would have recognized that the GPS information received by GPS receiver 310 includes ‘geographical coordinates corresponding to a geographical location of the mobile device.’” Pet. 14–15 (emphasis omitted; citing Ex. 1002 ¶ 212; Ex. 1015 ¶ 87).

Patent Owner argues that Petitioner’s contention is incorrect because GPS signals received by a GPS receiver “do not include any geographical coordinates of devices.” PO Resp. 16 (citing Ex. 2004 ¶ 31). Patent Owner is correct that the GPS signals “received by” a GPS receiver do not have coordinates of the device containing the GPS receiver. Petitioner agrees, stating that “no GPS system works in that way.” Pet. Reply 2. Petitioner notes that “[n]othing in the claim requires the receiver’s coordinates to

actually be *received* by the GPS receiver.” Pet. Reply 2. Petitioner is correct on this point. The recited GPS receiver must be “configured to obtain geographical coordinates,” not receive those coordinates. In essence, this dispute between the parties resulted from language used in the Petition, which alleges that “the GPS information received by GPS receiver 310 includes ‘geographical coordinates corresponding to a geographical location of the mobile device.’” Pet. 14–15 (emphasis omitted).

Notwithstanding Petitioner’s imprecise “received by” language, we understand Petitioner’s contention to be that the GPS receiver uses GPS satellite signals to specify location. This is consistent with Petitioner’s reliance on Makoto’s disclosure that, “[i]n GPS, a mobile terminal device receives a GPS signal sent from a GPS satellite to specify its own location in the mobile terminal device using the received GPS signal.” Ex. 1005 ¶ 2; *see* Pet. 14 (citing this disclosure). With this understanding, we address the remainder of the parties’ arguments for this limitation.

Patent Owner argues that Makoto does not teach “coordinates” required by this limitation. PO Resp. 13–22; PO Sur-reply 2–8. Patent Owner contends that the term “coordinates” does not appear in Makoto and that Petitioner attempts to fill the gap with unsupported, conclusory expert testimony. PO Resp. 14–15 (citing Pet. 14; Ex. 1002 ¶ 212; Ex. 2005, 45:1–9, 46:8–14). Patent Owner contends that a person of ordinary skill in the art would not have recognized that GPS information includes geographical coordinates and that the “GPS Standard Positioning Service Performance Standard defines the contents of GPS signals and demonstrates that GPS signals’ navigation messages do not include any geographical coordinates of devices.” PO Resp. 15–16 (citing Ex. 2004 ¶ 31; Ex. 2005, 47:11–48:5, 49:4–17). Patent Owner further contends that a person of

ordinary skill in the art would have recognized that “Makoto’s GPS information is a GPS signal and its navigation message” and that neither GPS signals received from a satellite nor their accompanying navigation message includes geographical coordinates. PO Resp. 17–21 (citing Ex. 2004 ¶¶ 32–35; Ex. 2006, 7–8¹¹). According to Patent Owner, “whether GPS receivers can compute coordinates from GPS signals is a function of design requirement,” and “there is no requirement to compute geographical coordinates.” PO Resp. 20 (citing Ex. 2004 ¶ 35). Patent Owner contends that Makoto’s Figure 5A shows a low accuracy level map or a “cartoon” map and that “Makoto does not disclose a requirement for real-time device position or geographical coordinates.” PO Resp. 21 (citing Ex. 2004 ¶ 36). According to Patent Owner, Makoto, motivated by its “goal to preserve users’ privacy,” “strives for a ‘positional relationship’ rather than a geographical relationship.” PO Resp. 21–22 (citing Ex. 1005 ¶ 5; Ex. 2004 ¶ 37).

Petitioner responds that “nothing in the challenged claims requires that GPS signals received from the GPS satellites contain coordinates of the device to be located.” Pet. Reply 2. Petitioner asserts that “claim 24 only requires a ‘GPS receiver . . . configured *to obtain* geographical coordinates’ of the device in which the receiver is located” but does not require “the receiver’s coordinates to actually be *received* by the GPS receiver.” Pet. Reply 2 (alteration in original). Petitioner contends that Makoto “expressly teaches a mobile terminal with a GPS receiver that ‘receives a GPS signal sent from a GPS satellite *to specify its own location* in the mobile terminal

¹¹ Citations to Exhibit 2008 are to page numbers added by Patent Owner to the exhibit.

device using the received GPS signal.” Pet. Reply 2–3 (citing Ex. 1005 ¶ 2, Fig. 17). Petitioner contends that based on this disclosure, a person of ordinary skill in the art would have understood that “a GPS receiver specifying its own location using received GPS data would constitute obtaining ‘geographical coordinates’ of the device.” Pet. Reply 3–4 (citing Ex. 1033 ¶ 8; Ex. 1002 ¶¶ 60–61; Ex. 1005 ¶ 2). Petitioner asserts that the GPS standard that Patent Owner relies upon confirms that “the GPS signals themselves include position data (orbital elements) of the satellites being used to triangulate a receiver location” and that each GPS receiver will use the received position data in order to “accomplish[] satellite position . . . computations *in the* most current realization of the . . . ***Earth-Centered, Earth-Fixed (ECEF) coordinate system.***” Pet. Reply 4–5 (citing Ex. 2006, 8, 13–15; Ex. 1033 ¶ 10). Petitioner further asserts that “a GPS receiver functions to monitor a plurality of ‘satellite signals . . . to accurately triangulate . . . and ***provide accurate coordinates.***” Pet. Reply 5 (citing Ex. 2006, 8; Ex. 1002 ¶ 61; Ex. 1033 ¶ 10).

In its Sur-reply, Patent Owner reiterates that Petitioner’s contentions are deficient because “Makoto does not disclose anything about indicating coordinates” and that “recitations of GPS information from GPS satellites do[] not disclose indicating coordinates, or coordinate translation data correlating coordinates of positions on the map with corresponding coordinates of geographical locations.” PO Sur-reply 2–5. Patent Owner contends that “Dr. Chatterjee does not dispute Dr. Terveen’s opinion that the GPS Performance Standard’s IDC-GPS200C defines the contents of Makoto’s GPS information and that [a person of ordinary skill in the art] would have turned to this GPS Performance Standard to understand the contents of a GPS Signal.” PO Sur-reply 6 (citing Ex. 2004 ¶¶ 31, 35).

We agree with Petitioner that claim 24 does not require that the GPS signals received from the satellites themselves must contain coordinates. *See* Pet. Reply 2. Rather, recitation 24e requires “a global positioning system (GPS) receiver, communicatively coupled to the CPU, configured to obtain geographical coordinates corresponding to a geographical location of the mobile device.” Although Makoto does not expressly state that the GPS receiver obtains geographical coordinates, Petitioner persuasively argues that an ordinarily skilled artisan would have recognized that Makoto’s GPS receiver operates in this manner. *See* Pet. 13–15 (citing Ex. 1005 ¶¶ 2, 100, Fig. 17; Ex. 1002 ¶ 212; Ex. 1015 ¶ 87). Makoto explains that

GPS (Global Positioning System), or the like, which provides information for specifying the location of a mobile terminal device to another mobile terminal device, and the like, is conventionally known. In GPS, a mobile terminal device receives a GPS signal sent from a GPS satellite *to specify* its own location in the mobile terminal device using the received GPS signal.

Ex. 1005 ¶ 2 (emphasis added). Makoto therefore discloses that the mobile device uses the GPS signal to specify its own location, which Petitioner contends would have been understood by skilled artisans as obtaining geographical coordinates of the device. Pet. 14–15¹²; Pet. Reply 3–4. Dr. Chatterjee testifies that a person of ordinary skill in the art would have understood that GPS information contains such geographical location information for specifying a receiving device’s own location because, for example, U.S. Patent Publication 2003/0178501 (Ex. 1015, “Doherty”)

¹² As noted at the beginning of this section, Petitioner’s “received by” language (Pet. 14) is imprecise, but Makoto discloses that the GPS signal is used to specify the location, not that the signal contains coordinates. Ex. 1005 ¶ 2.

discloses a GPS receiver that “constantly monitors a plurality of geosynchronous orbiting satellite signals . . . to accurately triangulate the vehicle’s position at any moment ***and provide accurate coordinates of the vehicle.***” Ex. 1002 ¶ 61 (citing Ex. 1015 ¶ 87). We credit Dr. Chatterjee’s testimony on this point because it is consistent with Makoto and Doherty’s disclosure. Moreover, the GPS standard relied upon by Patent Owner supports Dr. Chatterjee’s testimony that GPS receivers receive satellite data to compute position in a *coordinate* system. See Ex. 2006, 13–15; Pet. Reply 4–5.

Patent Owner agrees with this general understanding in the art about how GPS receivers work but argues that “whether GPS receivers can compute coordinates from GPS signals is a function of design requirement.” PO Resp. 20. Relying on Dr. Terveen’s testimony, Patent Owner contends that “if a system requires low accuracy levels, there is no requirement to compute geographical coordinates.” PO Resp. 20 (citing Ex. 2004 ¶ 35). Dr. Terveen, however, offers no evidence to support his claim that certain GPS receivers *do not* compute coordinates in determining geographical location. Ex. 2004 ¶ 35. On the contrary, the GPS standard relied upon by Patent Owner assumes that GPS receivers compute coordinates and also makes clear that the purpose of GPS is “to provide a *reliable* and continuous positioning and timing service to the GPS user community.” Ex. 2006, 8, 13–15 (emphasis added). We therefore find Dr. Terveen’s testimony conclusory and Patent Owner’s argument unpersuasive.

Even if we were to agree with Patent Owner that certain GPS receivers, by design, avoid the use of geographic coordinates, Patent Owner offers no persuasive basis to find that a person of ordinary skill in the would have understood the GPS receiver disclosed in Makoto to be of that special

type. Patent Owner bases its “low accuracy system” argument on Makoto’s map, shown in Makoto’s Figure 5A, which Patent Owner contends “is not a geographical map because it merely consists of blocks, which are not drawn to any geographical or geo-referenced relationship.” PO Resp. 21 (citing Ex. 2004 ¶ 36). Patent Owner and Dr. Terveen offer no evidence to support this claim. Figure 5A of Makoto is reproduced below.

[FIG. 5]
(A)

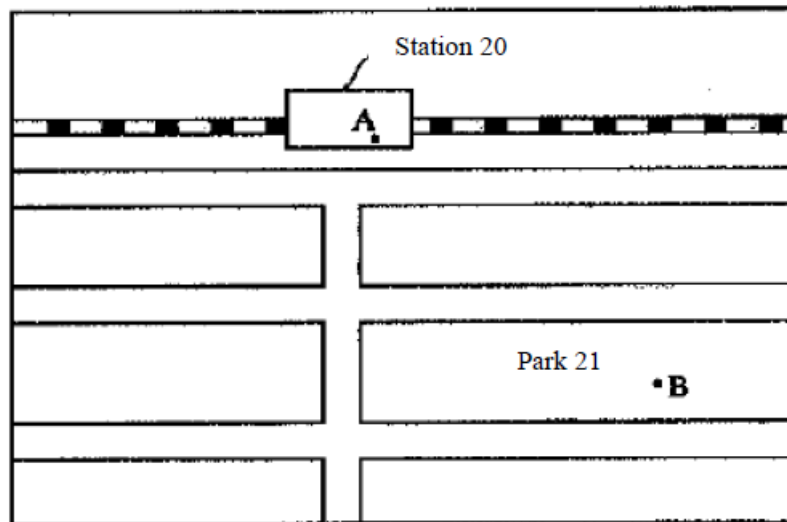


Figure 5A discloses “a display screen including a display specifying the location of mobile phone devices 4₁ and 4₂ on a map . . . outputted to the display unit 15 of mobile phone device 4₁.” Ex. 1005 ¶ 56. The map shows one mobile device at a specific point (A) in a train station and another one at a specific point (B) within a park. Ex. 1005 ¶ 56, Fig. 5A. Aside from Dr. Terveen’s testimony, Patent Owner offers no evidence to support that a person of ordinary skill in the art would consider that level of location identification to be of “low accuracy” or that Makoto’s GPS receiver would not compute such location information in terms of coordinates. We therefore agree with Petitioner that a person of ordinary skill in the art would

have understood Makoto's GPS receiver as specifying its own location using geographical coordinates of the device. Pet. Reply 4–5; Tr. 6:12–8:7, 12:2–10; *see also* Ex. 1005 ¶ 2 (“In GPS, a mobile terminal device receives a GPS signal sent from a GPS satellite to specify its own location in the mobile terminal device using the received GPS signal.”).

Lastly, Patent Owner argues that Makoto's system avoids the use of geographical coordinates in order to preserve users' privacy. PO Resp. 22 (citing Ex. 1005 ¶ 5; Ex. 2004 ¶ 37). Makoto, however, makes it clear that it protects user privacy by obtaining a user's permission before sharing the user's location information. *See* Ex. 1005 ¶¶ 5, 7; Tr. 12:2–5. We see nothing in Makoto to suggest that it achieves any privacy goals through the use of inaccurate location information.

Based on Petitioner's persuasive contentions and evidence, and for the reasons discussed above, we find that Makoto's GPS receiver 310 is “a global positioning system (GPS) receiver, communicatively coupled to the CPU, configured to obtain geographical coordinates corresponding to a geographical location of the mobile device,” as recited in claim 24.

d) Recitation 24f

Claim 24 recites that “the CPU [is] configured to execute instructions to perform” the operations listed in recitations 24g–r. Petitioner argues that processing unit 314 in Makoto's mobile device performs the recited operations in the proposed combination. Pet. 15 (citing Ex. 1002 ¶¶ 213–214). We find that the Makoto's processing unit, in the proposed combination, executes instructions to perform operations, and we address each recited operation below.

e) Recitation 24g

The first operation is “associating the mobile device with an identifier, wherein the identifier corresponds to a network participant” (recitation 24g). Petitioner argues that Makoto’s disclosure of generating requests with a communication device ID for the mobile device teaches “associating the mobile device with an identifier” and that this identifier corresponds to the user of the mobile device. Pet. 15–17 (citing Ex. 1005 ¶¶ 100, 103, 107, 114, 119, Fig. 16; Ex. 1002 ¶¶ 55–58, 215).

Patent Owner argues that Makoto’s communication device ID is an identifier of the mobile communication device, not a network participant. PO Resp. 23 (citing Ex. 1005 ¶¶ 107, 114, Fig. 16; Ex. 2004 ¶¶ 41–42). According to Patent Owner, “Makoto identifies a device, not a participant.” PO Resp. 23 (citing Ex. 2004 ¶ 42).

We disagree. We find that Makoto’s communication device ID corresponds to the device and the device’s user, who is a network participant. For example, Makoto discloses that “user 309₁ uses mobile communication device 304₁, and user 309₂ uses mobile communication device 304₂,” and Figure 16 shows that these users are communicating via their mobile devices on communication network 302. Ex. 1005 ¶ 100, Fig. 16, *cited in* Pet. 16–17. This is consistent with the ’100 patent’s disclosure of “the cellular phone user” as a “communication net participant.” Ex. 1001, 7:12–16.

Patent Owner also argues that “Makoto does not show that the mobile devices perform the operation of associating a device with a network participant.” PO Resp. 24 (citing Ex. 1005 ¶ 114; Ex. 2004 ¶ 43).

We disagree. Petitioner’s assertion is that the “associating” happens when Makoto’s mobile device generates requests containing, *inter alia*, the

communication device ID. *See* Pet. 15–16 (citing Ex. 1005 ¶¶ 107, 114, 119). For example, Makoto discloses that “in the processing unit 314 of mobile communication device 304₁, a group registration request containing the communication device ID of mobile communication device 304₁ and the communication device IDs of a plurality of mobile communication devices belonging to a group is generated.” Ex. 1005 ¶ 107. We find that this disclosure teaches performing the operation of “associating the mobile device with an identifier” as part of the group registration request, and we find that “the identifier corresponds to a network participant” for the reasons discussed above.

Based on Petitioner’s persuasive argument and evidence, we find that Makoto teaches that its processing unit performs the operation of “associating the mobile device with an identifier, wherein the identifier corresponds to a network participant.”

f) Recitation 24h

Claim 24 recites “determining, by the CPU, a device location corresponding to the geographical location of the mobile device based on the geographical coordinates obtained by the GPS receiver located within the mobile device” (recitation 24h). Petitioner argues that processing unit 314 in Makoto’s mobile device determines the device location based on information from the GPS receiver. Pet. 17–18 (citing Ex. 1005 ¶¶ 2, 97, 100; Ex. 1002 ¶¶ 59–62, 211–212, 216; Ex. 1015 ¶ 87).

Other than its arguments that Makoto does not teach “geographical coordinates,” which we discuss above in section II.D.2.c, Patent Owner does not dispute Petitioner’s contentions that the processing unit in Makoto’s mobile device determines the location. *See* PO Resp.

Petitioner's contentions for recitation 24h are persuasive. Makoto discloses that "GPS receiver 310 receives the GPS information from a plurality of GPS satellites of the GPS satellite group 303 and outputs this to the processing unit 314." Ex. 1005 ¶ 100. As discussed above in section II.D.2.c, Makoto discloses that the GPS location is displayed on the mobile device, which shows that the CPU determines a device location to display on the map based on the GPS information received.

Based on Petitioner's persuasive contentions and evidence, we find that Makoto teaches "determining, by the CPU, a device location corresponding to the geographical location of the mobile device based on the geographical coordinates obtained by the GPS receiver located within the mobile device."

g) Recitation 24i

Claim 24 recites "receiving, from a server, mapping data including a map and coordinate translation data correlating coordinates of positions on the map with corresponding coordinates of geographical locations" (recitation 24i). For this operation, Petitioner relies on a combination of teachings from Makoto and Konishi. Pet. 18–25. Petitioner argues that Makoto discloses receiving map information from a server and that this map information "must necessarily include 'coordinate translation data correlating coordinates of positions on the map with corresponding coordinates of geographical locations'" so that the GPS information is accurately displayed on the map. Pet. 18–20, 23 (emphasis omitted) (citing Ex. 1005 ¶¶ 52–56, 97, 124, Figs. 5A, 5B; Ex. 1002 ¶¶ 41–44, 63–75, 217). Petitioner notes that Makoto does not explicitly state that the map information includes a map and relies on Konishi for this, arguing that downloading a map would overcome the problems of having to store large

amounts of data locally. Pet. 20–22 (citing Ex. 1008 ¶¶ 26–33; Ex. 1002 ¶¶ 29–33, 64–72, 217). Petitioner also argues that, although Makoto “discloses the steps of displaying the geographical location of mobile devices on a map in connection with the first embodiment,” a person of ordinary skill in the art would have recognized the benefits of such a display in the fourth embodiment, such as “to visually display the geographical relationship between devices for the user’s benefit.” Pet. 24–25 (citing Ex. 1005 ¶¶ 54–56, 126, 128–129; Ex. 1002 ¶¶ 75, 217).

Patent Owner argues that “Makoto fails to disclose or suggest any ‘coordinates,’ ‘geographical coordinates,’ or ‘coordinate translation data.’” PO Resp. 14 (citing Ex. 2004 ¶ 30); *see also* PO Sur-reply 4 (“Makoto does not disclose anything about indicating coordinates . . .”). This argument focuses on the issue of whether Makoto teaches coordinates, which we address above in section II.D.2.c. For the reasons discussed above in section II.D.2.c, we find that Makoto’s GPS system teaches the use of coordinates. We find persuasive Petitioner’s contention that the information necessary to display the map would have data “correlating coordinates of positions on the map with corresponding coordinates of geographical locations,” as recited in claim 24. Makoto discloses that “map information required to display the location of mobile phone devices 4₁ and 4₂ on a map” is downloaded to the mobile device. Ex. 1005 ¶¶ 53–54; *see* Pet. 23–24. We credit Dr. Chatterjee’s testimony that “the locations of the mobile communication devices could not be accurately displayed on the map” without information correlating map positions to geographical positions, i.e., “coordinate translation data.” Ex. 1002 ¶ 74. This testimony is consistent with Makoto’s disclosure that, “as shown in FIG. 5(A), a display screen including a display *specifying the location* of mobile phone devices 4₁ and 4₂ on a map

is outputted.” Ex. 1005 ¶ 56 (emphasis added). For the reasons discussed above in section II.D.2.c, we disagree with Patent Owner’s arguments that Figure 5A shows a “cartoon map” that is not accurate and that “is not geo-referenced or drawn to any geographical scale or coordinate system.” *See* PO Resp. 21 (citing Ex. 2004 ¶ 37).

Patent Owner also raises various arguments, discussed below, for the first time in its Sur-reply. These arguments are untimely. *See In re NuVasive, Inc.*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016) (holding that the patent owner waived arguments that were not raised in its response after institution); Paper 12 at 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”). Nevertheless, we address these untimely arguments, and, for the reasons set forth below, we disagree with these arguments.

In its Sur-reply, Patent Owner argues that “[n]either Makoto nor Konishi teach[es] a server transmitting the map to the device.” PO Sur-reply 3. According to Patent Owner, Makoto discloses that a map is generated on the phone, not downloaded to the phone, and that any “map information” transmitted does not include a map. PO Sur-reply 2–3 (citing Ex. 1005 ¶¶ 55–57).

We disagree. Makoto discloses that “processing unit 14 of mobile phone device 4₁ reads the map information specified in Step ST12 from the storage unit 13, or downloads via the telephone transceiver 11 from a predetermined server device connected to the mobile phone communication network 2.” Ex. 1005 ¶ 54. Thus, Makoto discloses that map information (“map data”) is received from a server. Furthermore, Makoto discloses that “the map information required to display the location of mobile phone devices 4₁ and 4₂ on a map is specified” and that this “map information” is

downloaded to mobile phone device 4₁. Ex. 1005 ¶¶ 53–54 (emphasis added). Based on this evidence, we find that Makoto at the very least suggests that the downloaded map information includes a map.

Furthermore, Petitioner relies on Konishi’s disclosure of downloading maps, which we address next. *See* Pet. 20–23.

Patent Owner argues that “Konishi merely refers to ‘transmit[ting] the information to the mobile telephone set’” and that “Konishi confirms that maps themselves are not transmitted because it reiterates that ‘the current position . . . [is] transmitted to the mobile telephone set.’” PO Sur-reply 3 (quoting Ex. 1008 ¶¶ 31, 33; alterations by Patent Owner). Konishi, however, expressly discloses “transmit[ting] the map to the customer information terminal.” Ex. 1008 ¶¶ 5–10. As Petitioner correctly points out (Pet. 21), Konishi discloses that “mobile telephone set 13” is “a customer information terminal.” Ex. 1008 ¶ 26. Thus, we disagree with Patent Owner’s assertion that Konishi does not disclose transmitting maps.

Konishi discloses that

information processing device 11 reads out a map of a region of a specific range with the customer position in the center from the map system 28 to the storage device 17, inputs the customer position and the current position of the retrieved vacant vehicle (step 36), transmits the information to the mobile telephone set 13, and displays the information on the screen 25 (step 37).

Ex. 1008 ¶ 31. In light of Konishi’s express disclosures of transmitting a map to a customer information terminal (Ex. 1008 ¶¶ 5–10), we agree with Petitioner (Pet. 21–22) that the information that is transmitted in the above-quoted passage includes the map mentioned in the passage.

In its Sur-reply, Patent Owner also disputes Petitioner’s reasoning to combine Makoto and Konishi for this limitation, arguing that “there would

have been no motivation to combine Makoto's static map, which must be re-generated each time a request is made, with Konishi's feature of sending positions because Makoto already purportedly discloses obtaining map information." PO Sur-reply 3. This conclusory argument is untimely and also does not address Petitioner's reasoning that downloading a map would overcome the problems of having to store large amounts of data locally, as might be required "depending on the size and resolution of the digital map." Pet. 22–23 (citing Ex. 1002 ¶¶ 29–33, 71–72, 217; Ex. 1007 ¶ 54; Ex. 1014, 6:14–20, 14:59–15:3). There may be some situations in which it is desirable to download a map and others in which it is not necessary. Konishi's disclosure of transmitting a map to a mobile device would certainly provide a benefit when the device does not already include the map.

Having considered the full trial record, based on Petitioner's persuasive argument and evidence, we find that the combination of Makoto and Konishi teaches "receiving, from a server, mapping data including a map and coordinate translation data correlating coordinates of positions on the map with corresponding coordinates of geographical locations" and that a person of ordinary skill in the art would have combined the teachings of Makoto and Konishi with a reasonable expectation of success, as asserted by Petitioner.

h) Recitation 24j

For the operation in recitation 24j ("receiving, from a server, location data indicating vehicle locations of one or more vehicles"), Petitioner argues that Makoto discloses that the mobile device requests and receives location data for other mobile devices associated with a group ID. Pet. 25–26 (citing Ex. 1005 ¶¶ 100, 105, 119–133; Ex. 1002 ¶¶ 45, 76–84, 218). Petitioner contends that, when a mobile device is in a vehicle, the location of the

device indicates the location of the vehicle. Pet. 26–27 (citing Ex. 1002 ¶¶ 25–28, 78, 218). Petitioner alternatively argues that Makoto in combination with Paul’s disclosure of equipping vehicles with wireless devices that track location renders obvious the subject matter of recitation 24j. Pet. 27–28 (citing Ex. 1006, code (57), 1:6–54, 2:16–24, 2:39–47, 3:13–15, 3:17–26, 3:34–36, 4:38–41; Ex. 1005 ¶ 1; Ex. 1002 ¶¶ 79–84, 218).

Patent Owner does not dispute Petitioner’s contentions for recitation 24j in the Response. *See* PO Resp. In its Sur-reply, Patent Owner argues that claim 24 requires that “the vehicle location data must indicate coordinates of a geographical location.” PO Sur-reply 2. We disagree because claim 24 recites that the “location data indicat[es] vehicle locations,” not coordinates of a geographical location. In any event, Patent Owner does not present any arguments based on its incorrect interpretation of the claims.

Petitioner’s contentions for recitation 24j are persuasive. Makoto discloses that a mobile device can request and receive location information for other mobile devices. Ex. 1005 ¶¶ 119–133, Fig. 18. We agree with Petitioner that, when the device is in a vehicle, the device location indicates the vehicle location. *See* Pet. 26. Similarly, Paul discloses receiving vehicle location information. Ex. 1006, 4:38–41 (“[T]he location of each vehicle 180 is known because of positional information gathered automatically from the vehicle’s 180’s wireless device.”). We find that a person of ordinary skill in the art would have combined Paul’s teachings of receiving vehicle location information with Makoto’s location-based system to improve location-based services by enabling the exchange of vehicle positions. *See* Ex. 1002 ¶ 82.

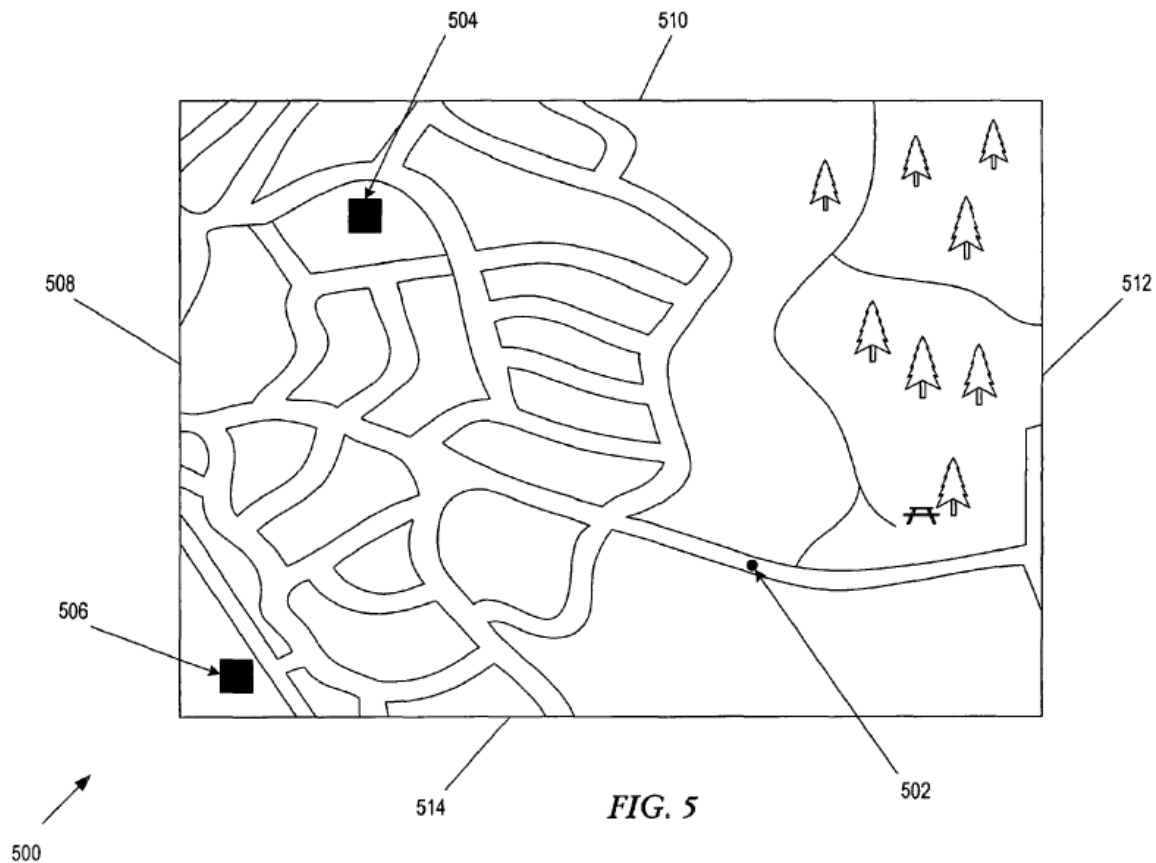
i) Recitations 24k–n

Claim 24 recites “marking the map with a plurality of symbols comprising: a participant symbol corresponding to the device location, one or more facility symbols corresponding to respective facility locations of one or more facilities, and one or more vehicle symbols corresponding to respective vehicle locations of the one or more vehicles” (recitation 24k). Claim 24 recites that this “marking the map” operation comprises “determining, based at least in part on the vehicle locations and the coordinate translation data, positions on the map corresponding to the vehicle locations” (recitation 24l), “displaying the map on the display of the mobile device” (recitation 24m), and “placing the vehicle symbols on the map at the determined positions corresponding to the vehicle locations” (recitation 24n).

For the operations in recitations 24k–n, Petitioner relies on Makoto’s disclosure of specifying locations of users A and B on a map. Pet. 29–30 (citing Ex. 1005 ¶¶ 56, 100, Figs. 5A, 16; Ex. 1002 ¶¶ 85–97, 219). Referring to its contentions for recitation 24j, Petitioner argues that Makoto alone and Makoto in combination with Paul render obvious marking the map with vehicle symbols for vehicle locations. Pet. 30–31 (citing Ex. 1005 ¶¶ 1, 56, Fig. 5A; Ex. 1006, 1:6–54, 2:39–47, 3:17–26, 4:38–41; Ex. 1002 ¶¶ 87–88, 219); *see also* Pet. 34–35 (discussing operations 24l–n). For the “facility” aspect of recitation 24k, Petitioner relies on a combination of Makoto and Hamynen, citing Makoto’s disclosure of searching for service information such as a nearby Chinese restaurant and Hamynen’s disclosure of plotting facilities on a map, and argues that the combination would have benefitted the user by providing the facility location relative to the user’s position, making it easier to locate the facility. Pet. 31–34 (citing Ex. 1005

¶¶ 56, 142–154, Fig. 5A; Ex. 1007 ¶¶ 8, 54–56, 58, Fig. 5; Ex. 1002 ¶¶ 92–97, 219).

Patent Owner argues that “Hamynen does not disclose the ability to view other users or *mark* the map with the locations of users, vehicles, or facilities.” PO Resp. 25 (citing Ex. 2004 ¶ 46). Petitioner, however, relies on the combination of Makoto and Paul to teach marking the map with participant and vehicle symbols and further relies on Hamynen for its disclosure of marking a map with facility symbols. *See* Pet. 29–34. Petitioner relies on Hamynen’s Figure 5, which is below.



Hamynen’s Figure 5 shows map 500 displayed on a mobile terminal, and the map includes blocks 504 and 506, which represent the two closest gas stations that resulted from a user search. Ex. 1007 ¶¶ 54–55, Fig. 5. Petitioner argues that blocks 504 and 506 are facility symbols. Pet. 32–33.

Patent Owner does not dispute that gas stations are facilities. *See* PO Resp. We find that Hamynen’s blocks 504 and 506 are facility symbols because they represent gas stations, which are facilities. Ex. 1007 ¶ 55. This is consistent with the ’100 patent specification’s disclosure that a “geographical facility displayed on the map includ[es] buildings.” Ex. 1001, 7:35–42. We note that Makoto’s Figure 5A shows a symbol on a map for station 20, which is also a building and, therefore, a facility. *See* Ex. 1005 ¶ 56 (“The map shown in FIG. 5(A) shows that user A is located within the enclosure of station 20”); *see* Pet. 29 (reproducing Makoto’s Figure 5A).

Patent Owner also argues that “there is no motivation to combine the teachings of Makoto with Hamynen to meet this limitation” because “Makoto is directed toward a ‘communication method’ to provide location information, where Hamynen discloses a ‘touring’ method by which users may run keyword searches for locations of interest using a web browser.” PO Resp. 25 (citing Ex. 1005, code (57); Ex. 1007 ¶ 74; Ex. 2004 ¶ 47). We disagree with Patent Owner and, instead, find persuasive Petitioner’s reasoning to combine. As Petitioner correctly points out (Pet. 29), Makoto discloses marking a map with symbols corresponding to locations of phones (participant symbols). Ex. 1005 ¶ 56, Fig. 5A. In particular, Makoto discloses that the “map shown in FIG. 5(A) shows that user A is located within the enclosure of station 20, and user B is located in a neighboring park 21.” Ex. 1005 ¶ 56. Thus, Makoto already discloses displaying facility information, such as for station 20. Hamynen’s disclosure of mapping facilities furthers Makoto’s own disclosure in this regard, and we find that a person of ordinary skill in the art would have combined these teachings to provide the benefit of displaying facility information relative to the user’s

position so that the user can find the facility more easily. *See* Ex. 1002 ¶ 96 (Dr. Chatterjee’s testimony that the combination would facilitate finding a service provider). Thus, we find that the combination of Makoto and Hamynen teaches marking a map with “one or more facility symbols corresponding to respective facility locations of one or more facilities,” as recited in claim 24.

Based on Petitioner’s persuasive contentions and evidence and for the reasons discussed above, we find that the combination of Makoto, Paul, and Hamynen teaches marking the map with symbols for participants, vehicles, and facilities and that a person of ordinary skill in the art would have combined the teachings of Makoto, Paul, and Hamynen with a reasonable expectation of success, as asserted by Petitioner.

j) Recitation 24o

Claim 24 recites

responsive to user selection of a portion of the display corresponding to a position on the map, identifying a selected facility symbol based on the selected position, comprising: initiating a search of a set of symbols including the facility symbols for a symbol located nearest to the selected position and, based on a result of the search, identifying the selected facility symbol as the symbol located nearest to the selected position

(recitation 24o). Petitioner argues that it would have been obvious to combine Hamynen’s teachings of a user search for the nearest facilities, such as gas stations, with Makoto’s teachings, which also include searching for facilities (e.g., Chinese restaurant), and provides reasons for the combination, such as an improved user experience. Pet. 35–39 (citing Ex. 1005 ¶¶ 142–154; Ex. 1007 ¶¶ 38, 54–55, Fig. 5; Ex. 1002 ¶¶ 105–111, 223). More particularly, Petitioner directs us to Hamynen’s disclosure that a

user can select the user's approximate location on a map and search for gas stations within a particular geographic area and that, "[o]nce the search has completed, the results may be plotted on map 500 as blocks 504 and 506, whereby blocks 504 and 506 represent the two closest gas stations that are relative to the user's current position 502." Ex. 1007 ¶ 55, *cited in* Pet. 37. Petitioner argues that such a search "necessarily include[s] searching for the nearest facility" and that it would have been obvious to narrow the search to only the gas station nearest the user. Pet. 38–39 (citing Ex. 1007 ¶ 55, Fig. 5; Ex. 1002 ¶¶ 107–109, 223).

Patent Owner argues that "Hamynen does not disclose that a user may select *any* position on the map." PO Resp. 27 (citing Ex. 1007 ¶ 55; Ex. 2004 ¶ 51). Hamynen, however, discloses that "the user of mobile terminal 402 may then use a pointing device, e.g., stylus or cursor, available on mobile terminal 402 to select his approximate location 502 on map 500." Ex. 1007 ¶ 55. Thus, it appears that Hamynen allows the user to select any position on the map, but, even if not, we find that Hamynen's disclosure of a user selecting his own location on the map teaches claim 24's recitation of a "user selection of a portion of the display corresponding to a position on the map." In its Sur-reply, Patent Owner argues that "[t]he sole disclosure of a selection of a position on a map is Hamynen's pointing device to select the user's own approximate position, and this pointing has nothing to do with entering a new entity of interest at the selected approximate position." PO Sur-reply 10 (citing Pet. 58–59; Ex. 1007 ¶ 55). It is not clear what claim language is implicated by Patent Owner's argument about "entering a new entity of interest," but, in any event, we find Petitioner's contentions persuasive as discussed herein.

Patent Owner acknowledges that Hamynen discloses keyword searching for gas stations but argues that “Hamynen does not disclose . . . the ability to initiate a search of a set of symbols for symbols located nearest to the selected position.” PO Resp. 27 (citing Ex. 1007 ¶ 55; Ex. 2004 ¶ 51). Thus, Patent Owner attempts to distinguish between searching facilities and searching symbols. We disagree with Patent Owner’s attempted distinction because claim 24 recites that the “facility symbols correspond[] to respective facility locations of one or more facilities,” and, therefore, searching for facilities, as in Hamynen, teaches “initiating a search of a set of symbols including the facility symbols.”

In its Sur-reply, Patent Owner argues for the first time that “[t]here is no motivation to combine the references to further modify the combination of Makoto’s static map as modified with Hamynen’s pointer-device map.” PO Sur-reply 10. This argument is untimely, but in any event we disagree with it. Rather, we agree with Petitioner, and we find that a person of ordinary skill in the art would have combined Hamynen’s search capabilities with Makoto to give a user “greater flexibility in locating desired facilities in any area, thereby improving the overall usefulness and convenience of Makoto’s mobile device and services.” *See* Pet. 39 (citing Ex. 1002 ¶¶ 110, 223). As Petitioner correctly points out (Pet. 36), Makoto already discloses searching for nearby facilities, such as “a Chinese restaurant that is located within ten-minute walking distance” of the phone. Ex. 1005 ¶ 149. Hamynen’s disclosure of indicating a location on a map to search would have provided more flexibility for the user to locate desired facilities. *See* Ex. 1002 ¶ 110 (Dr. Chatterjee’s testimony that the combination would provide greater flexibility in finding a service provider).

Having considered the full trial record, we determine that Petitioner's contentions and evidence for recitation 24o are persuasive. We find that Hamynen's disclosure of a user selecting a location on a map and searching for facilities near that location teaches "responsive to user selection of a portion of the display corresponding to a position on the map, identifying a selected facility symbol based on the selected position, comprising: initiating a search of a set of symbols including the facility symbols for a symbol located nearest to the selected position." Ex. 1007 ¶ 55, Fig. 5. We agree with Petitioner that Hamynen's disclosure of identifying the two closest gas stations involves determining distances to the gas stations and that searching for the closest one would have been obvious because the closest station was identified as part of the search for the two closest ones. *See* Pet. 38–39 (citing Ex. 1007 ¶ 55; Ex. 1002 ¶¶ 109, 223).

Based on Petitioner's persuasive contentions and evidence and for the reasons discussed above, we find that the combination of Makoto and Hamynen teaches the subject matter of recitation 24o and that a person of ordinary skill in the art would have combined the teachings of Makoto and Hamynen with a reasonable expectation of success, as asserted by Petitioner.

k) Recitation 24p

Claim 24 recites "after receiving user input on the touch screen display, transmitting, by the mobile device transmitter, first information to a first vehicle of the one or more vehicles" (recitation 24p). Petitioner argues that Makoto, as modified by Hamynen's touch screen teachings (*see* recitation 24b above) and (if necessary) by Paul's vehicle teachings (*see* recitation 24j above), teaches the operation in recitation 24p in two ways. Pet. 39–43 (citing Ex. 1005 ¶¶ 107–113, 117, 119, 122–124; Ex. 1002 ¶¶ 113–117, 224–226; Ex. 1007 ¶ 86).

In the first way, Petitioner argues that Makoto teaches this subject matter by disclosing that a user of one mobile device transmits a group ID (“first information”) to another mobile device, which is in a vehicle in the combination with Paul. Pet. 40–42 (citing Ex. 1005 ¶¶ 107–113). In the second way, Petitioner argues that Makoto teaches this subject matter by disclosing that information including GPS information (“first information”) from one mobile device is sent to other mobile devices in the group based on permission requirements being met. Pet. 42–43 (citing Ex. 1005 ¶¶ 117, 119, 122–124).¹³

Patent Owner does not dispute Petitioner’s contentions for recitation 24p. *See* PO Resp.

Petitioner’s contentions for recitation 24p are persuasive. We find Petitioner’s “first way” persuasive because Makoto discloses that, after requesting and receiving a group ID (“first information”), “[u]ser 309₁ notifies the group ID to user 309₂, for example, by transmitting the group ID from mobile communication device 304₁ to mobile communication device 304₂ via the communication network 302.” Ex. 1005 ¶¶ 107–113. We find Petitioner’s “second way” persuasive because the flowchart of Makoto’s Figure 21 and the accompanying description disclose sharing location

¹³ In summarizing its second argument for recitation 24p, Petitioner maps Makoto’s “group ID” to “first information” recited in the claim. Pet. 39–43. We understand Petitioner’s second argument also to be that Makoto’s GPS information corresponds to the recited “first information.” *See* Pet. 42–43, 45–46; *see also* 515 Pet. 36 (“Thus, in this second way, Makoto alone and in view [of] Paul discloses that user 309₁ enters an instruction (i.e., ‘user input’) to generate a location information registration request containing GPS information of mobile communication device 304₁ (i.e., ‘first information’), which is transmitted to other mobile communication devices in the group, including the vehicle-associated device (i.e., ‘first vehicle’).”).

information among devices in a group when permitted. Ex. 1005 ¶¶ 117, 119, 122–124, Fig. 21.

Based on Petitioner’s persuasive contentions and evidence, we find that the asserted combination of references teaches the subject matter of recitation 24p.

l) Recitation 24q

Claim 24 recites “after transmitting the first information to the first vehicle, receiving, at the mobile device receiver, second information corresponding to the first vehicle and displaying the received second information on the touch screen display of the mobile device” (recitation 24q).

Petitioner argues that Makoto, as modified by Hamynen’s touch screen teachings (*see* recitation 24b above) and (if necessary) by Paul’s vehicle teachings (*see* recitation 24j above), teaches the operation in recitation 24q by its disclosure of receiving and displaying GPS information corresponding to another mobile device after sending the group ID (“first way” above) or its own GPS information (“second way” above). Pet. 43–46 (citing Ex. 1005 ¶¶ 106, 119–120, 122, 124–126; Ex. 1002 ¶¶ 119–120, 228–230).

Patent Owner does not dispute Petitioner’s contentions for recitation 24q. *See* PO Resp.

Petitioner’s contentions for recitation 24q are persuasive. Makoto discloses that, if permission requirements are met, “the GPS information of mobile communication device 304₂ is transmitted to mobile communication device 304₁ from the location information service providing device 305” and that “the location display screen specifying the location of mobile

communication device 304₂ on a map is outputted to the display unit 315 of mobile communication device 304₁.” Ex. 1005 ¶¶ 124–126.

Based on Petitioner’s persuasive contentions and evidence, we find that the asserted combination of references teaches the subject matter of recitation 24q.

m) Recitation 24r

Claim 24 recites “wherein the mobile device does not have access to a phone number associated with a computing device corresponding to the first vehicle, an Internet Protocol (IP) address associated with the computing device corresponding to the first vehicle, and an e-mail address associated with the computing device corresponding to the first vehicle” (recitation 24r).

Petitioner argues that Paul “recognizes that passengers and drivers may wish to keep potentially confidential data, including a telephone number, from other users.” Pet. 47 (citing Ex. 1006, 5:10–15). Petitioner argues that it would have been obvious “to use a unique identifier separate from the user’s telephone number, e-mail address, and IP address as [a] communication device ID” in Makoto based on Paul to protect confidential information and further Makoto’s objective of privacy. Pet. 46–48 (citing Ex. 1005 ¶¶ 3–5, 45, 107–132; Ex. 1006, 5:4–15; Ex. 1002 ¶¶ 121–127, 231).

Patent Owner argues that Petitioner’s contentions fail because Paul teaches that the phone number of the driver of the first vehicle is transmitted to the passenger’s phone. PO Resp. 29 (citing Ex. 1006, 5:4–9; Ex. 2004 ¶ 56). This argument ignores Paul’s teaching of not sharing phone numbers, on which Petitioner relies. Paul teaches both options in the following passage:

[T]he passenger's cell phone (or other wireless device) number may be transmitted to the driver and/or the driver's cell phone number may be transmitted to the passenger 170, so that the two can communicate directly over the wireless network 120.

In one embodiment, the passenger's and driver's cell phone numbers (and any other potentially confidential data) are kept only at the data center and communications coordinated through the data center. In one embodiment, the driver and passenger are each given a unique identifier separate from their cell phone number or other wireless access device.

Ex. 1006, 5:4–15. Thus, Paul teaches sharing phone numbers, but Petitioner's contention of obviousness is based on Paul's express disclosure of keeping cell phone numbers and other confidential information at the data center and not sharing that information. *See* Pet. 47 (citing Ex. 1006, 5:1–15). Patent Owner's argument, therefore, is not responsive to Petitioner's obviousness contentions.

Petitioner's contentions for recitation 24r are persuasive. We find that Paul teaches not giving a mobile device access to the phone number of another mobile device. Ex. 1006, 5:10–15. We find that a person of ordinary skill in the art would have applied this teaching to the teachings of Makoto to further Makoto's privacy goals, as asserted by Petitioner. *See* Pet. 47–48 (citing Ex. 1005 ¶¶ 3, 5; Ex. 1006, 5:4–15; Ex. 1002 ¶¶ 124–127, 231). We find, therefore, that the asserted combination teaches the subject matter of recitation 24r.

n) Conclusion for Claim 24

For the reasons discussed above and based on Petitioner's contentions and evidence, we conclude that the subject matter of claim 24 would have been obvious based on the combined teachings of Makoto, Konishi, Paul, and Hamynen.

3. *Claim 1*

Claim 1 recites “[a] method performed by a mobile device having a display and one or more processors, the method comprising” steps that are similar to the operations recited in claim 24. One notable difference between these claims is that claim 1 does not recite the use of GPS, which is recited in dependent claim 2. Petitioner contends that the subject matter of claim 1 would have been obvious based on the combined teachings of Makoto, Konishi, Paul, and Hamynen for reasons similar to those given for claim 24, which we discuss above. 515 Pet. 11–38.

Patent Owner relies on the arguments addressed above in § II.D.2 and does not present additional arguments for claim 1. *See* PO Resp. 13–29. For the reasons discussed above with regard to claim 24 and based on Petitioner’s persuasive contentions and evidence, we determine that Petitioner has established by a preponderance of the evidence that the subject matter of claim 1 would have been obvious based on the combined teachings of Makoto, Konishi, Paul, and Hamynen.

4. *Claims 2–12, 16–19, 23, and 25–29*

Petitioner asserts that dependent claims 2–12 are unpatentable as obvious over the combined teachings of Makoto, Konishi, Paul, and Hamynen. Pet. 48–61; 515 Pet. 39–60. We address Petitioner’s contentions and any arguments by Patent Owner below.

a) Petitioner’s Contentions

Claim 2 depends from claim 1 and recites that

determining the device location comprises obtaining geographical coordinates representing the geographical location of the mobile device from a global positioning system (GPS) receiver located within the mobile device; and marking the map further comprises placing the participant symbol at a position on

the map corresponding to the geographical coordinates representing the geographical location of the mobile device.

Petitioner contends that Makoto teaches this subject matter because it discloses obtaining coordinates from the GPS receiver of the mobile device and displaying the location of the mobile device on the map based on the GPS position. 515 Pet. 39 (citing Ex. 1005 ¶¶ 2, 56,¹⁴ 100; Ex. 1002 ¶¶ 129–131).

Claim 3 depends from claim 1 and recites “wherein transmitting the first information to the first vehicle comprises sending data comprising at least one of the identifier and the device location to a server.” Petitioner argues that Makoto teaches this subject matter because it discloses sending GPS information (device location) and communication device ID (identifier) in a location information registration request to location information service providing device 305 (server). 515 Pet. 40 (citing Ex. 1005 ¶ 117; Ex. 1002 ¶¶ 132–133).

Claim 4 recites,

The method of claim 1, further comprising updating the map by updating at least one item selected from the group consisting of: a position of the participant symbol, positions of the one or more vehicle symbols, and a portion of the map displayed on the display of the mobile device.

Petitioner argues that a person of ordinary skill in the art would have understood that Makoto teaches that each location information request would result in the most updated location information for the mobile device and other devices in the group to be displayed. 515 Pet. 40–41 (citing

¹⁴ Based on context, we understand Petitioner’s citation to be to Makoto notwithstanding Petitioner’s use of “*id.*” following a citation to the declaration of Dr. Chatterjee.

Ex. 1005 ¶¶ 17, 103, 114–117, 119–124; Ex. 1002 ¶¶ 135–137). Petitioner further argues that Konishi teaches updating the position of an approaching vehicle on a map at regular intervals, and Petitioner contends that a person of ordinary skill in the art would have combined this functionality with Makoto to provide updated information without requiring the user to manually request updated location information. 515 Pet. 41–44 (citing Ex. 1008 ¶¶ 26–33; Ex. 1002 ¶¶ 138–143).

Claim 5 recites, “The method of claim 1, further comprising: receiving, from a server, updated respective vehicle locations of the one or more vehicles; and updating, based on the received updated vehicle locations and the coordinate translation data, positions of the one or more vehicle symbols on the map.” Claim 25 similarly recites, “The system of claim 24, wherein the operations further comprise: receiving, from a server, at the mobile device receiver, updated respective vehicle locations of the one or more vehicles; and updating, based on the received updated vehicle locations and the coordinate translation data, positions of the one or more vehicle symbols on the map displayed on the touch screen display.”

For claims 5 and 25, Petitioner argues that Konishi teaches updating the position of an approaching vehicle on a map at regular intervals, and Petitioner contends that a person of ordinary skill in the art would have combined this functionality with Makoto to provide updated information on the displayed map without requiring the user to manually request updated location information. Pet. 48–54 (citing Ex. 1005 ¶¶ 17, 103, 114–117, 119–124; Ex. 1008 ¶¶ 26–33; Ex. 1002 ¶¶ 134–145, 232); 515 Pet. 44–45 (citing

Ex. 1002 ¶¶ 144–146; Ex. 1005 ¶ 126); *see also* 515 Pet. 40–44 (addressing claim 4).¹⁵

Claim 6 recites, “The method of claim 1, further comprising: receiving, from a GPS receiver, updated device locations; and updating, based on the received device locations and the coordinate translation data, a position of the participant symbol on the map.” As with claim 5, Petitioner argues that a person of ordinary skill in the art would have combined the teachings of the asserted references to provide updated location information on the displayed map without requiring the user to manually request updated location information. 515 Pet. 45–46 (citing Ex. 1002 ¶ 148).

Claim 7 depends from claim 1 and recites “wherein the received second information is sent by the computing device corresponding to the first vehicle based on at least one criterion selected from the group consisting of: (1) passage of time, and (2) movement of the first vehicle.” Petitioner argues that, in its proposed combination, the updated location information (GPS information) is sent at regular intervals (based on the “passage of time”) in response to location information requests. 515 Pet. 47 (citing Ex. 1008 ¶¶ 32–33; Ex. 1002 ¶¶ 152–154).

Claim 8 depends from claim 1 and recites “wherein the received second information comprises one or more messages.” Petitioner argues that

¹⁵ For claim 5, Petitioner refers to discussions in “Section IX.A.1(f),” “Sections IX.A.4 and IX.A.5(a),” and “Sections IX.A.1(h)-(j).” 515 Pet. 44–45. Petitioner cross-references various parts of Section IX throughout its Petitions. *See, e.g.*, Pet. 49 (citing Section IX.A.1(j)), 53 (citing Sections IX.A.1(l)-(n)); 515 Pet. 46 (citing Sections IX.A.1(d) and IX.A.2(a)), 47 (citing Section IX.A.1(m)). Section IX in each Petition contains a discussion regarding discretionary denial. *See* Pet. 66–71; 515 Pet. 73–77. In context, it is clear that Petitioner’s cross-references to Section IX are meant to refer to Section VIII.

a person of ordinary skill in the art would have understood that the received GPS information is a message. 515 Pet. 47 (citing Ex. 1002 ¶¶ 155–156).

Claim 9 depends from claim 8 and recites “wherein the one or more messages comprise data to facilitate the mobile device transmitting the first information to the first vehicle without the mobile device using the phone number, IP address, and e-mail address associated with the first vehicle.”

Petitioner refers to its contentions for the limitation of claim 1 reciting

wherein the mobile device does not have access to a phone number associated with a computing device corresponding to the first vehicle, an Internet Protocol (IP) address associated with the computing device corresponding to the first vehicle, and an e-mail address associated with the computing device corresponding to the first vehicle.

515 Pet. 47 (citing Ex. 1002 ¶ 157); *see* 515 Pet. 37–38; *see also* § II.D.2.m above.

Claim 10 recites, “The method of claim 1, further comprising: communicating the identifier to a server; and joining a communication network after the communication of the identifier to the server.” Claim 26 recites, “The system of claim 24, wherein the operations further comprise: communicating, by the mobile device transmitter, the identifier to a server; and joining a communication network after the communication of the first identifier to the server.”

For claims 10 and 26, Petitioner argues that Makoto discloses sending the communication device ID to location information service providing device 305. Pet. 54–55 (citing Ex. 1005 ¶¶ 103, 107, 108, 114, 115, 119, 120; Ex. 1002 ¶¶ 234–238); 515 Pet. 48 (citing Ex. 1005 ¶¶ 108, 115, 120; Ex. 1002 ¶¶ 158–159). Petitioner further argues that “Makoto’s group registration request creates a communication network between mobile

communication devices belonging to the group” and that mobile communication device 304₁ joins the network of devices associated with the group after the group registration request. Pet. 55–56 (citing Ex. 1005 ¶¶ 106–108, 111, 114, 117, 119, 124; Ex. 1002 ¶¶ 236–238); 515 Pet. 48–49 (citing Ex. 1005 ¶¶ 106–108, 111, 114, 117, 119, 124; Ex. 1002 ¶¶ 160–164).

Claim 11 depends from claim 10 and recites “wherein the communication network comprises one or more communication devices corresponding, respectively, to the one or more vehicles, and wherein each of the one or more communication devices is associated with a respective identifier.” Claim 27 depends from claim 26 and recites similar subject matter as follows: “wherein the identifier is a first identifier, and wherein the communication network comprises one or more communication devices corresponding, respectively, to one or more second vehicles, and wherein each of the one or more communication devices is associated with a respective second identifier.”

For claims 11 and 27, Petitioner contends that each of Makoto’s mobile communication devices has a communication device ID and that, in the combination with Paul, each mobile device corresponds to a vehicle. Pet. 57 (citing Ex. 1005 ¶¶ 97, 107, 111; Ex. 1002 ¶ 240); 515 Pet. 49–50 (citing Ex. 1005 ¶¶ 97, 107, 111; Ex. 1002 ¶ 166).

Claim 28 recites,

The system of claim 27, wherein the operations further comprise: receiving, by the mobile device receiver, the second identifiers corresponding to one or more communication devices; and displaying, on the map displayed on the touch screen display, one or more second vehicle symbols corresponding to the second identifiers corresponding to the second vehicles.

Petitioner relies on Makoto's disclosure of receiving location information of other mobile devices in the group and argues that the received information would include the identifiers of the devices (in vehicles) to which the locations correspond. Pet. 58–59 (citing Ex. 1005 ¶¶ 107, 119–120, 122, 124, 126; Ex. 1002 ¶¶ 241–243).

Claim 12 recites,

The method of claim 1, further comprising determining a location-reporting status of the mobile device, wherein the location-reporting status is one of a reporting state and a non-reporting state, and wherein transmitting the first information to the first vehicle comprises sending the device location to a server only when the location-reporting status is in the reporting state.

Claim 29 depends from claim 24 and recites subject matter similar to claim 12 as follows:

wherein: the operations further comprise determining, by the CPU, a location-reporting status of the mobile device, wherein the location-reporting status is one of a reporting state and a non-reporting state; and transmitting, by the mobile device transmitter, the first information to the first vehicle further comprises sending the device location to a server only when the location-reporting status is in the reporting state.

Petitioner refers to its contentions for claims 4 and 25 regarding sending location registration requests at regular intervals and argues that the device is in a reporting state when it sends a location registration request. Pet. 60–61 (citing Ex. 1005 ¶¶ 117, 123–124; Ex. 1002 ¶¶ 167–169, 245); Pet. § VIII.A.2 (addressing claim 25)); 515 Pet. 50–51 (citing Ex. 1002 ¶¶ 168–169; 515 Pet. § VIII.A.4); *see also* Pet. 48–54 (addressing claim 25); 515 Pet. 40–44 (addressing claim 4).

Claim 16 recites,

The method of claim 1, further comprising determining coordinates of the selected position on the map, wherein data associated with the set of symbols include coordinates of positions on the map of the symbols in the set, wherein the search of the set of symbols includes a search of the coordinates of the positions of the symbols in the set for coordinates located nearest to the coordinates of the selected position, and wherein the selected facility symbol is identified as the symbol located nearest to the selected position based on a result of the search of the coordinates of the positions on the map of the symbols.

For claim 16, Petitioner refers to its contentions for the limitation of claim 1 reciting

responsive to user selection of a portion of the display corresponding to a position on the map, identifying a selected facility symbol based on the selected position, comprising: initiating a search of a set of symbols including the facility symbols for a symbol located nearest to the selected position and, based on a result of the search, identifying the selected facility symbol as the symbol located nearest to the selected position.

515 Pet. 51–55; *see* § II.D.2.j above (discussing same subject matter recited in claim 24 (recitation 24o)). Petitioner argues that a person of ordinary skill in the art would have understood that, to select a position on a map displayed on a screen, the mobile device “must necessarily determine three sets of coordinates: (1) the coordinates of the selected position of the display; (2) the coordinates of the map projected on the display corresponding to the selected position of the display; and (3) the location coordinates corresponding to the coordinates of the selected position on the map.”

515 Pet. 52 (citing Ex. 1002 ¶¶ 171–172). As to claim 16’s recitation of searching coordinates, Petitioner argues that, although “Makoto in view of Hamynen discloses that the search for the symbol nearest to the selected

position is based on geographic location coordinates,” a person of ordinary skill in the art “would have recognized that the search could have also been based on the locations’ corresponding coordinates on the map or the corresponding coordinates of the display” because these coordinates are determined in order to display the map. 515 Pet. 54 (citing Ex. 1005 ¶¶ 142–154; Ex. 1007 ¶¶ 38, 54–55). Petitioner contends that “whether the search is based on coordinates of the geographic location, coordinates of the map, or coordinates of the display, is but a design choice amongst a finite [number of] ways of performing a geographical search for the symbol nearest to the selected position.” 515 Pet. 55 (citing Ex. 1002 ¶ 178).

Claims 17 and 18 recite subject matter similar to claim 16. Claim 17 recites,

The method of claim 1, further comprising determining coordinates of the selected portion of the display, wherein data associated with the set of symbols include coordinates of portions of the display corresponding to the symbols in the set, wherein the search of the set of symbols includes a search of the coordinates of the portions of the display corresponding to the symbols in the set for coordinates located nearest to the coordinates of the selected portion of the display, and wherein the selected facility symbol is identified as the symbol located nearest to the selected position based on a result of the search of the coordinates of the portions of the display corresponding to the symbols.

Claim 18 recites,

The method of claim 1, further comprising determining coordinates of a location represented by the selected position on the map, wherein data associated with the set of symbols include coordinates of locations of entities represented by the symbols in the set, wherein the search of the set of symbols includes a search of the coordinates of the locations of the entities represented by the symbols in the set for coordinates located nearest to the

coordinates of the location represented by the selected position on the map, and wherein the selected facility symbol is identified as the symbol located nearest to the selected position based on a result of the search of the coordinates of the locations of the entities represented by the symbols.

Petitioner argues that the subject matter of claims 17 and 18 would have been obvious for reasons similar to those given for claim 16. *See* 515 Pet. 55–57 (citing Ex. 1002 ¶¶ 180–192).

Claim 19 recites, “The method of claim 1, further comprising: after identifying the selected facility symbol, displaying an address of the facility represented by the facility symbol.” Petitioner cites Makoto’s disclosure of displaying service information for a searched business and argues that displaying address information would have been obvious in view of Makoto’s disclosure and in view of Hamynen’s disclosure of displaying the street address. 515 Pet. 58–59 (citing Ex. 1005 ¶¶ 149–154; Ex. 1007 ¶ 42; Ex. 1002 ¶¶ 193–196); *see* Ex. 1005 ¶¶ 149–154 (disclosing a search for a Chinese restaurant and the display of “service information” for that restaurant); Ex. 1007 ¶ 42 (disclosing that location information can be represented by “street address”).

Claim 23 recites,

The method of claim 1, wherein the map is first map, wherein the coordinate translation data are first coordinate translation data, wherein an area depicted in the first map represents a first portion of an area depicted in a second map, and wherein the method further comprises: receiving, from a server, a third map representing a second portion of the area depicted in the second map and second coordinate translation data correlating coordinates of positions on the second map with corresponding coordinates of geographical locations.

Petitioner cites Makoto's disclosure of changing a map by zooming in and out and Konishi's disclosure of downloading maps and argues that it would have been obvious that, when the zoom of Makoto's maps is changed, new maps would be downloaded with coordinate data for the new maps. 515 Pet. 59–60 (citing Ex. 1005 ¶¶ 52–57; Ex. 1002 ¶¶ 197–200).

b) Patent Owner's Arguments

Referring to arguments it makes for the independent claims, Patent Owner contends that Petitioner has not shown “the ‘coordinate(s)’ and ‘geographical coordinate(s)’ limitations where they rely on the contents of GPS signals or GPS messages” and, therefore, that Petitioner's contentions fail for dependent claims that recite the use of coordinates. PO Resp. 29–30 (citing Ex. 2004 ¶ 58). We disagree with this argument because, for the reasons explained above in sections II.D.2.c and II.D.2.g, we find that the asserted combination teaches the use of coordinates and geographical coordinates.

Referring to arguments it makes for the independent claims, Patent Owner also argues that Petitioner has not shown that Makoto in view of Hamynen discloses “marking the map” and, therefore, cannot show that the combination teaches claim 2's recitation of “marking the map.” PO Resp. 30 (citing Ex. 2004 ¶ 59). We disagree with this argument because, for the reasons explained above in section II.D.2.i, we find that the asserted combination teaches “marking the map.” We find persuasive Petitioner's contentions for claim 2, summarized above, that Makoto teaches displaying the location of the mobile device on the map based on the GPS location. *See* 515 Pet. 39.

Patent Owner also argues that Petitioner cannot show “the search of the set of symbols” recited in each of claims 16–18, referring to its argument

for the independent claims that the asserted combination does not teach searching symbols. PO Resp. 30 (citing Ex. 2004 ¶ 60). We disagree with this argument for the reasons explained above in section II.D.2.j. We find persuasive Petitioner’s contentions for claims 16–18, summarized above, including that it would have been obvious to search coordinates to find the nearest facility. *See* 515 Pet. 55.

As noted above, claims 11, 27, and 28 recite that communication devices are associated with identifiers. Referring to its arguments for the independent claims, Patent Owner argues that “Makoto associates an identifier with a user, *not a communication device*.” PO Resp. 30–31 (citing Ex. 2004 ¶ 61; PO Resp. 22–24). This argument conflicts with Patent Owner’s assertion as to the independent claims that “Makoto identifies a device, not a participant.” PO Resp. 23 (citing Ex. 2004 ¶ 42); *see also* PO Resp. 23 (asserting that Makoto’s “‘communication device ID’ remains with the device, not the participant”). Putting aside Patent Owner’s inconsistent assertions, we find that Makoto’s communication device ID corresponds to, and is associated with, the device and the device’s user for the reasons explained above in section II.D.2.e.

For the limitation of claims 12 and 29 reciting “sending the device location to a server only when the location-reporting status is in the reporting state,” Patent Owner contends that “Petitioner does not argue that any specific reference discloses this limitation” and that “Petitioner points only to the Declaration of Dr. Chatterjee, who submits that whether the mobile communication device transmits or remains passive determines whether it is in a ‘reporting’ or ‘non-reporting’ state without citing to any evidence.” PO Resp. 31 (citing Ex. 2004 ¶ 62).

We disagree with Patent Owner’s arguments because they do not account for the fact that Petitioner’s contentions for claims 12 and 29 refer to its contentions for claims 4 and 25 to show that the asserted combination teaches that the devices are in a reporting state when they transmit location information at regular intervals, as taught by Konishi. Pet. 60–61 (citing Ex. 1005 ¶¶ 117, 123–124; Ex. 1002 ¶¶ 167–169, 245; Pet. § VIII.A.2 (addressing claim 25)); 515 Pet. 50–51 (citing Ex. 1002 ¶¶ 168–169; 515 Pet. § VIII.A.4); *see also* Pet. 48–54 (addressing claim 25); 515 Pet. 40–44 (addressing claim 4). Konishi discloses reporting location information “at regular time intervals.” Ex. 1008 ¶ 33; *see* Pet. 51 (discussing this disclosure); *see* 515 Pet. 42–43 (discussing this disclosure). Petitioner contends that a person of ordinary skill in the art would have combined Konishi’s regular reporting functionality with Makoto to provide updated information without requiring the user to manually request updated location information. 515 Pet. 41–44 (citing Ex. 1008 ¶¶ 26–33; Ex. 1002 ¶¶ 138–143); Pet. 48–54 (citing Ex. 1005 ¶¶ 17, 103, 114–117, 119–124; Ex. 1008 ¶¶ 26–33; Ex. 1002 ¶¶ 134–145, 232).

c) Conclusion for Claims 2–12, 16–19, 23, and 25–29

Having considered the parties’ arguments and the complete trial record, we find persuasive Petitioner’s contentions and evidence, summarized above, and we conclude that the subject matter of claims 2–12, 16–19, 23, and 25–29 would have been obvious based on the combined teachings of Makoto, Konishi, Paul, and Hamynen.

*E. Obviousness Based on Makoto, Konishi, Paul, Hamynen, and Agrawal
(Claims 13–15, 30, 31)*

Petitioner asserts that claims 13–15, 30, and 31 would have been obvious over the combined teachings of Makoto, Konishi, Paul, Hamynen, and Agrawal. Pet. 61–66; 515 Pet. 61–65.

Claim 13 depends from claim 1 and recites

wherein transmitting the first information to the first vehicle comprises transmitting data including the first information to a server using an Internet Protocol, wherein the second information corresponding to the first vehicle is transmitted by the server to the mobile device using the Internet Protocol, and wherein an IP address of the server is accessible to the mobile device.

Claim 14 depends from claim 13 and recites “wherein the data transmitted to the server further includes a second identifier corresponding to a second network participant associated with the computing device corresponding to the first vehicle.” Claim 15 depends from claim 14 and recites that “the server stores an IP address of the computing device associated with the second network participant identified by the second identifier” and that “the server transmits the first information to the computing device corresponding to the first vehicle in a message addressed to the stored IP address of the computing device corresponding to the first vehicle.”¹⁶

¹⁶ Claim 15 recites steps performed by the server even though independent claim 1, from which claim 15 ultimately depends, recites a “method performed by a mobile device.” This apparent conflict in the claims does not impact our ability to render a decision on whether the claimed subject matter would have been obvious based on the asserted combination of references. *See Samsung Elecs. Am., Inc. v. Prisua Eng'g Corp.*, 948 F.3d 1342, 1355 (Fed. Cir. 2020) (noting that indefiniteness “does not necessarily preclude the Board from addressing the patentability of the claims on section 102 and 103 grounds”).

Claim 30, depending from claim 24, and claim 31, depending from claim 30, recite subject matter similar to claims 13–15.

For these claims, Petitioner refers to its contentions for the independent claims regarding Makoto’s disclosure of transferring information between devices via location service providing device 305 (server). 515 Pet. 61–65; Pet. 61–66. Petitioner acknowledges that Makoto does not mention using Internet Protocol (IP) for transmission, and Petitioner argues that a person of ordinary skill in the art would have used IP in Makoto’s system, relying on Agrawal’s disclosure of the benefits of communicating in wireless networks using IP. 515 Pet. 62–63 (citing Ex. 1009 ¶¶ 2–3, 5, 14; Ex. 1002 ¶¶ 255–256); Pet. 62–63 (citing Ex. 1009 ¶¶ 2–3, 5, 14; Ex. 1002 ¶¶ 253–255, 264).¹⁷ For example, Agrawal discloses that “cellular phones and other similar wireless devices allow individuals to access the Internet when communicating through wireless IP-based networks, thereby providing tremendous convenience, power and flexibility.” Ex. 1009 ¶ 3; *see* 515 Pet. 62 (discussing this disclosure). Petitioner argues that, in the combination, the “mobile communication device would have access to the IP address of location information service providing device 305” based on Agrawal’s disclosure of using IP addresses to transmit data in IP networks. 515 Pet. 63 (citing Ex. 1009 ¶ 5; Ex. 1005 ¶¶ 117–122; Ex. 1002 ¶ 256); Pet. 64–65 (citing Ex. 1009 ¶ 5; Ex. 1005 ¶¶ 117–122; Ex. 1002 ¶¶ 256, 266); *see* Ex. 1009 ¶ 5 (“Information is communicated between different users by specifying the information content, source IP address of the information sender, and destination IP address of the information recipient.”). Petitioner also argues that location

¹⁷ Agrawal is Exhibit 1009, not Exhibit 1008 as cited by Petitioner.

information service providing device 305 would store the IP addresses of the devices with which it communicates. 515 Pet. 65 (citing Ex. 1009 ¶ 5; Ex. 1002 ¶ 262); Pet. 66 (citing Ex. 1009 ¶ 5; Ex. 1002 ¶¶ 261–262, 267).

Patent Owner relies on the arguments addressed above in § II.D.2 and does not set forth additional arguments for claims 13–15, 30, and 31. *See* PO Resp.

For the reasons given by Petitioner and summarized above, we find that the combination of Makoto, Konishi, Paul, Hamynen, and Agrawal teaches the subject matter of claims 13–15, 30, and 31 and that a person of ordinary skill in the art would have combined the teachings of the references, including Agrawal’s disclosures of the use of IP, in the manner asserted with a reasonable expectation of success. Based on Petitioner’s contentions and evidence, therefore, we conclude that the subject matter of claims 13–15, 30, and 31 would have been obvious based on the combined teachings of Makoto, Konishi, Paul, Hamynen, and Agrawal.

F. Obviousness Based on Makoto, Konishi, Paul, Hamynen, and Scaer (Claims 20–22)

Petitioner asserts that claims 20–22 would have been obvious over the combined teachings of Makoto, Konishi, Paul, Hamynen, and Scaer. 515 Pet. 65–73.

Claim 20 depends from claim 1 and recites

wherein the mobile device is a first mobile device, wherein the map is a first map, and wherein the method further comprises:

receiving second user input via user interaction with a second portion of the display of the first mobile device, the second user input specifying a position on the first map of an event symbol representing an event; and

based on the second user input:

determining coordinates of a location of the event based on coordinates of the specified position on the first map and the

- coordinate translation data;
- associating the location of the event with the event symbol;
- displaying the event symbol at the specified position on the first map; and
- transmitting the location of the event to a second mobile device corresponding to the first vehicle, wherein the second mobile device is operable to display a second map and to place the event symbol on the second map.

Claim 21 depends from claim 20 and recites “wherein the coordinates of the location of the event are determined based on coordinates of the position of the event symbol on the map and the coordinate translation data.” Claim 22 depends from claim 20 and recites “wherein the coordinates of the location of the event are determined based on coordinates of the second portion of the display and the coordinate translation data.”

Thus, claims 20–22 add “an event symbol representing an event” to the map of claim 1, which already includes a participant symbol, one or more facility symbols, and one or more vehicle symbols. Petitioner argues that it would have been obvious to allow users to include event symbols on the map based on Scaer’s teachings of allowing users to include traffic incident information on a map. 515 Pet. 66–71 (citing Ex. 1010 ¶¶ 3, 23, 24, 40–42, Figs. 8–10; Ex. 1005 ¶¶ 126, 129; Ex. 1002 ¶¶ 271–277). For example, Scaer discloses allowing users to report incidents such as “traffic accidents, traffic congestion, road construction, road closures, weather events, and other traffic-related events that affect vehicle travel on roads.” Ex. 1010 ¶ 41; *see* 515 Pet. 66–67 (discussing this disclosure). Scaer discloses in Figure 9 (not shown) that users can enter location information for the incident. *See* 515 Pet. 67 (showing Scaer’s Figure 9).

Petitioner contends that a person of ordinary skill in the art “would

have recognized the benefits of transferring selected area of interest/event location information to location information service providing device 305, such as enabling users to not only share their locations, as taught by Makoto, but also the locations of areas of interest/event, as taught by Scaer.” 515 Pet. 69 (citing Ex. 1002 ¶ 274). Petitioner argues that a person of ordinary skill in the art would have recognized that, by combining the teachings of Makoto, Hamynen, and Scaer, “a user could beneficially specify an area of interest/event for display on a map as a symbol and for transmission to other devices, as discussed above, by simply selecting a portion of the touch screen display showing a map corresponding to the location of the area of interest/event, as taught by Hamynen.” 515 Pet. 70 (citing Ex. 1002 ¶ 276). Petitioner argues that a person of ordinary skill in the art would have had a reasonable expectation of success in making the combination because “Makoto’s system is already capable of sharing and displaying mobile device locations, and so programming the system to share and display similar information for areas of interest instead of devices would have been a straightforward extension of Makoto’s teachings.” 515 Pet. 71 (citing Ex. 1002 ¶ 277). Petitioner argues that this combination of Scaer’s event teachings with the combination of Makoto, Konishi, Paul, and Hamynen discussed for claim 1 teaches the subject matter of claims 20–22. 515 Pet. 65–73.

Referring to arguments it makes for the independent claims, Patent Owner contends that Petitioner has not shown “the ‘coordinate(s)’ and ‘geographical coordinate(s)’ limitations where they rely on the contents of GPS signals or GPS messages” and, therefore, that Petitioner’s contentions fail for dependent claims 20–22, which recite “coordinates.” PO Resp. 29–30 (citing Ex. 2004 ¶ 58). We disagree with this argument because, for the

reasons explained above in sections II.D.2.c and II.D.2.g, we find that the asserted combination for claim 1 teaches the use of coordinates and geographical coordinates.

For the reasons given by Petitioner and summarized above, we find that the combination of Makoto, Konishi, Paul, Hamynen, and Scaer teaches the subject matter of claims 20–22 and that a person of ordinary skill in the art would have combined the teachings of the references, including Scaer’s disclosures of incident reporting, in the manner asserted with a reasonable expectation of success. Based on Petitioner’s contentions and evidence, therefore, we conclude that the subject matter of claims 20–22 would have been obvious based on the combined teachings of Makoto, Konishi, Paul, Hamynen, and Scaer.

G. Patent Owner’s Arguments as to Dr. Chatterjee’s Testimony

Patent Owner argues that “Dr. Chatterjee has no experience in GPS satellite, GPS receiver, and GPS communications systems,” that he “failed to base any of his opinions on the GPS specifications at the time of the invention,” and that his “opinions directly contradict the GPS standards at the time of the invention (in a manner necessary to achieve a favorable outcome for Petitioner).” PO Resp. 8–11 (citing Ex. 2005, 11:22–12:7, 12:18–24, 13:4–8, 45:7–9, 45:11–18, 46:9–14). Patent Owner therefore contends that “Dr. Chatterjee’s opinions regarding the numerous ‘coordinates’ limitations are conclusory, unsupported, and unreliable” and that we should accord no weight to his testimony. PO Resp. 11.

Petitioner responds that Patent Owner’s arguments are without merit and that Dr. Chatterjee fully explained how the prior art maps to the claims, both in his written testimony and during cross-examination. Pet. Reply 12–13 (citing Ex. 1002 ¶¶ 49–284; Ex. 2005, 14:18–49:25).

In its Sur-reply, Patent Owner argues Dr. Chatterjee's second declaration is "an effort to supplement a deficient Petition." PO Sur-reply 11. Patent Owner also reiterates its argument that Dr. Chatterjee has no relevant experience in GPS satellite systems and that his deposition testimony shows that his opinions on coordinates are conclusory, unsupported by evidence, and plain wrong. PO Sur-reply 12–13 (citing Ex. 2005, 11:11–14:17, 16:13–17:2, 22:22–23:20, 44:8–18, 47:24–48:5).

As a threshold matter, Patent Owner did not file a motion to exclude or strike Dr. Chatterjee's declaration testimony. *See* Paper 12, 10 (setting a deadline for parties to may file a motion to exclude evidence under 37 C.F.R. § 42.64(c)). We have, however, considered Patent Owner's arguments as to Dr. Chatterjee's testimony and do not find them persuasive.

We begin by assessing Dr. Chatterjee's ability to testify as to the patentability issues presented here. A witness offering expert testimony as to the understanding of one of ordinary skill in the art must have at least ordinary skill to provide relevant and reliable testimony that is helpful to the factfinder. *See Kyocera Senco Indus. Tools, Inc. v. ITC*, 22 F.4th 1369, 1376–77 (Fed. Cir. 2022). Dr. Chatterjee has a bachelor's degree in electrical engineering and computer science from the University of California, Berkeley, and a doctorate degree in computer science from the Massachusetts Institute of Technology. *See* Ex. 1002 ¶ 5. Dr. Chatterjee has studied "networked client architectures and systems" and authored a book on developing web services. Ex. 1002 ¶¶ 5, 9. He also claims to have "extensive experience in architecting, developing, optimizing, deploying and managing computing systems, including location-based systems." Ex. 1002 ¶ 10; *see also* Ex. 1002 ¶¶ 7, 8. This level of skill exceeds the qualifications for the level of ordinary skill in the art under the definition we have adopted

for purposes of this opinion. *See* § II.B above. We are not persuaded that the portions of Dr. Chatterjee’s deposition testimony to which Patent Owner directs us raise questions as to his qualifications to offer testimony in this matter.¹⁸ We therefore find that Dr. Chatterjee is qualified to offer testimony on issues from the vantage point of an ordinarily skilled artisan and that his opinions are based on specialized knowledge, training, and experience.

“The Board has broad discretion to assign weight to be accorded expert testimony.” Patent Trial and Appeal Board Consolidated Trial Practice Guide, 35 (Nov. 2019) (*available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated>). In reviewing and according weight to Dr. Chatterjee’s testimony, as well as Dr. Terveen’s testimony, we have separately considered whether each aspect of their testimony is supported by the disclosures of the prior art references, the challenged patent, and other evidence of record. *See Elbit Sys. of Am., LLC v. Thales Visionix, Inc.*, 881 F.3d 1354, 1358 (Fed. Cir. 2018) (“The PTAB is entitled to weigh the credibility of the witnesses.”); *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1041 (Fed. Cir. 2017) (“To the extent [a party] challenges the PTAB’s factual findings, . . . the PTAB is permitted to weigh expert testimony and other record evidence and, in so doing, rely on certain portions of an expert’s declaration while disregarding others.”). We have considered Patent Owner’s critiques of Dr. Chatterjee’s testimony as we

¹⁸ For example, Dr. Chatterjee’s testimony regarding whether he had ever designed a GPS satellite system or an actual satellite (Ex. 2005, 13:11–13:20) does not disqualify him from offering testimony here. Notably, Dr. Terveen’s proposed level of ordinary skill in the art for the ’100 patent requires no specific experience in GPS satellites, receivers, or systems. *See* Ex. 2004 ¶ 27.

analyzed Petitioner's grounds and accorded his testimony appropriate weight.

III. CONCLUSION¹⁹

For the reasons discussed above, we determine that Petitioner has proven, by a preponderance of the evidence, that claims 1–31 of the '100 patent is unpatentable, as summarized in the following tables:

IPR2022-00514:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
24–29	103(a)	Makoto, Konishi, Paul, Hamynen	24–29	
30, 31	103(a)	Makoto, Konishi, Paul, Hamynen, Agrawal	30, 31	
Overall Outcome			24–31	

IPR2022-00515:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–12, 16–19,	103(a)	Makoto, Konishi, Paul, Hamynen	1–12, 16–19, 23	

¹⁹ 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).

23				
13–15	103(a)	Makoto, Konishi, Paul, Hamynen, Agrawal	13–15	
20–22	103(a)	Makoto, Konishi, Paul, Hamynen, Scaer	20–22	
Overall Outcome			1–23	

IV. ORDER

Accordingly, it is

ORDERED that claims 1–31 of the '100 patent have been shown to be 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.

IPR2022-00514
Patent 10,299,100 B2

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