

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FEDEX CORPORATE SERVICES, INC.,
Petitioner,

v.

ROAMBEE CORPORATION,
Patent Owner.

IPR2022-00934
Patent 10,990,922 B1

Before KEN B. BARRETT, KRISTEN L. DROESCH, and
PAUL J. KORNICZKY, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable
Denying Patent Owner's Revised Motion to Amend

35 U.S.C. § 318(a)

Granting Petitioner's Motion to Exclude

37 C.F.R. § 42.64

I. INTRODUCTION

A. Background and Summary

FedEx Corporate Services, Inc. (“Petitioner”)¹ filed a Petition requesting *inter partes* review of U.S. Patent No. 10,990,922 B1 (“the ’922 patent,” Ex. 1001). Paper 1 (“Pet.”). The Petition challenges the patentability of claims 1–20 of the ’922 patent. We instituted an *inter partes* review of all challenged claims on all proposed grounds of unpatentability. Paper 12. Roambee Corporation (“Patent Owner”)² filed a Response to the Petition. Paper 15 (“PO Resp.”). Petitioner filed a Reply (Paper 18, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 22, “PO Sur-reply”).

Patent Owner also filed a contingent Motion to Amend proposing substitute claims 21–40 if we find the original claims unpatentable (Paper 16) and Petitioner filed an Opposition (Paper 19). Pursuant to Patent Owner’s request, we provided Preliminary Guidance on the Motion to Amend. Paper 21. Patent Owner then filed a Revised Contingent Motion to Amend. Paper 23 (“Rev’d MTA” or “RMTA”). Petitioner filed an Opposition to Patent Owner’s Revised Contingent Motion to Amend (Paper 26, “Pet. RMTA Opp.”), Patent Owner filed a Reply (Paper 30, “PO RMTA Reply”), and Petitioner filed a Sur-reply (Paper 35, “Pet. RMTA Sur-reply”).

Additionally, Petitioner filed a Motion to Exclude Evidence (Paper 32), to which Patent Owner filed an Opposition (Paper 34), and Petitioner filed a Reply (Paper 36).

¹ Petitioner identifies FedEx Corporate Services, Inc. as the real party-in-interest. Pet. 61.

² Patent Owner identifies Roambee Corporation as the real party-in-interest. Paper 4, 2.

An oral hearing was held on August 31, 2023, and a transcript of the hearing is included in the record. Paper 40 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–20 of the ’922 patent are unpatentable. We also determine that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–40 are unpatentable. Accordingly, we *deny* Patent Owner’s Revised Contingent Motion to Amend. We also *grant* Petitioner’s Motion to Exclude.

B. Related Proceedings

Both parties identify, as a matter involving or related to the ’922 patent, *FedEx Corporate Services, Inc. v. Roambee, Corp.*, No. 1:21-cv-00175-CFC (D. Del.). Pet. 61; Paper 4, 2. Petitioner also indicates that the following Patent Trial and Appeal Board cases involve patents asserted in the Delaware litigation: IPR2022-00584, IPR2022-00585, IPR2022-00586, and IPR2022-00587. Pet. 61.

C. The ’922 Patent

The ’922 patent, according to the Specification, “relates to continuous inventory management, more specifically, utilizing multiple mobile devices to relay inventory management information.” Ex. 1001, 1:5–7. The Specification indicates that conventional inventory management relies upon humans in the tracking of assets, and this leads to errors and, in turn, inefficiencies. *Id.* at 1:11–15. The Specification also indicates that conventional truck load tracking does not provide automatic feedback of movement, location, or the condition of the shipment in transit, or whether the shipment was moved from one carrier to another. *Id.* at 1:16–21. Thus,

according to the '922 patent, “there is a need for systems, methods, and devices for improved techniques to track inventory utilizing multiple mobile devices listening for wireless signals from inventory affixed wireless trackers without the need for human intervention.” *Id.* at 1:23–26.

The '922 patent discloses a method for tracking the location of an asset during a shipment using a wireless tracker and a mobile device. *Id.* at 1:30–39.

[A] system 100 for tracking a shipment using a wireless tracker . . . includes one or more computer servers 102 that may host a web portal 104 or other user portal. A user device (114–116) such as a smartphone, tablet computer, laptop computer, and desktop computer may access the web portal 104 over the Internet 108. Alternatively, a user device 114 may access the computer server(s) 102 across a mobile network 106. In addition, a geo-fence origin area 110 may be set around the asset having the wireless tracker 112 which has a wireless signal that is received by user device 114 or 116 and is in communication with the computer server(s) 102 over the mobile network 106. Such a system may be used by a shipping delivery company or a company that frequently ships various assets among the company's facilities that are separated by geographic distances. As the asset is moved[,] its wireless signal from the wireless tracker is sensed by mobile device 120 which relays an identification, data packet and location of the cell phone at the time of reception of the wireless signal to the cloud server.

Id. at 4:14–34.

[T]he wireless tracker 112 may include one or more sensors that are configurable. Further, the wireless tracker 112 may access and forward the sensor information. In addition, the wireless tracker 112 may determine a trigger event based on the location of the wireless tracker 112 or sensor information such as deceleration or movement of the truck door. In addition, the wireless tracker 112 may send or transmit a notification to the computer server 102 based on the trigger

event. Further, the computer server(s) may forward the notification to user devices (114–116). The wireless tracker 112 may send or transmit sensor data to the computer server 102. Further, the computer server(s) may forward the sensor data or other sensor data to user devices (114–116).

Id. at 4:58–5:4.

“The wireless tracker 200 includes communication module 210 and authentication module 204.” *Id.* at 5:14–16. “A passive radio frequency identification (RFID) tag 208 is . . . programmed to have a unique identity/identification.” *Id.* at 5:17–19.

The authentication module 204 is used to track the chain of custody of the shipment associated with the wireless tracker 200. In one embodiment, a shipper at a shipment origin may enter an authentication code into the authentication module 204. . . . Upon receiving the shipment at the shipment destination, a receiver of the shipment may open the shipment to access the authentication code on the packing slip. The authentication code is entered into the authentication module 204 and verified (either locally or at a server). In addition, the verification may include determining whether the wireless tracker 200 is within a distance threshold of the shipment destination in accordance with the shipment order.

Id. at 6:50–67. “If the code was determined to be received by the authentication module 204 within both the distance threshold and [a] time threshold then the management module 212 may transmit a notification to a computer server through the communication module 210 verifying chain of custody.” *Id.* at 7:15–20.

D. Illustrative Claim

Of the challenged claims of the '922 patent, claims 1, 10, and 15 are independent claims. The remaining challenged claims are dependent claims.

Claim 1, reproduced below with Petitioner's bracketed annotations inserted, is illustrative.

1. [1pre] A method, comprising:
 - [1a] associating a wireless tracker co-located with an asset, wherein the wireless tracker emits a tracker identification and a sensor payload including a fixed identification;
 - [1b] receiving a code via the wireless tracker at a shipment origin;
 - [1c] receiving, by at least one of a plurality of mobile devices, the tracker identification, and the sensor payload as the asset and wireless tracker are moved from one location to another location;
 - [1d] forwarding the tracker identification, the sensor payload, and an associated location of the at least one of the plurality of mobile devices to a server; and
 - [1e] monitoring the tracker identification and the associated location of the at least one of the plurality of mobile devices;
 - [1f] receiving another code at the wireless tracker at a shipment destination;
 - [1g] determining that the location of the wireless tracker is within a distance threshold of the shipment destination; and
 - [1h] transmitting a notification via the wireless tracker to the server to verify a chain of custody of the shipment when the another code was received by an authentication module of the wireless tracker within a time threshold and the distance threshold.

Ex. 1001, 16:10–36.

E. Evidence

Petitioner relies on the following references:

Name	Reference	Exhibit(s)
Sharma	US 2015/0262123 A1; published Sept. 17, 2015	1005
Cova	US 8,314,704 B2, issued Nov. 20, 2012	1007

Petitioner also relies on the declaration of Dr. Daniel Engels (Ex. 1003) in support of its arguments, and Patent Owner relies on the

declarations of Dr. Abdelsalam A. Helal (Exs. 2005, 2007, 2013) in support of its arguments. The parties also rely on other exhibits as discussed below.

F. Instituted Ground of Unpatentability

We instituted an *inter partes* review of the challenged claims on the following ground:

Claim(s) Challenged	35 U.S.C. § ³	Reference(s)/Basis
1–20	103	Sharma, Cova

II. PETITIONER’S MOTION TO EXCLUDE

Petitioner moves to exclude Exhibits 2013, 2014, and 2015.

Paper 32, 1. The exhibits pertain to Patent Owner’s arguments regarding the meaning of “mobile device” and include a new declaration by Patent Owner’s expert. *See* Paper 34, 1. The exhibits were submitted with Patent Owner’s Sur-reply, and thus after the filing of Petitioner’s last authorized substantive brief and after the close of discovery. *See* Paper 13 (Scheduling Order). Petitioner argues, *inter alia*, that the exhibits are unduly prejudicial because they were untimely filed and because the new declaration (Ex. 2013) “contains impermissible new evidence submitted in support of the Sur-Reply that was not previously submitted in this proceeding,” and submitted “long after [Patent Owner] Roambee set forth its proposed construction of ‘mobile device’ in the Patent Owner Response.” Paper 32, 2–3; *see also id.* at 7–9 (arguing Exhibits 2014 and 2015 also are unduly prejudicial).

³ The ’922 patent was filed after the effective date of the relevant aspects of the Leahy Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), and we apply the AIA versions of 35 U.S.C. §§ 103 and 112.

Petitioner further argues that:

[Patent Owner] Roambee should not be allowed to stuff the record with new and improper evidence. Exs 2013, 2014, and 2015 should be excluded at least under FRE 403 due to Roambee's late submission of the exhibits. Roambee had every opportunity to submit timely evidence with its Patent Owner Response filed January 26, 2023 (POR), but it chose then not to submit this evidence in support its construction of "mobile device" in the POR. Paper 15, at 5–10. Roambee now attempts to backfill evidence supporting its POR positions, but Roambee must live with its strategic choice. [Petitioner] FedEx would be unduly prejudiced by allowing Roambee to add Exs 2013, 2014, and 2015 to the record over four months after Roambee's discovery window closed, and two months after FedEx's discovery window closed.

Paper 36, 1. Petitioner further argues that "the Trial Practice Guide's bright-line prohibition on Sur-Reply evidence supports exclusion." *Id.* (citing Patent Trial and Appeal Board Consolidated Trial Practice Guide (2019), 73 ("The sur-reply may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness.")).

Patent Owner argues that the new expert declaration is not unduly prejudicial because the statements "in Dr. Helal's declaration[] were directly responsive to Petitioner's own arguments set forth in its Reply, and were consistent with the positions that Roambee has set forth from the beginning of this proceeding." *Id.* at Paper 34, 4. Similarly, Patent Owner argues, as to Exhibit 2014, that "Petitioner also cannot show that this publication is irrelevant under Rule 401 or prejudicial under Rule 403, because it is an example of how the term 'mobile device' is commonly used, which is probative of a key disputed fact—the plain meaning of 'mobile device.'" *Id.* at 9; *see also id.* at 11–12 (similar arguments for Exhibit 2015).

The Board’s rules, as reiterated in the Trial Practice Guide, provide that “[a] sur-reply . . . may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness.” 37 C.F.R. § 42.23(b); Consolidated Trial Practice Guide 73, <https://www.uspto.gov/TrialPracticeGuideConsolidated>. This rule not only promotes the orderly presentation of the parties’ respective cases and the joining of issues early, but also serves to minimize the possibility of undue prejudice to a party due to the introduction of evidence—particularly new expert opinion testimony—without an adequate opportunity to test the veracity of the witness’s testimony through cross-examination and to otherwise respond to the new evidence in briefing.

In its Preliminary Response, Patent Owner argued that no formal claim constructions are necessary, but then argued that “mobile device” has a particular meaning in the ’922 patent and further argued the devices (including a smartphone) in the relied-on prior art references were not such a mobile device. *See* Paper 11, 6, 10–11, 14–15. Thus, Patent Owner should have recognized early in this case that the meaning of the term was at issue. Removing any doubt, we discussed Patent Owner’s implied construction in the Decision on Institution, and preliminary determined that Patent Owner’s understanding of the recited term “mobile device” was not correct. *See* Paper 12, 12–14. Patent Owner’s Response, the next substantive brief in the case, addressed the claim construction issue and Patent Owner submitted a supplemental declaration of Dr. Helal in support of those arguments. *See* PO Resp. 5–10. Rather than submit other allegedly supporting evidence at that time, Patent Owner waited to do so until after Petitioner filed its Reply (Petitioner’s final substantive brief addressing the original challenge), where

Petitioner argued, *inter alia*, that “Dr. Helal’s testimony should be given little weight, if any,” and that “[h]is supplemental declaration consists almost entirely of statements that are not supported by the ’922 patent.” Pet. Reply 25.

Patent Owner should have been on notice of the potential claim construction dispute as of the filing of the Petition, over a year before the filing of Patent Owner’s Sur-reply, and certainly was on notice upon the issuance of the Decision on Institution. Patent Owner had the opportunity to address claim construction in its post-institution Response and to submit supporting evidence at that time. Patent Owner offers no reasonable excuse for belatedly filing exhibits purporting to support its arguments and Dr. Helal’s opinions. Rather, Patent Owner concedes that it filed the exhibits after Petitioner pointed out that many of Dr. Helal’s opinions were unsupported. *See* PO Sur-reply 2 n.1 (“Roambee introduces this declaration [Exhibit 2013] strictly to support its responses to Petitioner’s arguments in Reply, which include assertions regarding Dr. Helal’s testimony, and not to serve as new evidence.”); Paper 34 (Patent Owner arguing that “all of the paragraphs in Ex. 2013 pertain to Roambee’s arguments in its Sur-Reply, which in turn respond to issues that Petitioner raised—some for the first time—in Reply” (citing Paper 18, 25); Pet. Reply (Paper 18), 25 (Petitioner arguing that Dr. Helal’s testimony should be given little or no weight because many of his statements are unsupported).⁴ Due to Patent Owner’s

⁴ Patent Owner’s assertion that the exhibit was not intended to be new evidence does not avoid the rule precluding new evidence with the sur-reply; the submission is evidence and it is new. PO Sur-reply 2 n.1. And, a reasonable reply to Petitioner’s argument that the expert’s testimony is

untimely filing, Petitioner's did not have an adequate opportunity to address Patent Owner's new evidence.

We grant Petitioner's motion to exclude Patent Owner's Exhibits 2013, 2014, and 2015, at least because they were filed in violation of 37 C.F.R. § 42.23(b).

III. ANALYSIS OF THE INSTITUTED CHALLENGE

A. Principles of Law

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must establish by a preponderance of the evidence that the challenged claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

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

unsupported would be to point out where support was previously provided, not the new submission of alleging supporting material.

obviousness or non-obviousness.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. The Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey–Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)).

Petitioner contends that:

A skilled artisan as of February 2, 2019 the '922 patent's earliest priority date would have been someone with at least a bachelor's degree in electrical engineering, computer engineering, or a related field, and at least two years of experience in design, development, and/or testing of hardware or software used in sensor networks and associated software, or the equivalent, with additional education substituting for experience and vice versa.

Pet. 6–7 (citing Ex. 1003 ¶ 35). Patent Owner does not dispute Petitioner's definition. PO Resp. 2.

Petitioner's definition is consistent with the level of ordinary skill reflected in the prior art references of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (recognizing that the prior art itself may reflect an appropriate level of skill in the art). We adopt Petitioner's definition of the person of ordinary skill in the art.

⁵ The parties have not directed our attention to any objective evidence of obviousness or non-obviousness.

C. Claim Construction

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). See 37 C.F.R. § 42.100(b). In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

The Petitioner states that no claim terms require express construction because the claims are unpatentable under any reasonable construction. Pet. 7. In the Preliminary Response, Patent Owner argued that no formal claim construction was necessary because Petitioner’s arguments fail under any reasonable construction. Paper 11, 6–7. However, in the Institution Decision, we stated that “certain of Patent Owner’s arguments involve implied claim constructions that merit discussion [in that decision]” and we also addressed, in the context of discussing Petitioner’s obviousness ground, certain other potential claim construction issues raised by the parties’ contentions. See Paper 12, 9. In the claim construction section of Response, Patent Owner discussed the construction of “mobile device,” “plurality of mobile devices,” “distance threshold,” “predefined geolocation,” and “cloud server.” PO Resp. 4–18.

1. Mobile Device

Patent Owner, *inter alia*, urges us to adopt a construction of the recited “mobile device” in a manner to exclude Cova’s shipboard relay from the scope of that term. *See, e.g.*, PO Resp. 33–36. We need not reach these specific arguments. As discussed further below in the analysis of Petitioner’s instituted obviousness challenge, Sharma’s user device, of which a smartphone is an example, is utilized in Petitioner’s challenges, and Patent Owner agrees that a smartphone is a “mobile device.” *See, e.g.*, PO Resp. 28–29 (“[Patent Owner] recognizes that *Sharma* identifies a ‘smartphone’ as an example of a ‘user device,’ . . . and that a ‘smartphone’ can be a type of mobile device as the term appears in the ’922 patent.”). Patent Owner’s concession is consistent with the ’922 patent, which identifies a smartphone as an example of a “mobile device.” *See, e.g.*, Ex. 1001, 14:41 (“a mobile device 714 such as a smart phone”).

We do note here, however, that the Specification indicates that the drafter sought very broad scope for a “mobile device,” giving it the same definition as a “user device,” which encompasses *any computing device*. *See* Ex. 1001, 15:56–59 (“[T]he terms user device and mobile device called out within this document refer to a mobile device which the user utilizes.”); *id.* at 13:7–9 (“Examples of user devices, include, but are not limited to, desktop computers, laptop computers, tablet computers, smartphones, and *any other computing devices*.” (emphasis added)).

We address below, in analyzing Petitioner’s application of the prior art to the claim limitations, Patent Owner’s remaining arguments as to why Sharma’s smartphone is not a mobile device.

2. *Plurality of Mobile Devices*

Patent Owner proposes a construction for a “plurality of mobile devices,” which is found in the claim phrase “receiving, by at least one of a plurality of mobile devices.” PO Resp. 10–13; Ex. 1001, 16:17 (claim 1). The parties agree that “plurality” means “multiple,” and we adopt that meaning in this decision. *See* PO Resp. 13; Pet. Reply 6. We address below, in the discussion of Petitioner’s contentions regarding specific claim limitations, Patent Owner’s proposed additional limitations on the phrase “plurality of mobile devices,” namely that this requires “receiving” by a plurality of the “at least one” mobile devices and also that there be a plurality of such devices in the proximity of the asset at each location along the journey from origin to destination. *See* PO Resp. 13.

3. *Distance Threshold and Predefined Geolocation*

Patent Owner argues that a “distance threshold” and a “predefined geolocation” are distinct from one another. PO Resp. 15; *see also id.* at 13–16 (proposing constructions for both terms).

Claim 1 recites, in pertinent part, “determining that the location of the wireless tracker is within a *distance threshold* of the shipment destination; and transmitting a notification via the wireless tracker to the server to verify a chain of custody of the shipment when the another code was received by an authentication module of the wireless tracker within a time threshold and the *distance threshold*.” Ex. 1001, 16:29–36 (emphasis added).

There is no dispute that Petitioner’s prior art discloses a “distance threshold” within the meaning of the ’922 patent. PO Resp. 13 (“Roambee does not dispute that *Sharma* discloses a ‘distance threshold’ as claimed in claim 1, Element [1g].”). We determine that there is no need to explicitly construe “distance threshold.”

Claim 2 depends from claim 1 and recites “determining whether the tracker identification and associated location are located within a *predefined geolocation*,” and claim 3, which depends from claim 2, recites “setting an alert if the tracker identification and associated location are outside the *predefined geolocation*.” Ex. 1001, 16:37–42 (emphasis added).

Patent Owner “contends that ‘predefined geolocation’ should be given its plain and ordinary meaning, as a [person of ordinary skill in the art] would understand it,” and that, “[i]n this context, a [person of ordinary skill in the art] would understand a ‘predefined geolocation’ to refer to any established geographical area.” PO Resp. 15 (citing Ex. 2007 ¶ 27). Petitioner agrees that, if a construction is necessary, a “‘predefined geolocation’ refers to an established geographical area for the purposes of this proceeding.” Pet. Reply 9–10 (citing PO Resp. 15). Thus, the parties agree that “predefined geolocation” refers to an established geographic area. We adopt the parties agreed-on definition and apply it in this decision.

4. *Cloud Server*

Dependent claim 7 recites “wherein at least one of the associating, receiving and monitoring is performed by a cloud server.” Ex. 1001, 16:51–53. Patent Owner, *inter alia*, urges us to adopt a construction of the recited “cloud server” in a manner to exclude Sharma’s server(s) from the scope of that term. *See, e.g.*, PO Resp. 16–18.

We address below, in analyzing Petitioner’s application of the prior art to the claim limitations, Patent Owner’s arguments as to why Sharma allegedly fails to disclose or suggest a “cloud server.”

D. The Alleged Obviousness of Claims 1–20 Over Sharma and Cova

Petitioner alleges that the subject matter of claims 1–20 of the '922 patent would have been obvious over Sharma and Cova. *See* Pet. 11–35 (addressing independent claim 1). Petitioner contends, for example, that Sharma discloses or suggests much of the subject matter of independent claim 1 and argues, *inter alia*, that “an ordinarily skilled artisan would have been motivated to modify the user devices of *Sharma* to serve as data relays as taught in *Cova*.” *Id.* at 24. Patent Owner argues that the references do not disclose the claimed invention and that Petitioner’s reasoning to combine the references’ teachings is flawed. *See* PO Resp. 18–43 (addressing independent claim 1).

For the reasons given below, we determine Petitioner has shown by a preponderance of the evidence that the challenged claims 1–20 are unpatentable over Sharma and Cova.

1. Sharma (Ex. 1005)

Sharma pertains to tracking a shipment using a wireless tracker.⁶ Ex. 1005, code (57) (Abstract). “[T]he wireless tracker is configured to receive and verify one or more codes to for a chain of custody of the shipment . . . [and] to determine a trigger event based on the location of the wireless tracker device and/or sensor information as well as send a notification to a computer server based on the trigger event.” *Id.*

⁶ According to Petitioner, “*Sharma* is a publication of an application filed by Patent Owner,” and “*Sharma* contains largely the same disclosure as the '922 patent.” Pet. 7.

“A user device (114–116) such as a smartphone, tablet computer, laptop computer, and desktop computer may access the web portal 104 over the Internet 108.” *Id.* ¶ 21.

Regarding the use of code authentication for the purpose of verifying an unbroken chain of custody, Sharma discloses:

In additional embodiments, the wireless 112 tracker is configured to receive and verify one or more codes to for a chain of custody of the shipment. In one embodiment, the wireless tracker receives a code at a shipment origin and receives a code at a shipment destination. Based on such authentication, the wireless tracker may transmit a notification to the computer server(s) 102 verifying chain of custody.

In further embodiments, the wireless tracker 112 may determine that the location of the wireless tracker 112 is within a distance threshold of the shipment destination. In addition, the wireless tracker 112 determine that a code was received within a time threshold. Thus, if the code was received and verified by the authentication module of the wireless tracker 112 within both the distance threshold and the time threshold, then the wireless tracker 112 may transmit a notification to the computer server(s) 102 verifying chain of custody.

Id. ¶¶ 25–26.

2. *Cova (Ex. 1007)*

Cova pertains “generally to monitoring and tracking physical assets such as intermodal shipping containers.” Ex. 1007, 1:14–16. Cova explains that users want to track assets as they travel from one place to another, and that a way to do that is via the use of a wireless monitoring and tracking device, or “tag,” coupled to the asset and that provides periodic location updates. *Id.* at 1:20–24. However, according to Cova, “a tracking device may sometimes have difficulty determining its location and transmitting its location to users.” *Id.* at 1:24–26. “For example, when the assets are

shipping containers that are stacked high and deep on a cargo ship, a tracking device coupled to an asset in the middle of the stack may face interference from the surrounding assets.” *Id.* at 1:26–29. “As another example, the structure of the conveyance itself may interfere with the tracking device.” *Id.* at 1:29–31. One disclosed way of addressing this is, “when a tag attached to the asset is unable to transmit position fix data describing a location of the asset to the service, a relay component is used to receive the tag position fix data from the tag and forward it to the service.” *Id.* at 1:43–47. Thus, according to Cova, “[a]ssets can be tracked even when they are stacked or otherwise shipped in configurations that make it difficult for tags coupled to assets to transmit position fix data [and a]sset tracking can be performed in real-time.” *Id.* at 1:50–53.

3. *The Alleged Obviousness of Independent Claim 1 Over Sharma and Cova*

a. *[Ipre] A method*

Petitioner contends that, to the extent that the preamble is limiting, Sharma discloses a method, and specifically one for tracking a shipment. Pet. 11 (citing Ex. 1005, Abstr., ¶¶ 20, 67, Figs. 5A–5C). According to Petitioner, “*Sharma* . . . discloses ‘tracking a shipment’ by determining the location of a wireless tracker, receiving authentication codes at various locations along an asset’s journey, determining whether the asset is within a distance threshold, and reporting chain of custody verifications at the end of an asset’s shipment journey.” *Id.* (citing Ex. 1005, Fig. 5A, ¶¶ 20, 67; Ex. 1003 ¶ 53).

Patent Owner “does not dispute that the preamble of claim 1 is disclosed by the asserted prior art.” PO Resp. 18.

- b. [1a] associating a wireless tracker co-located with an asset, wherein the wireless tracker emits a tracker identification and a sensor payload including a fixed identification*

Petitioner contends that “*Sharma* discloses ‘a wireless tracker co-located with an asset’ as claimed because *Sharma* discloses ‘tracking a shipment or asset using a wireless tracker.’” Pet. 12 (citing Ex. 1005 ¶¶ 20–22, 48; Ex. 1003 ¶ 55). Petitioner further contends that *Sharma* discloses that its wireless tracker 200 may be associated with shipping order information, and therefore discloses “associating a wireless tracker co-located with an asset” as recited in claim 1. *Id.* (citing Ex. 1005 ¶ 38; Ex. 1003 ¶ 56).

Petitioner further contends that:

Sharma’s wireless tracker emits a “tracker identification and a sensor payload including a fixed identification,” as claimed. Engels, ¶ 57. *Sharma* discloses a “wireless tracker identifier (e.g. RFID)” that is “used to uniquely identify the wireless tracker” and is read at different points of a shipment journey. *Sharma*, [0038]–[0039]. A skilled artisan would have understood that a tracker identifier in *Sharma* constitutes an example of a “fixed identification” because the tracker identifier does not change throughout the journey. Engels, ¶ 57. *Id.* at 12–13; *see also id.* at 14 (Petitioner arguing that “[t]he ’922 [patent] does not require more than what *Sharma* discloses.”).

Petitioner also contends that “[a] skilled artisan would have understood that because *Sharma*’s wireless tracker transmits notifications with sensor information, *Sharma* discloses emitting ‘a sensor payload including a fixed identification’ as claimed.” *Id.* at 13 (citing Ex. 1003 ¶ 58); *see also, e.g.*, Ex. 1005 ¶ 64 (*Sharma* stating that “[t]he user may input information that is transmitted to the wireless tracker (via the computer

server) to request the wireless tracker take a temperature reading with its temperature sensor and provide such temperature sensor information to the user device (via the computer server).).”

Patent Owner “does not dispute that Element [1a] is disclosed by the asserted prior art.” PO Resp. 18.

c. [1b] receiving a code via the wireless tracker at a shipment origin

Petitioner contends that Sharma discloses “receiving a code via the wireless tracker at a shipment origin” as recited in claim 1. Pet. 16–17 (citing Ex. 1003 ¶ 62). According to Petitioner, “*Sharma* discloses an authentication module in its wireless tracker to track ‘the chain of custody of the shipment associated with a wireless tracker,’ and discloses that ‘a shipper at a shipment origin may enter an authentication code into the authentication module of the wireless tracker.’” *Id.* at 16 (citing Ex. 1005 ¶ 44, Fig. 5A).

Patent Owner “does not dispute that Element [1b] is disclosed by the asserted prior art.” PO Resp. 18.

d. [1c] receiving, by at least one of a plurality of mobile devices, the tracker identification, and the sensor payload as the asset and wireless tracker are moved from one location to another location

Petitioner contends that “*Sharma* discloses ‘a plurality of mobile devices’ as claimed, because *Sharma* discloses ‘user device[s] (114–116) such as a Smartphone, tablet computer, laptop computer, and desktop computer.’” Pet. 17–18 (alteration in original; citing Ex. 1005 ¶¶ 21, 62); *see also id.* at 18 (Petitioner parenthetically quoting Ex. 1005 ¶ 24 in which Sharma uses the plural term “user devices” in the context of the server forwarding notifications).

Regarding the portion of the limitation pertaining to receiving tracker information and sensor payload, Petitioner contends that:

Sharma discloses that its wireless tracker “transmit[s] a notification to a computer server” regarding the tracker identification and the sensor payload as claimed. [Ex. 1005 ¶32]; Engels, ¶ 64. *Sharma* further discloses the user devices receiving notification information transmitted from the wireless trackers. *Sharma*, [0024] (“In addition, the wireless tracker 112 may send or transmit a notification to the computer server 102 based on the trigger event. Further, the computer server(s) may forward the notification to user devices (114–116).”).

Id. at 18; *see also id.* at 13 (citing Ex. 1005 ¶ 64 (“The user may input information that is transmitted to the wireless tracker (via the computer server) to request the wireless tracker take a temperature reading with its temperature sensor and provide such temperature sensor information to the user device (via the computer server).”). In other words, Petitioner contends that *Sharma*’s user device (mapped to the “mobile device”) receives information from the tracker via the server. Petitioner further contends that, based on the above, “a person of ordinary skill in the art would have understood that *Sharma* discloses ‘receiving, by at least one of a plurality of mobile devices, the tracker identification, and the sensor payload as the asset and wireless tracker are moved from one location to another location.’” *Id.* at 19 (citing Ex. 1003 ¶ 64); *see also id.* at 12–13 (Petitioner contending that the tracker identification is read at different points of a shipment journey) (citing Ex. 1005 ¶¶ 38–39).

Petitioner also contends that “[a] skilled artisan would have understood that *Cova*’s relays constitute ‘mobile devices’ because the relays are movable with respect to the conveyance and/or move with the conveyance.” Pet. 19 (citing Ex. 1003 ¶ 65). Petitioner further contends

that Cova's relay has a communications unit to receive tag data from the tags, and that "*Cova's* relays receive tag data including 'an identification of the event (or event type)' in addition to 'an identification of the tag, or an identification of the asset to which the tag is coupled.'" *Id.* at 19–20 (citing Ex. 1007, 4:27–39, 9:50–52, Fig. 6A). According to Petitioner, a person of ordinary skill in the art would understand Cova to disclose receiving, by at least one mobile device, the tracker information and sensor payload as the asset and tracker are moved. *Id.* (citing Ex. 1003 ¶ 65). As discussed below in the context of the next limitation (the "forwarding" limitation 1d), Petitioner contends, *inter alia*, that Cova teaches using the relay to transmit tag data to the server and that it would have been obvious to modify Sharma's user device (*e.g.*, a smartphone) to act as a relay between the tracker and the server in light of Cova's teachings.⁷ *See id.* at 21, 24; *see also* Pet. Reply 14 ("a POSITA would have been motivated to modify *Sharma's* user devices to operate as relays based on the disclosure of *Cova*").

Patent Owner argues that neither Sharma nor Cova discloses a "mobile device" as recited in the claims of the '922 patent. PO Resp. 28–35. For the following reasons, we find that Sharma discloses a mobile device. Because Petitioner's proposed combination utilizes Sharma's device, we

⁷ Petitioner also proposes an alternative modification where Cova's relays, which Petitioner contends are "mobile devices," are incorporated into Sharma's system. Pet. 24; Pet. Reply 17; *see also* Tr. 18:10–20 (Petitioner clarifying that, in that proposed modification, Cova's relays are added to the system and do not replace Sharma's user devices, which are retained). We need not reach this alternative modification because we determine the other proposed modification—that using Sharma's user device as a relay—to be adequate to meet Petitioner's burden.

need not reach Patent Owner’s argument that Cova’s relay (which moves along with the asset and tracker) is not a “mobile device.” *See id.* at 33–35.

The Specification indicates, and Patent Owner does not dispute, that a smartphone is a “mobile device” within the meaning of the ’922 patent. *See, e.g.,* Ex. 1001, 14:40–42 (“a mobile device 714 such as a smart phone”); PO Resp. 6 (“As stated in the specification, a smart phone is a type of mobile device.”). Patent Owner agrees that Sharma discloses the use of a smartphone, which is labeled in Sharma as an example of a “user device.” *See, e.g.,* PO Resp. 28–29 (“[Patent Owner] recognizes that *Sharma* identifies a ‘smartphone’ as an example of a ‘user device,’ . . . and that a ‘smartphone’ can be a type of mobile device as the term appears in the ’922 patent.”). Patent Owner does not identify any structural distinction between the smartphone that is a “user device” in Sharma and the smartphone that is a “mobile device” in the ’922 patent. To the contrary, Patent Owner asserts that a key aspect of the claimed invention is that it utilizes ordinary smartphones, arguing that “the ’922 patent claims and disclosure . . . rely on the ubiquity of mobile devices.” PO Resp. 11; *see also, e.g.,* PO Sur-reply 3 (“The claimed invention is specifically making use of the ubiquity of high-speed mobile computing devices such as smartphones.”); Ex. 1001, 3:28–36 (the Specification explaining that the described invention “leverages *existing resources*” such as “mobile phones [that] are the single largest group of high speed computing devices deployed.” (emphasis added)).

Patent Owner argues that the data flow direction of Sharma’s user device is the opposite of that claimed. *See* PO Resp. 29–32. Specifically, Patent Owner argues that “the ’922 patent claims a mobile device receiving information from a tracker so that it can be forwarded *to* a server, whereas

Sharma discloses a user device receiving information and notifications about a shipment *from* a server.” *Id.* at 30; *see also* Tr. 46:17–19 (“[T]he user device of *Sharma* and the mobile device of the ‘922 [patent], put simply, are on opposite sides of a server.”). This argument is unpersuasive as Patent Owner is attempting to distinguish the same device—e.g., a smartphone—on how it is intended to be used rather than any structural distinction.⁸ *See* PO Resp. 31 (admitting that *Sharma*’s user device can transmit information to the server, and not simply receive information from the server); PO Sur-reply 11 (“[T]he user devices of *Sharma* specifically serve an entirely different purpose than the mobile devices in the ’922 [patent].”). A particular smartphone does not cease being a “mobile device” when it is receiving information from the server and its status as a “mobile device” does not turn on a given user’s subjective intent or purpose. To the extent that the recited mobile device is required to operate in a particular manner, such requirements should be reflected elsewhere in the claim language not read into the term “mobile device.”

Patent Owner somewhat relatedly argues that “*Sharma* does not disclose a mobile device that receives information directly from a tracker” and that “the ’922 mobile devices must be receiving information *only* from the wireless trackers, a clear distinction over *Sharma*.” PO Resp. 29, 32. We do not agree with these arguments as they are not commensurate with the claim language, which does not contain the limiting qualifier “directly”

⁸ We acknowledge that independent claim 1 is a method claim. Nonetheless, “mobile device” is recited as an apparatus used in the method, and we first assess whether the prior art discloses or suggests that apparatus before assessing whether the proposed combination discloses or suggests the particular usage of the apparatus in the claimed method.

in reciting “receiving, by at least one of a plurality of mobile devices, [tracker and sensor data],” and which does not recite a negative limitation precluding the mobile device from receiving information from anything other than the tracker. Ex. 1001, 16:17–20; *see* PO Resp. 32 (citing Specification embodiments without adequate explanation as to why the claims should be limited to those specific embodiments). Additionally, Patent Owner is arguing the references separately rather than addressing Petitioner’s proposed combination in which Sharma’s user device is modified per Cova’s teachings to relay information from the tracker to the server. *See* Pet. 21–22, 24; *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the [challenge] is based upon the teachings of a combination of references.”).

Patent Owner further argues that “Petitioner has not shown a reasonable likelihood of proving that the user devices in *Sharma* are ‘mobile devices’ within the meaning of the challenged claims” because “*Sharma* does not disclose . . . leveraging multiple mobile devices to continuously perform this function throughout the journey of an asset, as claimed in the ’922 patent.” PO Resp. 28–29. We disagree with this quantity-based argument because the structure of Sharma’s user device, e.g., a smartphone, does not change whether it is alone or among multiple other mobile devices.

We find that at least Sharma’s user device in the form of a smartphone is a “mobile device” as recited in the claims of the ’922 patent.

Patent Owner argues that:

[C]laim 1 requires information emitted from a tracking device to be received and forwarded to a server (by a series of mobile devices) as the asset moves to different locations, from the time

that the asset leaves its origin point to the time it arrives at its destination. A [person of ordinary skill in the art] would understand that this amounts to “continuous inventory management.” (Helal Suppl. Decl. [Ex. 2007] ¶¶ 18, 19.)

PO Resp. 22; *see id.* at 21 (“It can also be inferred from claim 1 that this continuous transmission of information takes place during the entire journey.”). Patent Owner also argues that “[t]he invention requires crowdsourcing because it relies on multiple devices with this listening capability across a global setting, rather than a single dedicated device co-located with an asset throughout its journey.” *Id.* at 27 (citing Ex. 1001, 4:11–13). According to Patent Owner, the claims require that there be “‘at least one’ mobile device used *at each location* along the journey from origin to destination.” *Id.* at 13 (emphasis added); *see also id.* at 35 (“The invention claimed in the ’922 patent overcomes this limitation by leveraging any mobile device in proximity to the asset *in all locations* the asset moves through from origin to destination.” (emphasis added)); PO Sur-reply 20–21 (“[T]here is support for continuous inventory management in the claim language,” in part, because “[i]ndependent claim 1 discloses a code received at an ‘origin’ followed by a code received at a ‘destination.’”). Patent Owner thus argues that the “receiving” limitation (labeled element 1c) “requires a ‘plurality of mobile devices’ and cannot be met with a singular device” and that “[t]he method of claim 1 demands multiple mobile devices, receiving the tracking identification and sensor payload of an asset moving from one location to another location, thus allowing for continuous tracking from the origin to destination points.” *Id.* at 19.

We do not agree with Patent Owner’s narrow view of the claim scope, a view which is based almost exclusively on specific embodiments in the Specification and on the testimony of its expert rather than claim language.

For reasons we now discuss, we reject Patent Owner’s implied request to limit the claims to certain disclosed embodiments, particularly where the claim drafter used broad language such as “at least one” rather than language of the narrower descriptions in the Specification and opted to not include the limiting modifiers proposed by Patent Owner. *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (“Though understanding the claim language may be aided by the explanations contained in the written description, it is important not to import into a claim limitations that are not a part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.”); *see, e.g.*, Ex. 1001, 2:42–44 (The Specification of the ’922 patent stating that “[t]he illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting.”); *id.* at 15:15–17 (“the specification and figures are to be regarded in an illustrative rather than a restrictive sense”).

As a reminder, the subject limitation recites “receiving, by at least one of a plurality of mobile devices, [the tracker and sensor data] as the asset and wireless tracker are moved from one location to another location.” Ex. 1001, 16:17–20. The limitation does not contain Patent Owner’s limiting modifier “continuous.” The claim language merely requires that an act of “receiving” be performed and does not require it to be performed repeatedly or continuously as Patent Owner urges.

The claim language also does not require repeating the “receiving” step at every location over the entire journey as Patent Owner impliedly argues, *see* PO Resp. 12–13, 19, 21, 35. The pertinent claim phrase is “receiving . . . as the asset and wireless tracker are moved from one location

to another location.” Ex. 1001, 16:17–20. Patent Owner’s assertion that this requires “continuous tracking from the origin to destination points” and repetitively performing the “receiving,” “forwarding,” and “monitoring” steps, PO Resp. 19, is referring to other limitations directed to the authentication process to verify chain of custody. Specifically, claim elements 1b and 1f call for receiving codes “via the tracker” and “at the tracker,” respectively, at the shipment origin and destination. Ex. 1001, 16:15–16, 16:27–28. We agree with Petitioner that these code-related steps do not involve the mobile device, which is the subject of the “receiving” step. Pet. Reply 20; *see, e.g.*, Ex. 1001, 6:50–54 (the Specification describing an embodiment with *the shipper* entering the code into the tracker and *the server* verifying the code). In other words, the authentication code limitations do not inform how or when the receiving step is performed. Rather, per the claim language, receiving is performed as the asset is “moved from one location to another location.” Patent Owner concedes that “[t]his language reflects that the mobile device receives the signal from the tracker/asset . . . as it moves into its vicinity.” PO Sur-reply 18 (citing Ex. 1001, 16:17–19, 18:1–4). Thus, the claim does not require “receiving” upon every movement of or at every location of the asset during its journey but, rather, this can be a one-time event, requiring at least one mobile device to receive the tracker data as the asset is moved.

We find that Sharma discloses or at least suggests receiving tracker and sensor data as the asset is moved from one location to another. *See, e.g.*, Ex. 1005 ¶ 38 (“[A] wireless tracker 200 provides the condition of the shipment in transit such as if the shipment is not within its shipping temperature, humidity, moisture limits, or if the shipment was moved from

one transport carrier to another, or the shipment was not handled properly.” (cited at Pet. 12–13)); Ex. 1005 ¶ 30 (“In some embodiments, the communication module 210 is configured to determine a current location of the wireless tracker device at one or more intervals wherein the one or more intervals are based on a delivery route of the shipment.” (cited at Pet. Reply 22)). Additionally, Petitioner’s proposed combination also relies on the teachings of Cova, which include the teaching of using a relay to receive and forward asset data as that asset is in transit.⁹ See Pet. 19–20; Pet. Reply 20–22; PO Resp. 35 (“[Patent Owner] clarifies this point by acknowledging that a relay device co-located with an asset on a ship may be able to relay tracking information for the duration of the *ship’s* journey.”); see also, e.g., Ex. 1007, 9:40–59. Accordingly, Sharma alone or in combination with Cova teaches or suggests “receiving . . . [the tracker and sensor data] as the asset and wireless tracker are moved from one location to another location.”

Regarding the claim phrase “receiving, by at least one of a plurality of mobile devices,” Patent Owner—based on its contention that the claimed invention requires crowdsourced, continuous inventory management from origin to destination—argues that the claim requires two forms of a plurality of mobile devices. See, e.g., PO Resp. 11 (“[Patent Owner] wishes to provide a construction for the phrase ‘plurality of mobile devices’ as used in the challenged claims. As disclosed in the ’922 patent, ‘systems, methods,

⁹ As mentioned, we need not reach Patent Owner’s argument that Cova’s relay is not a “mobile device.” Even if the relay is not a “mobile device” within the meaning of the ’922 patent, a person of ordinary skill in the art still would appreciate the applicability of Cova’s teachings of using a device as a relay for asset tracking.

and devices for continuously monitoring inventory using crowdsource cell phones’ are provided.”). Specifically, Patent Owner argues that there must be a receiving mobile device at each and every location along the journey from origin to destination (i.e., a plurality of receiving devices spread across the entire transit path) and that there must be a plurality of receiving-capable devices at each of those locations. PO Resp. 10–13; *see id.* at 13 (“[E]ven if only one mobile device is used, ‘a plurality of mobile devices’ should still be given patentable weight, and it should be construed as corresponding to multiple mobile devices present in proximity to the asset and wireless tracker at a given location and to ‘at least one’ mobile device used at each location along the journey from origin to destination.”); *id.* at 27 (“Giving effect to the entire term, the phrase ‘at least one of a plurality of mobile devices’ conveys multiple mobile devices performing the relaying function successively, with one or more doing the receiving forwarding at a time.”).

For the same reasons just discussed, we disagree with Patent Owner’s position that the claimed invention is limited to crowdsourced, continuous tracking from origin to destination where the recited “receiving” must be performed repeatedly by multiple (a plurality of) mobile devices. The claim language requires the receiving to be performed by only one (although it could be more than one) mobile device. Further, we understand Patent Owner to concede that the Specification discloses a single-device embodiment. *See* PO Sur-reply 16–17. Specifically, Patent Owner states:

[A]s the specification makes clear, Figure 1 [of the ’922 patent] is a functional block diagram, depicting the elements of certain embodiments of the claimed system for continuous inventory management, including *how one mobile device* (identified in Figure 1 as 120) *can be used to relay information to a cloud server when it is within range of the tracker/asset.* ’922 patent,

4:14-34. *The claims disclose that as few as one mobile device at a time* ('922 patent, 16:17) *can perform this function* “as the asset is moved.” '922 patent, 4:30.

Id. (emphasis added); *see also* Pet. Reply 6–7, 18 (asserting that the same Figure 1 and cited portion of column 4 of the Specification “discloses using mobile device 120—a single mobile device—to relay information as an asset with a wireless tracker is moved.”).

Highlighting that Patent Owner’s proposed claim construction is divorced from the claim language is Patent Owner’s argument that independent claim 10 also requires multiple mobile devices performing the recited “receiving” step. *See* PO Resp. 44 (“[Patent Owner] further notes that although claim 10 in its current form does not expressly claim a plurality of mobile devices as claim 1 does, it nonetheless requires multiple mobile devices to perform the system as claimed.”). Independent claim 10, a system claim, does not contain the “plurality” phrase, and refers to a single mobile device. Ex. 1001, 16:64, 17:2, 17:5–6 (reciting “*a mobile device* configured to receive,” “an associated location of *the mobile device*,” and “the associated location of *the mobile device*” (emphasis added)). We, again, decline to read words into or out of the claim in order to limit the claim scope to an embodiment in the Specification.

We also do not agree with Patent Owner’s argument that, “[t]o construe this phrase [‘at least one of a plurality of mobile devices’] to mean only one mobile device would render much of the language superfluous, which is contrary to principles of claim construction.” PO Sur-reply 5–6 (citing *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 810 (Fed. Cir. 2021)). First, the preference for avoiding a claim construction that would render a term superfluous is not a rigid rule. *SimpleAir, Inc. v. Sony Ericsson Mobile*

Commc'ns AB, 820 F.3d 419, 429 (Fed. Cir. 2016) (“It is true that ‘interpretations that render some portion of the claim language superfluous are disfavored.’ . . . The preference for giving meaning to all terms, however, is not an inflexible rule that supersedes all other principles of claim construction.”); *see also Intel Corp.*, 21 F.4th at 809–810 (indicating that it would be a *disfavored* result to render a word superfluous). Even if the challenged claims were drafted by the applicant in a manner that renders a phrase superfluous, we decline Patent Owner’s request to re-draft them. Second, Patent Owner offers an explanation of the role of “a plurality of mobile devices” in the claims, which indicates that the phrase is not superfluous. According to Patent Owner, “the ubiquity of mobile devices means that the asset and wireless tracker are likely to be within transmission range of multiple mobile devices at any given time and location.” PO Resp. 12. This is consistent with our preliminary construction in the Institution Decision, where we stated, “[t]o the extent that the ‘plurality of mobile devices’ phrase is entitled to patentable weight, it merely requires the existence of, but not the use of, a mobile device in addition to ‘the at least one.’” Paper 12, 11. We maintain that construction in this Final Decision. And, Patent Owner concedes that there existed at the time of the patent application filing a “ubiquity of mobile devices.” PO Resp. 11–12; *see also* Tr. 27:19–21 (Patent Owner asserting that “[t]he architecture of the ‘922 is instead an opportunistic one. It leverages the existing resource of mobile devices, in particular smartphones, which were ubiquitous by the time of the ‘922’s filing date.”).

We determine that Petitioner has demonstrated that Sharma or the combination of Sharma and Cova teaches or suggests limitation 1c,

“receiving, by at least one of a plurality of mobile devices, the tracker identification, and the sensor payload as the asset and wireless tracker are moved from one location to another location.”

e. [1d] forwarding the tracker identification, the sensor payload, and an associated location of the at least one of the plurality of mobile devices to a server

Petitioner contends, *inter alia*, that the “forwarding” limitation is taught or suggested by the combination of *Sharma* and *Cova*. Pet. 21 (“To the extent that Patent Owner disputes whether *Sharma* discloses ‘forwarding . . . an associated location of the at least one of a plurality of mobile devices to a server,’ this element would have been obvious over *Sharma* in view of *Cova*.” (alteration in original)).

Petitioner contends that *Sharma* discloses the tracker transmitting to the server the tracker’s location, the tracker’s identification, and notifications based on trigger events, which, in turn, are based on sensor information (mapped to “sensor payload”). *Id.* at 20–21 (citing Ex. 1003 ¶ 67; Ex. 1005 ¶¶ 23–24). Petitioner relies on *Cova* for the mobile device location feature. Petitioner contends that *Cova* can receive location data and transmit it to the tag, and that “*Cova* discloses that ‘a relay component is used to receive the tag position fix data from the tag and forward it to the server.’” Pet. 22–23 (citing Ex. 1007, Abstr., 1:45–47, 9:54–57, 9:59–66). According to Petitioner, a person of ordinary skill in the art would have understood that this is forwarding the device’s location to the server “because *Cova*’s relays are located at the same location as its assets.” *Id.* (citing Ex. 1007, Figs. 6A, 6B; Ex. 1003 ¶ 69); *see id.* at 23–24. Petitioner also contends that *Cova* discloses its relay transmitting (forwarding) to the server, via the relay, the tag (tracker) identifier and tag data including event notifications, which

include asset location. *Id.* at 22–23. Petitioner contends that Cova thus discloses forwarding to the server the tracker identification, sensor payload, and mobile device location. *Id.* at 24.

Petitioner offers several reasons why a person of ordinary skill in the art would have combined the references’ teachings to arrive at the claimed subject matter, and contends that this would have been done with a reasonable expectation of success. Pet. 24–28. Petitioner contends, *inter alia*, that “an ordinarily skilled artisan would have been motivated to modify the user devices of *Sharma* to serve as data relays as taught in *Cova* . . . since *Sharma*’s system is subject to the problems *Cova* was designed to overcome.” *Id.* at 24 (citing Ex. 1003 ¶¶ 46, 70). Petitioner further contends that:

Cova provides a teaching, suggestion, and motivation for an ordinarily-skilled artisan to modify *Sharma*, almost ten years before the ’922 patent’s February 2019 priority date. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 415-21 (2007); Engels [Ex. 1003], ¶¶ 47, 71. In particular, *Cova* teaches using relays to assist wireless tracking devices in sending and receiving data when the wireless tags “face interference from surrounding assets” and when “the structure of the conveyance itself may interfere with the tracking device.” *Cova*, 1:20-31, 43-47. Engels, ¶¶ 47, 71.

Id. at 24–25. Petitioner further contends that “[a] skilled artisan would have also recognized that the mobile relays of *Cova* would be implemented by modifying the user devices and/or shipping transportation vehicles of *Sharma* using known techniques, such as by positioning *Sharma*’s user device near the wireless trackers and enabling the user device to function as a relay of data from the wireless tag to the server.” *Id.* at 26 (citing Ex. 1003 ¶¶ 48, 73). According to Petitioner, “*Sharma* and *Cova* disclose similar, and complementary, systems and functionality, and a person of ordinary skill in

the art would have expected success in combining elements of the two disclosures.” *Id.* at 25 (citing Ex. 1003 ¶¶ 45, 72); *see also id.* at 26 (“An artisan of ordinary skill would have reasonably expected success in implementing well-known . . . relay functionality of *Cova* into *Sharma*’s similar system.”).

Patent Owner argues that, in the proposed combination, there is no “forwarding . . . [of] an associated location of the at least one of the plurality of mobile devices to a server,” as recited in the claim. PO Resp. 40–42. According to Patent Owner, *Cova* merely forwards the location of the tag (the tracker) rather than the relay’s own location. *Id.* at 40–41. Patent Owner argues that:

Cova does not disclose a relay capable of forwarding its own associated location to a server along with the tracker identification and sensor payload. This is a function of being a less sophisticated device which does not have the same functionality and processing capabilities as the mobile devices claimed in the '922 patent.

Id. at 41 (citing Ex. 2007 ¶ 11).

We do not agree with these arguments. First, in the proposed combination, the device is not an unsophisticated relay but *Sharma*’s user device, which can be a sophisticated smartphone like that identified as a mobile device in the '922 patent. Second, *Cova*’s relay is on the same ship as the asset, *see, e.g.*, Ex. 1007, Fig. 6A, and Patent Owner concedes that “[t]he *Cova* relay thus allows for relaying information about a package *while it is in the vicinity of the asset*,” *id.* at 27–38. Patent Owner does not explain adequately why forwarding a co-located asset’s location (which is the ultimate goal of both *Cova* and the '922 patent) is not also forwarding the location of the relay itself. To the extent that Patent Owner argues that the

tracker is precluded from knowing its location and that the recited mobile device must add the location data to the information obtained from the tracker before forwarding to the server, this is not commensurate with the claim language which does not contain such a negative limitation on the tracker, does not specify the source of the location information, and does not contain an “augmenting” step as implied by Patent Owner. *See, e.g.*, PO Resp. 31–32 (“[T]he ’922 tracker does not have location self-tracking capabilities. Rather, the ’922 tracker relies on the mobile device to augment and add location information before forwarding the information to the server.”); *id.* at 20 (“The mobile device, in turn, forwards the received information after augmenting it with its location information.”); *cf.* Ex. 1007, 10:22–26 (Cova explaining: “The outside communication unit 602c [of the relay] can also receive location data. For example, the outside communication unit 602c can include a receiver box operable to receive GPS signals from a GPS satellite 618.”).

Patent Owner also argues that “by referring once again not to a single ‘user device’ but to ‘one of the plurality of user devices,’ Element [1d] requires the same crowdsourcing function implied in Element [1c],” and that “combining *Sharma* with *Cova* would not create the continuous forwarding element claimed in [1d].” PO Resp. 41–42. However, the “forwarding” limitation 1d, like the “receiving” limitation 1c, does not contain Patent Owner’s limiting modifier “continuous” and, for the same or similar reasons discussed above for the “receiving” limitation, does not require crowdsourcing or a plurality of different mobile devices performing the “forwarding” step.

Patent Owner characterizes Petitioner's proposed modification as "replacing Sharma's user devices with *Cova*'s relays," but also acknowledges that Petitioner's proposed modification where Sharma's device is used to relay information, not where the existing capabilities of Sharma's devices are deleted. PO Resp. 36, 38. Patent Owner argues that a person of ordinary skill in the art "would not be motivated to modify the 'user devices' disclosed in *Sharma* to function like the relay component in *Cova*." *Id.* at 38 (citing Ex. 2007 ¶ 13). Specifically, Patent Owner argues that modifying Sharma's user device, e.g., a smartphone, "into special hardware such as *Cova* relays would require co-locating the modified device within the assets in particular and specific ways," which, according to Patent Owner, would result in a modified device that has lost "its function as a user device that can be held and used by a user and kept with the user." PO Resp. 38–39. Similarly, Patent Owner argues in the Sur-reply that the proposed combination would not have been obvious because it would have required one "to compress the multi-part hardware of the *Cova* relay into a single device and combine it with the user devices of *Sharma*." PO Sur-reply 19. We do not agree with these arguments because Petitioner is not proposing the bodily incorporation of *Cova*'s relay structure into Sharma's system, *see, e.g.*, Pet. Reply 16–17, such that Sharma's user device would have to take on the size, shape, and position relative to the assets, as Patent Owner characterizes. *See* PO Resp. 38–39 (asserting that *Cova*'s relay is, for example, the same size and shape as the assets and positioned on top of the stack of assets, and implying that Sharma's modified user device would be the same). Rather, Petitioner is proposing to apply *Cova*'s teachings of using a device as a relay to modify Sharma's system so that the user device

serves as the relay between the asset and the server. Pet. 24; Pet. Reply 17 (arguing that “[t]he [Patent Owner Response] acknowledges that the ‘Cova relay thus allows for relaying information about a package *while it is in the vicinity of the asset*,’ . . . the exact functionality that the Petition combines with the user devices of *Sharma*.” (quoting PO Resp. 37–38)).

Patent Owner also argues that a person of ordinary skill in the art would not have combined the references’ teachings because “the user device of *Sharma* and the relay of *Cova* are on opposite sides of the server.” PO Resp. 39–40. Patent Owner is referring to the direction of data flow, arguing that the unmodified *Sharma* user device only receives tracker and asset data from the server and, when modified, would also send that same data to the server, and argues that “[t]here is no legitimate purpose to send the same information back and forth across the network.” *Id.* at 39. We cannot agree with this argument—characterizing the data flow path as being both in its unmodified and modified forms—because Petitioner’s proposed modification has *Sharma*’s user device serving as the relay for the information between the tracker and the server, not for the server and user device to send the same data back and forth to each other.

In the Sur-reply, Patent Owner makes a related argument that the proposed combination would result in the “inherently illogical” situation where *Sharma*’s user devices “provide a user with information about an asset that they are already co-located with.” PO Sur-reply 19–20. We do not agree with this argument because the data flow in the proposed combination is such that the user device relays the information to the server, which is not necessarily co-located with the moving asset.

We determine that Petitioner has demonstrated that the proposed combination satisfies all the requirements of the “forwarding” limitation. We also determine that Petitioner has provided adequate reasoning as to why one of ordinary skill in the art would have made the proposed combination and has provided adequate evidence to show that a person of ordinary skill in the art would have had a reasonable expectation of success in doing so. For example, we agree that Cova teaches the use of a device as a relay for tracking assets, and that a person of ordinary skill in the art would have been motivated to modify Sharma’s user devices to serve as relays between the tracker and the server.

f. [1e] monitoring the tracker identification and the associated location of the at least one of the plurality of mobile devices

Petitioner contends that “*Sharma* and *Cova* disclose this [“monitoring”] element.” Pet. 28 (citing Ex. 1003 ¶ 77). Petitioner contends that “*Cova* discloses that the objective of its system is to provide ‘monitoring and tracking’ information about an asset shipped with a tag associated with it.” *Id.* (citing Ex. 1007, 1:38–43). Petitioner further contends that Cova’s tag monitors and tracks the asset, and that the monitored data received by the server from the tag includes the tag (tracker) identification and a location of the asset and, by extension, the location of the co-located relay (mapped to a mobile device). *See* Pet. 28 (citing Ex. 1007, 4:27–39; Ex. 1003 ¶ 77) (referring to Petitioner’s contentions regarding limitation 1d); *id.* at 21–22 (Petitioner’s contentions regarding limitation 1d, including the assertion that relay is configured to transmit tag data to server system 610).

For this “monitoring” limitation 1e, Patent Owner argues that, “[a]s with Elements [1c] and [1d], Element [1e] expressly requires not only a mobile device, but a plurality of mobile devices, which successively perform the claimed function.” PO Resp. 42 (citing Ex. 1001, 16:24–26). Patent Owner further argues that, “for the reasons set forth above, . . . Elements [1c], [1d], and [1e] require a plurality of mobile devices,” and that, “[b]ecause *Sharma* and *Cova* do not disclose a plurality of mobile devices as claimed, Petitioner also cannot succeed in showing that they render obvious Element [1e].” *Id.* at 42–43.

We, for substantially the same reasons discussed for the “receiving” limitation 1c, disagree that the monitoring limitation, which recites “monitoring the tracker identification and the associated location of the at least one of the plurality of mobile devices,” Ex. 1001, 16:24–26, requires a plurality of mobile devices successively performing the “monitoring” function, as Patent Owner urges.

We determine that Petitioner has demonstrated that the proposed combination satisfies all the requirements of the “monitoring” limitation.

g. [1f] receiving another code at the wireless tracker at a shipment destination

Petitioner contends that Sharma discloses that the tracker receives an authentication code at the shipment origin and an authentication code at the destination. *See* Pet. 29–30 (citing Ex. 1003 ¶¶ 78–79; Ex. 1005 ¶¶ 25, 33, 44, 67, claim 9, Fig. 5A). Patent Owner “does not dispute that Element [1f] is disclosed by the asserted prior art.” PO Resp. 43.

- h. [1g] determining that the location of the wireless tracker is within a distance threshold of the shipment destination*

Petitioner contends, *inter alia*, that “[i]n describing Fig. 5A, *Sharma* discloses ‘determining, by the management module, that the location of the wireless tracker device is within a distance threshold of the shipment destination, as shown in block 510.’” Pet. 31 (citing Ex. 1003 ¶ 80; Ex. 1005 ¶¶ 35, 67, Fig. 5A). As an example of this disclosure, Petitioner reproduces *Sharma*’s Figure 5A and annotates the decision block labeled “Is Location Within Distance Threshold?” (block 510). *Id.* According to Petitioner, “[d]uring prosecution of the ’922 application, Patent Owner represented that this element is supported by application paragraph [0041], a paragraph that appears verbatim in *Sharma*.” *Id.* at 32 (bracketing in original) (citing Ex. 1002, 30, 138; Ex. 1006, 494; Ex. 1005 ¶ 35). Patent Owner “does not dispute that Element [1g] is disclosed by the asserted prior art.” PO Resp. 43.

- i. [1h] transmitting a notification via the wireless tracker to the server to verify a chain of custody of the shipment when the another code was received by an authentication module of the wireless tracker within a time threshold and the distance threshold*

Petitioner contends, referring to its contentions for limitations 1f and 1g, that *Sharma* discloses the tracker’s authentication module receiving a code when within the claim’s recited thresholds. *See* Pet. 33 (citing Ex. 1005 ¶¶ 35, 67, Fig. 5). Petitioner further contends that, “[i]n describing Fig. 5A, *Sharma* also discloses a management module of the wireless tracker ‘transmitting a chain of custody verification notification to a computer server and forwarded to a user device, as shown in block 516’ ‘if a code is received and verified within a distance threshold of the shipment destination

and within a configured time threshold.” *Id.* at 33–34 (Ex. 1003 ¶ 82; Ex. 1005 ¶ 67, Fig. 5A). Patent Owner “does not dispute that Element [1h] is disclosed by the asserted prior art.” PO Resp. 43.

j. Conclusion as to Independent Claim 1

Having considered the parties’ arguments and evidence, we determine that Petitioner has shown by a preponderance of the evidence that the subject matter of independent claim 1 would have been obvious over Sharma and Cova.

4. The Alleged Obviousness of Independent Claims 10 and 15 Over Sharma and Cova

Independent claim 10 is a system claim reciting a server, a mobile device, and a wireless tracker that together perform the same or similar method of independent claim 1. Ex. 1001, 16:59–17:17. Independent claim 15 recites a “computer readable medium comprising instructions that, when read by a processor, cause the processor to perform” a method the same or similar to that of claim 1. *Id.* at 17:29–18:19; *see* PO Resp. 45 (“Claim 15 is an independent claim reciting a ‘non-transitory computer readable medium comprising instructions that, when read by a processor, cause the processor to perform’ the same steps as recited in the method of claim 1.”). Petitioner’s contentions for independent claims 10 and 15 are the same or similar to those set forth for independent claim 1 and discussed above. Pet. 48–54, 56–59.

Independent claim 10 does not contain the “plurality” phrase of the other independent claims. *See* Ex. 1001, 16:59–17:16. Rather, independent claim 10 recites, *inter alia*, “a mobile device configured to receive [tracker/payload data],” “forward . . . an associated location of *the mobile device*,” and “wherein the server is also configured to monitor the . . . the

associated location of *the mobile device*.” *Id.* at 16:64–66, 17:1–2, 17:4–6 (emphasis added). Thus, independent claim 10 requires the use of one mobile device (but does not preclude the use of more than one). *See KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000) (“This court has repeatedly emphasized that an indefinite article ‘a’ or ‘an’ in patent parlance carries the meaning of ‘one or more’ in open-ended claims containing the transitional phrase ‘comprising.’”).

Patent Owner argues that, “although claim 10 in its current form does not expressly claim a plurality of mobile devices as claim 1 does, it nonetheless requires multiple mobile devices to perform the system as claimed.” PO Resp. 44; see also *id.* at 44–45 (arguing that the appearance of a “plurality” in a dependent claim “demonstrates an intention to incorporate the plurality limitation into claim 10.”). Patent Owner also argues that independent claim 10, like the other independent claims, “also requires continuous tracking for the same reasons discussed [for the other independent claims]—the claim language describes an asset being moved from one location to the next from an origin to a destination, and that the specification clarifies that this functionality is to be repeated throughout the journey by multiple mobile devices.” PO Sur-reply 22.

We decline Patent Owner’s invitation to read into claim 10 the requirement of a plurality of mobile devices and, for the reasons discussed above, we also decline to limit the claim to repeated, continuously tracking from origin to destination.

For independent claim 15, Patent Owner “reasserts that Petitioner’s challenge to claim 15 fails for the same reasons articulated above with respect to claim 1,” and that, “[a]s the Board notes in its [Institution]

Decision, [Patent Owner] asserts no additional arguments with regard to claim 15.” PO Resp. 45.

We have considered the evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of independent claims 10 and 15 would have been obvious based on Sharma and Cova for the reasons discussed in the Petition.

5. The Alleged Obviousness of Dependent Claims 2–9, 11–14, and 16–20 Over Sharma and Cova

a. Dependent Claims 2 and 3

Dependent claim 2 recites “[t]he method of claim 1, further comprising determining whether the tracker identification and associated location are located within a predefined geolocation.” Ex. 1001, 16:37–39. Dependent claim 3 recites “[t]he method of claim 2, further comprising setting an alert if the tracker identification and associated location are outside the predefined geolocation.” *Id.* at 16:40–42. Thus, these claims are directed to determining, respectively, whether a tracker is within or outside of a predefined geolocation.

The parties agree that a “predefined geolocation” refers to an established geographical area. PO Resp. 15; Pet. Reply 9.

Petitioner contends, *inter alia*, that Sharma in combination with Cova discloses these limitations. Pet. 35–38. Petitioner notes that Sharma states that “the wireless tracker 112 may determine that the location of the wireless tracker 112 is within a distance threshold of the shipment destination.” *Id.* at 35 (citing Ex. 1005 ¶ 26). Sharma determines this particular location in the context of, among other things, authentication for chain of custody verification. Ex. 1005 ¶ 26. Petitioner, relying on the testimony of

Dr. Engels, contends that “[a] skilled artisan would have understood that *Sharma*’s wireless tracker determines whether its identification data was within a distance threshold of a shipment destination is the same as the ability to determine that it is within a predefined geolocation.” Pet. 35 (citing Ex. 1003 ¶ 84). Petitioner also contends that Cova renders obvious the limitation of claim 2 because Cova teaches that its “tags . . . provide event notifications including ‘a location of the asset 108 when the event occurred,’ and ‘tag 114 can report a process event when the tag 114 enters, leaves or persists within a geofence.’” *Id.* at 36 (citing Ex. 1007, 2:47–50; 3:24–25). Petitioner also notes that Cova discloses that its “system . . . checks to see if the location of the security event . . . is inside a geofence corresponding to the destination location.” *Id.* at 36–37 (quoting Ex. 1007, 5:59–61 (alterations in original)).

Petitioner also contends that, “[r]egarding the additional limitation of ‘setting an alert’ recited in claim 3, *Sharma* discloses configuring distance thresholds around relevant geographic locations including a shipment destination,” and that “*Sharma* explains that ‘[a] distance threshold may be configured as 500 meters[; i]f an authentication code is received by the wireless tracker such that the wireless tracker is located beyond 500 meters of the shipment destination, then a notification is generated by the wireless tracker.” *Id.* at 37 (citing Ex. 1005 ¶ 27). Petitioner further contends that “[a] person of ordinary skill would have understood that because the *Sharma-Cova* combination discloses generating a notification/alert when an asset, its tracking tag, and a relay on a conveyance are located beyond a distance threshold or exit from a geographical boundary, the *Sharma-Cova* combination discloses ‘setting an alert if the tracker identification and

associated location are outside the predetermined geolocation” as claimed.” *Id.* at 38 (citing Ex. 1005, ¶ 91).

Patent Owner argues that “Petitioner incorrectly maps the ‘distance threshold’ disclosed in *Sharma* to the ‘predefined geolocation’ disclosed in claim 2.” PO Resp. 14 (citing Pet. 35). Patent Owner asserts that “a ‘distance threshold’ is distinct from a ‘predefined geolocation,’ because the former exists in relation to a fixed point, like an origin or destination, while the latter may exist anywhere.” *Id.* at 15. Patent Owner further argues that a person of ordinary skill in the art would not combine the references’ teachings because the two concepts are used for different intended purposes, asserting that *Sharma* uses a distance threshold for battery energy tracking and chain of custody verification according to a specific algorithm, whereas *Cova*’s “geofence only indicates if an object enters, leaves or lingers in a geofence—nothing else.” PO Resp. 46–47; *see also* PO Sur-reply 7 (arguing that a geofence is an area “with the purpose” of being used in a particular manner). According to Patent Owner, “[*Cova*’s] geofence does not fit into the chain of custody verification algorithm [of *Sharma*],” and “[a] geofence has no use and cannot benefit *Sharma*’s chain of custody verification algorithm.” PO Resp. 47.

Petitioner replies that a “distance threshold” and a “geolocation” are related concepts, that dependent claims 2 and 3 do not recite a chain of custody algorithm, and that *Cova* does not teach away from using a geofence in *Sharma*. *See* Pet. Reply 10–11, 23–24. Patent Owner’s view of the two concepts is consistent with Petitioner’s assertion that the two are related, with Patent Owner arguing that “a distance threshold exists in relation to a fixed point, and a predefined geolocation refers to any established

geographical area.” PO Sur-reply 8. Petitioner contends that “[t]he ’922 patent is . . . based on *Sharma* and discloses the same ‘chain of custody’ verification,” and thereby teaches the applicability of geofences and geo-zones. *Id.* at 24 (citing Ex. 1005 ¶ 44; Ex. 1001, 8:55–9:16).

We have considered Patent Owner’s arguments and evidence, but we do not agree with Patent Owner’s position. A person of ordinary skill in the art is not an automaton. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). Even if Cova’s geofencing is used for a different purpose than Sharma’s distance threshold or one can be anywhere and the other is based on a fixed point, as Patent Owner asserts, a person of ordinary skill in the art would recognize that the geofencing concept has useful applicability in Sharma’s distance- and location-based chain of custody verification scheme. *See* Ex. 1003 ¶ 84 (Dr. Engels testifying that a person of ordinary skill in the art would have understood Sharma’s ability to determine whether the tracker is within a distance threshold is the same as the ability to determine if the tracker is within a predefined geolocation).

We determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claims 2 and 3 would have been obvious over Sharma and Cova.

b. Dependent Claim 7

Dependent claim 7 recites “[t]he method of claim 1, wherein at least one of the associating, receiving and monitoring is performed by a cloud server.” Ex. 1001, 16:51–53.

Petitioner contends, for example, that Sharma discloses “computer server 305 receiving ‘the condition of the shipment in transit such as if the shipment is not within its shipping temperature, humidity, moisture limits, or if the shipment was moved from one transport carrier to another,” and thus,

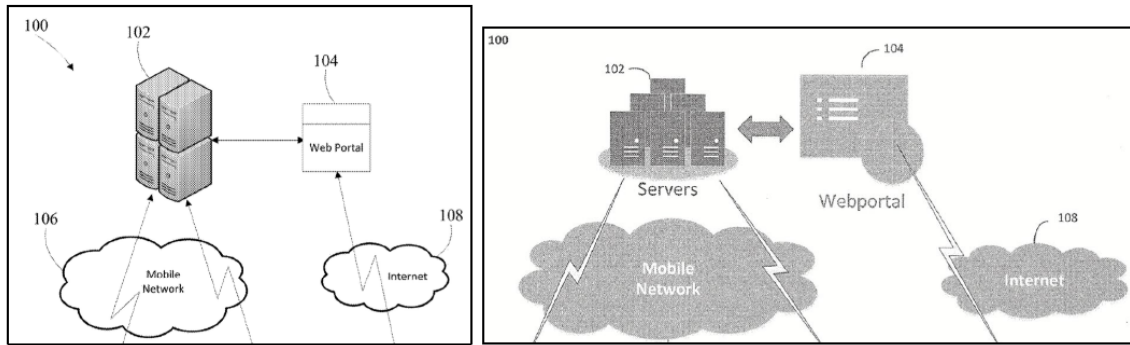
teaches a server performing monitoring. Pet. 43–44 (citing Ex. 1005 ¶ 54). Petitioner also contends that “*Sharma* further discloses computer server 305 that ‘may be part of a computer server system . . . that may include one or more computer servers,’ that ‘may be co-located with each other or distributed among different locations.’” *Id.* at 44 (quoting Ex. 1005 ¶ 43). Relying on the testimony of Dr. Engels, Petitioner asserts that “[a] person of ordinary skill in the art would have understood that Sharma’s distributed computer system server constitutes a ‘cloud server’ as claimed.” *Id.* (citing Ex. 1003 ¶ 106).

Patent Owner, in the claim construction section of the Response and relying almost exclusively on extrinsic evidence in the form of its expert opinion, argues that the recited cloud server is different than and has functionalities beyond those of a local server and a mere server in a distributed system. *See* PO Resp. 16–18. Patent Owner, in the Response, relies only on its claim construction arguments (in addition to those directed to the underlying independent claim 1) in asserting that Petitioner’s challenge to claim 7 is flawed. *See id.* at 46–47 (“[Patent Owner] Roambee asserts that its proposed construction[] of the term[] . . . ‘cloud server’ provide[s] an independent basis for rejecting Petitioner’s challenges.”). In the Sur-reply, Patent Owner asserts that “cloud server” has its plain and ordinary meaning, and reiterates its argument that there is a distinction between a local server and a cloud server. PO Sur-reply 9.

We do not understand Petitioner to construe a cloud server as encompassing a local server or to map any local server in Sharma to the recited cloud server. Rather, Petitioner maps a non-local server to the recited “cloud server,” with Petitioner’s mapping includes Sharma’s “one or

more computer servers,’ that ‘may be . . . distributed among different locations.’” *Id.* at 44 (quoting Ex. 1005 ¶ 43). We understand Petitioner’s statement that “[Patent Owner’s expert] Dr. Helal [on cross-examination] described a ‘cloud server’ in the same manner as a ‘local server’ when explaining that both communicate with clients via the Internet or an intranet” is an assertion that the testimony is evidence that Patent Owner is incorrect in attempting to construe “cloud server” as limited to a server having certain specific functionalities. *See* Pet. Reply 12 (citing Ex. 1024, 32:24–34:10).

We find persuasive Petitioner’s argument that, although “cloud server” is not defined in the ’922 patent, the Specification suggests that a cloud server can involve multiple computers like Sharma’s server that is distributed among different locations. *See* Pet. Reply 12 (quoting Ex. 1001, 37–41 (“One possible communication extension is to utilize sensors as the cloud, a mesh network imitating aspects of the internet in which many computers provide the network.”)); *id.* (citing Ex. 1001, 8:51–54 (“The components shown in FIG. 3 may be located in one computer server or be distributed among more than one computer server and/or databases.”))). Additionally, we find persuasive Petitioner’s argument that “*Sharma* includes the same description and a nearly identical depiction of item 102 [computer server(s)] as the ’922 [patent].” *Id.* at 12–13 (citing Ex. 1005 ¶ 43, Fig. 1). In that regard, Petitioner provides a side-by-side comparison of portions of the respective Figures 1, which we reproduce below.



Above, on the left, is a portion of Figure 1 of the challenged patent with server(s) 102, a cloud shaped mobile network 106, and unshown wireless tracker 112. Ex. 1001, 4:14–27, Fig. 1. Above, on the right, is Figure 1 of Sharma with servers 102, cloud shaped mobile network 106, and unshown wireless tracker 112. Ex. 1005 ¶ 21, Fig. 1. Thus, both depict a mobile network cloud between the tracker and the server. Patent Owner’s expert, Dr. Helal, described, on cross-examination, Figure 1 of the ’922 patent as “demonstrate[ing] the cloud server to be 102.” Ex. 1024, 44:10–14. We find that Sharma discloses or at least suggests to a person of ordinary skill in the art a “cloud server” within the meaning of the ’922 patent.

We determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claim 7 would have been obvious over Sharma and Cova.

c. The Remaining Challenged Claims—Dependent Claims 4–9, 11–14, and 16–20

Petitioner identifies teachings in the prior art references that teach or suggest the limitations of dependent claims 4–9, 11–14, and 16–20, and provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Pet. 39–43, 45–47, 55, 59–61. Patent Owner does not present separate or additional arguments addressing these claims.

We have considered the evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claims 4–9, 11–14, and 16–20 would have been obvious based on the relied-on prior art for the reasons discussed in the Petition.

IV. REVISED MOTION TO AMEND

Patent Owner filed a contingent Revised Motion to Amend (“RMTA”), presenting substitute claims 21–40. *See* RMTA 1–13. Because we conclude that Petitioner has shown by a preponderance of the evidence that each of challenged claims 1–20 is unpatentable, we consider Patent Owner’s RMTA with respect to the substitute claims.

“Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.” *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential). Patent Owner bears the burden of persuasion to show by a preponderance of the evidence that the motion to amend complies with these requirements. 37 C.F.R. § 42.121(d)(1). Specifically, a patent owner must provide a claim listing reproducing each proposed substitute claim, and must make an initial showing to demonstrate the following: (1) the amendment proposes a reasonable number of substitute claims; (2) the amendment responds to a ground of unpatentability involved in the trial; and (3) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

As also provided under our Rules, a petitioner bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claim is unpatentable. 37 C.F.R. § 42.121(d)(2).

Patent Owner, as explained below, has met its burden of persuasion to show that the amendments comply with the requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. As also explained below, however, Petitioner has demonstrated by a preponderance of the evidence that each of the Proposed Substitute Claims is unpatentable over the prior art under 35 U.S.C. § 103.

A. Proposed Substitute Claims

Patent Owner proposes to amend the '922 patent by adding new claims 21–40 as respective substitutes for original claims 1–20. *See* RMTA 1, 29–38 (App. A). Of the proposed substitute claims, claims 21, 30, and 35 are independent claims. Independent claim 21, which is proposed as a substitute for original independent claim 1, is reproduced below with Petitioner's bracketed annotations inserted¹⁰ and is illustrative.

21. (substitute for claim 1, if found unpatentable)

[21pre1] A method of continuously tracking an asset on a journey from a shipment origin to a shipment destination,
[21pre2] the asset passing a plurality of mobile devices on the journey, the method comprising:

[21a] associating a wireless tracker co-located with
[[an]]the asset, wherein the wireless tracker periodically emits a wireless signal comprising a tracker identification and a sensor payload including a fixed identification;

[21b] receiving a code via the wireless tracker at [[a]]the shipment origin;

¹⁰ Underlined language in the proposed substitute claims reflects subject matter added to corresponding original claim, and double brackets or strikethroughs indicate deletions.

[21c1] receiving, by ~~at least one of a plurality of successive~~ mobile devices of the plurality of mobile devices in turn, the wireless signal comprising the tracker identification[[,]] and the sensor payload as the asset and wireless tracker are moved from one location to another location on the journey,

[21c2] wherein each of the plurality of mobile devices has installed thereon a mobile application that runs in background and listens for the wireless signal;

[21d1] forwarding the tracker identification, the sensor payload, and an associated location of the ~~at least one of the plurality of successive~~ mobile devices in turn to a server,

[21d2] wherein each mobile device of the plurality of mobile devices that receives the wireless signal forwards the tracker identification, the sensor payload, and the associated location to the server; and

[21e] monitoring the tracker identification and the associated location of the ~~at least one of the plurality of successive~~ mobile devices as the asset and the wireless tracker are moved from one location to another location on the journey;

[21f] receiving another code at the wireless tracker at [[a]]the shipment destination;

[21g] determining that the location of the wireless tracker is within a distance threshold of the shipment destination; and

[21h] transmitting a notification via the wireless tracker to the server to verify a chain of custody of the shipment when the another code was received by an authentication module of the wireless tracker within a time threshold and the distance threshold.

RM TA 29–30 (App. A).

B. Requirements for Amendment

Patent Owner bears the burden of persuasion to show that proposed substitute claims 21–40 meet the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. 37 C.F.R. § 42.121(d). For the reasons that follow, we determine that Patent Owner has satisfied that burden.

1. Reasonable Number of Substitute Claims

A motion to amend must “propose a reasonable number of substitute claims.” 35 U.S.C. § 316(d)(1)(B); *see also* 37 C.F.R. § 42.121(a)(3) (“A motion to amend may cancel a challenged claim or propose a reasonable number of substitute claims.”). “There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.” *Lectrosonics*, IPR2018-01129, Paper 15 at 4; *see also* 37 C.F.R. § 42.121(a)(3). Here, Patent Owner proposes no more than one substitute claim for each challenged claim. RMTA 29–38 (App. A). Petitioner does not contend that the number of substitute claims is unreasonable. *See generally* Pet. RMTA Opp. We determine that this requirement is met.

2. Responsive to Ground of Unpatentability

“A motion to amend may be denied where. . . [t]he amendment does not respond to a ground of unpatentability involved in the trial.” 37 C.F.R. § 42.121(a)(2)(i). The Petition asserts that claims 1–20 are unpatentable over the cited prior art. Pet. 1–3, 7–61. Patent Owner responds, through the RMTA, to the grounds of unpatentability involved in the trial by proposing substitute claims 21–40 for challenged claims 1–20 that each recite new elements, and new combinations of elements. *See* RMTA 2, 15–25, 29–38 (App. A). Petitioner does not contend that the proposed amendments fail to respond to a ground of unpatentability in this trial. *See generally* Pet. RMTA Opp. We determine that this requirement is met.

3. May Not Enlarge the Claim Scope

An amendment may not seek to enlarge the scope of the claims of the patent. 35 U.S.C. § 316(d)(3); 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2). Patent Owner asserts that substitute claims 21–40 do not seek to enlarge the

scope of challenged claims 1–20. RMTA 2. We agree and find that each proposed substitute claim includes amendments that narrow the claim scope. *See* RMTA 29–38 (App. A). Petitioner does not contend that any proposed substitute claim enlarges the scope of any challenged patent claim. *See generally* Pet. RMTA Opp. We determine that this requirement is met.

4. *No New Matter*

An amendment may not introduce new matter. 35 U.S.C. § 316(d)(3); 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2). New subject matter is any addition to the claims that lacks sufficient support in the subject patent’s original disclosure. *See TurboCare Div. of Demag Delaval Turbomach. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) (“When [an] applicant adds a claim . . . , the new claim[] . . . must find support in the original specification.”). Patent Owner also is required to show written description support in “the original disclosure of the patent for each claim that is . . . amended,” and in “an earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought.” 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2).

Patent Owner identifies adequate written description support for proposed substitute claims 21–40 in the original disclosure of the ’922 patent. *See* RMTA 3–13 (citing, e.g., Ex. 1002, 97 (Fig. 1), 102–103 (Figs. 6, 7)), 122–123 (¶¶ 5–7), 125 (¶ 15), 127–128 (¶ 20), 129 (¶¶ 26, 28), 130–131 (¶¶ 29–30), 157–158 (¶¶ 75–77)). For example, as cited by Patent Owner, Figure 7 of the patent application and its associated description provide support for the “successive” mobile device recitations because they show mobile device 710 receiving wireless signal 712 from asset 610 near origin area 110, mobile device 714 receiving wireless signal 712 from asset 610 when the asset moves outside origin area 110, and mobile

device 720 receiving wireless signal 716 from asset 610 when the asset moves to a location in proximity to destination area 718. Ex. 1002, 103 (Fig. 7), 157–158 (§ 76). These disclosures show “successive” mobile devices receiving or forwarding a signal “in a particular order” because, as shown and described, mobile device 710 is first to receive the wireless signal, mobile 714 is second to do so, and mobile device 720 is third. *See id.* Figure 6 of the original disclosure similarly shows “successive” mobile devices 616, 618, and 622, each, in turn, receiving and forwarding a wireless signal from a different location as asset 610 moves from origin to destination. *Id.* at 102 (Fig. 6). The original disclosure of the ’922 patent describes Figure 6 accordingly: “[m]obile device 616, 618, 620 and 622 each in turn receives the wireless signal and forwards the ID and sensor payload along with the mobile device location to the cloud server via an RF signal such as cellular, WiFi, WiMax and the like.” *Id.* at 157 (§ 75).

Petitioner does not present any persuasive arguments that any proposed substitute claim introduces new matter or is unsupported in the original disclosure. *See generally* Pet. RMTA Opp.

For at least these reasons, we determine that each proposed substitute claim is supported by the original disclosure of the ’922 patent and does not seek to add new matter. We determine that this requirement is met.

5. Conclusion Regarding the Requirements for Amendment

We determine that Patent Owner has met its burden of persuasion to show that the amendments comply with the requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. The burden of persuasion now lies with Petitioner to show, by a preponderance of the evidence, that any proposed substitute claim is unpatentable. 37 C.F.R. § 42.121(d)(2).

C. Evidence

Petitioner, in challenging the patentability of the proposed substitute claims, relies on the following references in addition to Sharma and Cova (discussed above):

Name	Reference	Exhibit(s)
FedEx '231	US 9,182,231 B2, issued Nov. 10, 2015	1015
Tile '254	US 2017/0352254 A1, published Dec. 7, 2017	1016
Kubo	US 9,591,570 B2, issued Mar. 7, 2017	1030

Petitioner also relies on the declaration of Dr. Daniel Engels (Ex. 1032) in support of its arguments, and Patent Owner relies on the declarations of Dr. Abdelsalam A. Helal (Exs. 2012, 2016) in support of its arguments. The parties also rely on other exhibits as discussed below.

D. Grounds of Unpatentability

Petitioner contends that the Substitute Claims are unpatentable based on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
21–40	103	Sharma, Cova, Kubo
21–40	103	Sharma, FedEx '231, Kubo
21–40	103	Sharma, Tile '254, Kubo
21–40	112	Indefiniteness

E. The Alleged Obviousness of the Proposed Substitute Claims Over Sharma, Cova, and Kubo

Petitioner contends that the subject matter of claims 21–40 would have been obvious over Sharma, Cova, and Kubo. Pet. RMTA Opp. 3–8 (citing Ex. 1032 ¶¶ 41–74). For reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–40 are unpatentable on that basis.

1. *Kubo (Ex. 1030)*

Kubo is a U.S. Patent titled “Method and System for Tracking Devices.” Ex. 1030, code (54). More specifically, Kubo describes techniques for controlling wireless beacons that are compliant with various Bluetooth specifications, including Bluetooth v4.0 (or greater) and Bluetooth Low Energy. *Id.* at 1:25–27, 2:3–5. We reproduce Figure 1 of Kubo, below:

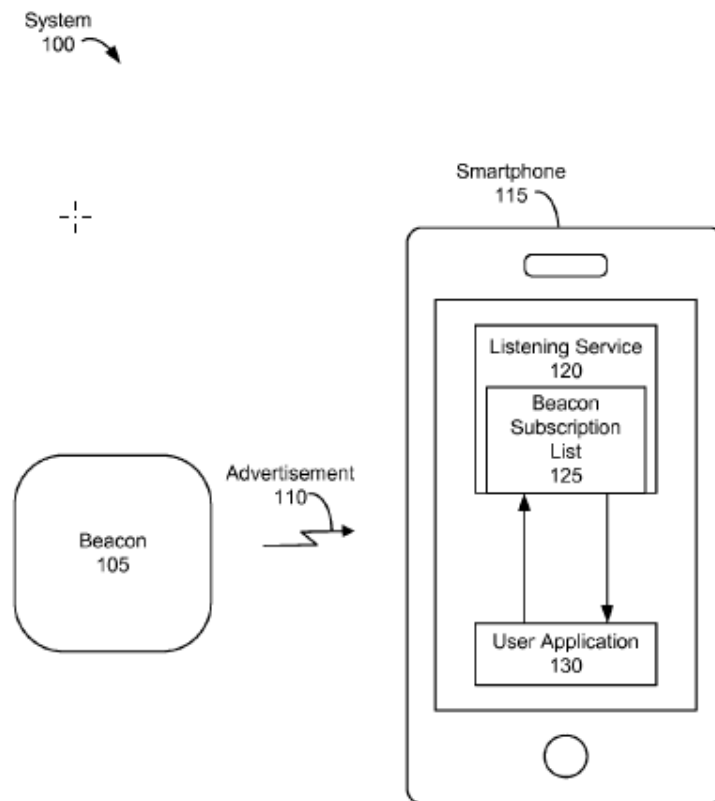


Figure 1 shows a system 100 including a wireless beacon 105 for transmitting one or more advertisements 110 (such as a wireless advertisement packet) to a smartphone 115 within a suitable radius of the beacon 105. Ex. 1030, 7:20–25. As shown, smartphone 115 includes a listening service 120 for detecting advertisements 110 from beacon 105. *Id.* at 7:39–40, 7:42–46, 8:6–7. According to Kubo, “listening service 120 . . . may provide an interface between the [smartphone 115’s] receiver and . . .

user application 130.” *Id.* at 7:39–42. Kubo describes that, “[b]y employing listening service 120 to alert user application 130 of detected advertisements, user application 130 can, indirectly, continuously monitor for advertisements, as listening service 120 can execute continuously even while user application 130 is in a sleep, standby, background or other non-executing mode.” *Id.* at 7:54–59.

2. *Petitioner’s Challenge*

The parties both focus their arguments on certain amended aspects of the proposed substitute claims, namely some of the aspects that Patent Owner amended in an attempt to overcome the Sharma-Cova ground asserted in the Petition against the original claims. *See* RMTA 15–19; Pet. RMTA Opp. 3–8; PO RMTA Reply 3–5; Pet. RMTA Sur-reply 5–6. We likewise focus our discussion here on those aspects.

Proposed substitute independent claim 21, for example, calls for the “receiving” be performed by “successive mobile devices . . . in turn,” for “forwarding” the tracker/sensor data and the “location of the successive mobile devices in turn” to the server, and for the “monitoring” of the location of the successive mobile devices “as the asset and the wireless tracker are moved from one location to another location on the journey.” RMTA, App. A. Claim 21 also includes the requirement that “each of the plurality of mobile devices has installed thereon a mobile application that runs in background and listens for the wireless signal.” *Id.*

Petitioner’s challenge builds on its Sharma-Cova ground asserted in the Petition. *See* Pet. RMTA Opp. 3–4 (citing Pet. 19–28). Petitioner reiterates its position, which we found to be persuasive for the reasons discussed above, that a person of ordinary skill in the art “would have been motivated to modify *Sharma*’s user devices to be relays.” *Id.* at 3 (citing

Pet. 24–28). Petitioner further contends that “*Sharma* and *Cova* render obvious most limitations [of the proposed substitute claims] including the amended preambles and ‘periodically emit[ting].’” *Id.* (citing Ex. 1032 ¶¶ 42–45, 60–63, 75–77). Petitioner contends that *Cova* teaches the aspect of the amended claims directed to the receiving of tracker data by successive devices. *Id.* at 3–4. Petitioner additionally contends that “[t]he ‘mobile application’ limitation is obvious from the combination including *Kubo*.” *Id.* at 4 (citing Ex. 1032 ¶¶ 42–45).

a. Successive Mobile Devices

Petitioner asserts that *Sharma* in view of *Cova* discloses “successive mobile devices” as recited in proposed substitute claim 21. Pet. RMTA Opp. 4–6. Specifically, Petitioner asserts that “[l]imitations [21c1], [21d1], [21d2], and [21e] require a second mobile device receiving and forwarding an ID and sensor payload after a first mobile device, and a server monitoring the forwarded information . . . as the tracker moves from ‘one location to another location’ in a journey,” and that “*Cova* operates this way under three mappings.” *Id.* at 4 (citing Ex. 1032 ¶¶ 46–48). We address only Petitioner’s second mapping, which, for the reasons discussed below, we find to be adequate to satisfy Petitioner’s burden.

Petitioner contends that *Cova* teaches relays “receiving a sensor payload and tracker ID *in turn*, and forwarding information to a server *in turn* over a journey.” Pet. RMTA Opp. 5–6 (citing Ex. 1007, 2:17–19, Figs. 1, 3; Ex. 1024, 2:17–24, 6:53–59, 74:7–75:22, 79:3–82:8; Ex. 1032 ¶¶ 56–57, 60, 62–63). Petitioner explains that “*Cova* discloses tracking an ‘intermodal shipping container . . . and conveyances including trucks, trains, ships, and airplanes.” *Id.* at 5 (citing Ex. 1007, 2:17–24; Ex. 1024, 74:7–75:22). Petitioner further explains that “*Cova* Figures 1 and 3 illustrate a

‘shipping scenario’ and journey ‘from an origin to a destination,’” in which “a shipment travels by land, then by ship, and then by land to the destination,” and that “Cova discloses a relay in a truck trailer relaying to a server” and “relaying signals from tracking tags in a ship or truck to the server.” *Id.* (citing Ex. 1007, 6:53–59, Figs. 1, 3; Ex. 1024, 79:3–82:8); *see also* Pet. RMTA Sur-reply 5–6 (citing, *inter alia*, Cova’s “Other conveyances” discussion at Ex. 1007, 6:46–59).

Patent Owner argues that Cova “does not disclose, teach, or suggest the use of multiple,” “successive relays even in the context of intermodal transportation” and “only discloses the use of a relay with respect to the containers on a ship, not for use with other conveyances.” RTMA 17–19 (citing Ex. 1007, 8:5–61, Fig. 5). In reply to Petitioner’s opposition to the revised motion to amend, Patent Owner reiterates its position, arguing that “Cova discloses only a single relay, described as a multi-part device installed on a ship, which is co-located with the packages only for the part of the journey that takes place on that ship.” PO RMTA Reply 4 (citing Ex. 1007, 9:48–50; Figs. 6a, 6b). For its argument that Cova only discloses a relay on a ship, Patent Owner points to various parts of Cova but does not adequately address the portions of Cova relied on by Petitioner. *See* RMTA 17–19 (citing Cova’s column 8 and Figure 5); PO RMTA Reply 3–4 (acknowledging that Petitioner relies on Cova’s Figures 1 and 3 but presenting arguments regarding the ship shown in Figures 6A and 6B); *e.g.*, Pet. RMTA Opp. 5 (discussing, *inter alia*, Cova’s discussion in column 6 for the propositions regarding relays on a ship *and a truck*). We do not agree with Patent Owner that Cova teaches only the use of a single relay on a ship.

We are persuaded by Petitioner’s assertion that a person of ordinary skill in the art “would have understood *Cova* Figs. 1 and 3 to show an asset transported over land *and* sea,” and that “[a]s *Cova*’s intermodal container moves by truck *and* ship, the tag connects to a relay on each conveyance, and each relay forwards a server,” which “is consistent with *Cova*’s teaching of combining implementations.” *Id.* (citing, e.g., Ex. 1007, 11:63–67; Ex. 1032 ¶ 54). As Dr. Engels’s testifies, “*Cova* discloses tracking assets moving in a truck using a relay that enables communication between assets in the truck trailer and an event server” because *Cova* describes the use of relays not only on ships (*see* Ex. 1007, Figs. 6A, 6B, 9:37–10:44) but also on conveyances other than ships (*see id.* at 6:46–59) when asset tracking tags are having problems communicating directly with the server. *See* Ex. 1032 ¶ 56. We also credit Dr. Engels’s testimony that, from the cited descriptions in *Cova*, “a person of ordinary skill in the art would have understood that” (1) “*Cova* discloses multiple modes of transportation used in a single journey, each mode having at least one relay,” (2) “as an intermodal container is moved by truck, then ship, then another truck, the container’s tracking device would have connected to the relay on each respective conveyance,” (3) “*Cova* discloses mobile device relays that receive a sensor payload and tracker identification successively in turn, and forward the information to a server in turn, over the course of a journey,” and (4) “*Cova*’s truck and ship relays perform the ‘receiving’ and ‘forwarding’ functions successively in turn as the asset progresses through the legs of the journey.” *Id.* ¶ 57. Patent Owner’s expert Dr. Helal also acknowledges that, in *Cova*, (1) “[e]xamples of conveyances include . . . trucks, trains, ships, and airplanes” (Ex. 1024, 75:13–18), (2) “column 6,

lines 53 to 59 discuss two ways for the system to handle tag communication with a server, on the ship or on the truck . . . [,] the second . . . way[.]” being “that . . . [t]he event server 212 can receive signals from a relay” (*id.* at 79:12–25), and (4) “it would be fair to say that a ship would have one relay and a truck would have another relay” (*id.* at 80:1–80:4).

Having considered the parties’ arguments and evidence, we determine that Petitioner’s second mapping of the teachings of Cova supports Petitioner’s contention that Cova discloses or suggests the “receiving,” “forwarding,” and “monitoring” of tracker identification, sensor payload, and location information for “successive” devices, as recited in limitations 21c1, 21d1, 21d2, and 21e. We further determine that, when these teachings of Cova are applied in Petitioner’s proposed combination where Sharma’s user devices, including a smartphone, are modified to be relays (Pet. RMTA Opp. 3), the resulting combination of Sharma and Cova discloses or suggests the “receiving,” “forwarding,” and “monitoring” limitations. Similarly, Petitioner’s arguments and evidence show that the proposed combination discloses or suggests the similar limitations recited in proposed substitute independent claims 30 and 35.

b. Mobile Application

Limitation 21c2 of proposed substitute claim 21 recites: “wherein each of the plurality of mobile devices has installed thereon a mobile application that runs in background and listens for the wireless signal.” RMTA 4 (Claims App.). Limitations 30c2 and 35c2 recite similar language. *Id.* at 7, 10 (Claims App.).

Petitioner asserts that Kubo renders obvious limitation 21c2 because “*Kubo*[’s] tracking devices comply[.] with Bluetooth standard v4.0+, ‘with applications in background or non-execution states,’” and “*Kubo*’s listening

service 120 is installed in a mobile device to listen for a wireless signal, and runs even when applications on the device are in background, sleep, or other non-executing states.” Pet. RMTA Opp. 7 (citing Ex. 1030, Abstract, 1:53–60, 2:3–5, 2:35–38, 7:20–59, 8:6–12, 9:5–11, 11:47–54, Fig. 1; Ex. 1032 ¶¶ 67–70). Petitioner reasons:

It would have been obvious to a [person of ordinary skill in the art] to modify *Sharma-Cova* to incorporate *Kubo*’s listening service. . . . The resulting system would have had mobile devices (*Sharma*’s user devices and/or *Cova*’s relays) with *Kubo*’s listening service running in the background to listen for wireless tracking signals, and relaying received information to a server (as in *Cova*), thus combining prior art elements according to known methods (compliance with Bluetooth), and applying *Kubo*’s known listening service to detect Bluetooth advertising signals. The combination would have yielded predictable results and improvements of *Sharma-Cova*’s receivers continuously scanning for Bluetooth signals while other applications are non-executing or power conservation modes.

Id. at 7–8 (citing Ex. 1030, 7:54–59, 8:6–12). Petitioner also asserts that a person of ordinary skill in the art “would have expected success in implementing *Kubo*, to comply with Bluetooth standards, and because *Kubo*’s listening service would not have required hardware changes to *Sharma-Cova*,” and “[a]ny software changes were well within the capabilities of a [person of ordinary skill in the art], especially given the detailed disclosure of *Kubo* and publicly-available Bluetooth specifications (including the 2700-page Ex1031) explaining software layers used for listening.” *Id.* at 8 (citing Ex. 1031, 709; Ex. 1032 ¶¶ 71–74).

The testimony of Patent Owner’s expert, Dr. Helal, is consistent with many of Petitioner’s contentions and demonstrates that the concept of a mobile application running in background and listening for wireless signals

was well known to a person of ordinary skill in the art. For example, Dr. Helal testifies that “*Kubo* discloses an invention using Bluetooth beacons deployed in known locations to position a mobile device,” and “[t]he invention [of *Kubo*] utilizes mobile applications and a Bluetooth listening service, both of which existed years before *Kubo*’s patent was issued” (Ex. 2016 ¶ 7), and that “any form of background processing by mobile apps, including listening to events, was known and practiced prior to *Kubo*’s patent filing” (*id.* ¶ 10). *See also, e.g., id.* ¶ 13 (Dr. Helal’s testimony that a person of ordinary skill in the art would recognize that the concepts of a mobile application and background listening “existed before the priority date of the ’922 patent or any of the asserted prior art.”).

Patent Owner argues that *Kubo* does not render obvious the added “mobile application” “because the ‘background listening service’ in *Kubo* is performed by a Bluetooth software driver,” which is “part of the device’s operating system, while a mobile application is a computer program that runs above and uses the operating system.” PO RMTA Reply 4–5 (citing Ex. 2016 (one of Dr. Helal’s declarations) ¶¶ 6–7, 12, 15). We do not agree with this argument because, as Petitioner points out, Patent Owner’s expert “Dr. Helal . . . never provides *any* citation to any authority or evidence concerning the state of the art,” and, in fact, “the ’922 [patent] belies [Patent Owner’s] argument and discloses the mobile application ‘installed as part of the operating system’ like a driver.” Pet. RMTA Sur-reply 9 (citing Ex. 1001, 4:5–7; Pet. RMTA Opp. 2, 6; Ex. 2016 ¶¶ 6–13). Dr. Helal’s conclusory assertion not only is entitled to little or no weight, but we agree that Helal’s opinion that the claimed “mobile application is a computer program that runs above and uses the operating system” is a claim

construction opinion contrary to the Specification. Ex. 1001, 4:5–7 (“The mobile application *when installed as part of the operating system* of a mobile device will work in the background and listen for [Bluetooth low energy] transmissions.”); 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

Patent Owner also argues that “[c]laim 21 is not claiming the concept of background listening, or of mobile applications generally,” but “refers to a specific mobile application that performs a designated action—listening for signals from a passing wireless tracker that can then be processed and relayed to a server”—which “Petitioner has failed to show that *Kubo* discloses.” PO RMTA Reply 5 (citing Ex. 1001, 3:59–4:14; Ex. 2016 ¶¶ 8–13). Patent Owner also argues that the proposed combination’s inclusion of *Kubo* is deficient because “the function of *Kubo*’s listening service is the opposite of the function of the mobile application in the ’922 patent.” PO RMTA Reply 10–11. According to Patent Owner, “*Kubo* calls for multiple wireless beacons determining the location of one central mobile device,” whereas “in the ’922 patent, a wireless tracker moves through an environment of different mobile devices, which then forward the tracker identification, sensor information, and location of the mobile device to a server.” *Id.* (citing Ex. 1001, 16:17–24; Ex. 1030, Fig. 3, 23:5–6, 25:1–7).

We do not agree with these arguments. Patent Owner is improperly attacking *Kubo* individually where Petitioner’s obviousness challenges are based on the combined teachings of Sharma, Cova, and *Kubo*. *See In re Merck*, 800 F.2d at 1097 (“Non-obviousness cannot be established by attacking references individually where the [challenge] is based upon the

teachings of a combination of references.”). Here, Petitioner relies on the combination of Sharma and Cova for rendering obvious the majority of the limitations of the proposed substitute claims and cites Kubo only for the “mobile application” elements recited in limitations 21c2, 30c2, and 35c2, which merely recite that “each . . . mobile device[] has installed thereon a mobile application that runs in background and listens for the wireless signal.” To meet its burden of establishing unpatentability, Petitioner need not show that Kubo also discloses that the signals being listened to by its mobile application via the listening service are “from a passing wireless tracker that can then be processed and relayed to a server,” or that “a wireless tracker moves through an environment of different mobile devices, which then forward the tracker identification, sensor information, and location of the mobile device to a server.” And, as Petitioner points out, Patent Owner’s argument “ignores that *Kubo* discloses what the claimed ‘mobile application’ requires,” “never explains how the substitute claims recite a ‘specific mobile application’ that differs from *Kubo*’s listening service,” and is “irrelevant to the substitute claims recitation of a ‘mobile application’ doing nothing more than ‘run[ning] in the background and listen[ing] for the wireless signal.’” Pet. RMTA Sur-reply 7–8.

We determine that the asserted teachings of Kubo support Petitioner’s contention that Kubo discloses or suggests the “mobile application” elements recited in limitations 21c2, 30c2, and 35c2, and that Petitioner has articulated adequate reason to combine the asserted teachings of Kubo with those of Sharma and Cova to arrive at the claimed invention.

c. Conclusion

Patent Owner does not present any arguments for the proposed substitute claims other than those addressed above. We have considered the

evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of proposed substitute claims 21–40 would have been obvious based on Sharma, Cova, and Kubo.

F. The Alleged Obviousness of the Proposed Substitute Claims Over Sharma, FedEx '231, and Kubo

Petitioner contends that the subject matter of claims 21–40 would have been obvious over Sharma, Fedex '231, and Kubo. Pet. RMTA Opp. 8–20 (citing Ex. 1032 ¶¶ 78–158). Patent Owner argues that a person of ordinary skill in the art would not be motivated to combine Sharma and FedEx '231 and that Kubo does not disclose the recited mobile application. PO RMTA Reply 5–11. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–40 are unpatentable as being obviousness over Sharma, FedEx '231, and Kubo.

1. FedEx '231 (Ex. 1015)

FedEx '231 is a U.S. Patent titled “Hierarchical Sensor Network for a Grouped Set of Packages Being Shipped Using Elements of a Wireless Node Network.” Ex. 1015, code (54). More specifically, FedEx '231 describes that a master node may receive a signal or message broadcast as an advertising packet from a nearby ID node associated with a package, where the signal may include identification information and sensor data. *Id.* at 19:33–37, 138:39–50, Fig. 7. FedEx '231 further describes that as a package (including its ID node) physically moves from one location to another, the ID node disassociates from one master node and is handed off to become associated with another master node. *Id.* at 3:43–46, 12:13–24, 34:25–38, 82:24–58, 84:17–36, 85:23–45, 86:38–87:15, 87:65–88:6,

Figs. 17–19. FedEx ’231 also describes that a master node can forward information, such as location information, an identification of an ID node, and a sensor payload, to the server. *Id.* at 3:43–46, 12:13–17, 27:36–49, 29:4–24, 34:25–38, 44:36–39, 74:14–22, 82:24–58, 83:60–84:3, 83:20–29, 84:17–36, 87:42–51, 164:57–65, 170:2–13, Fig. 4 (item 475, “GPS”).

Figure 17 of FedEx ’231 is reproduced below.

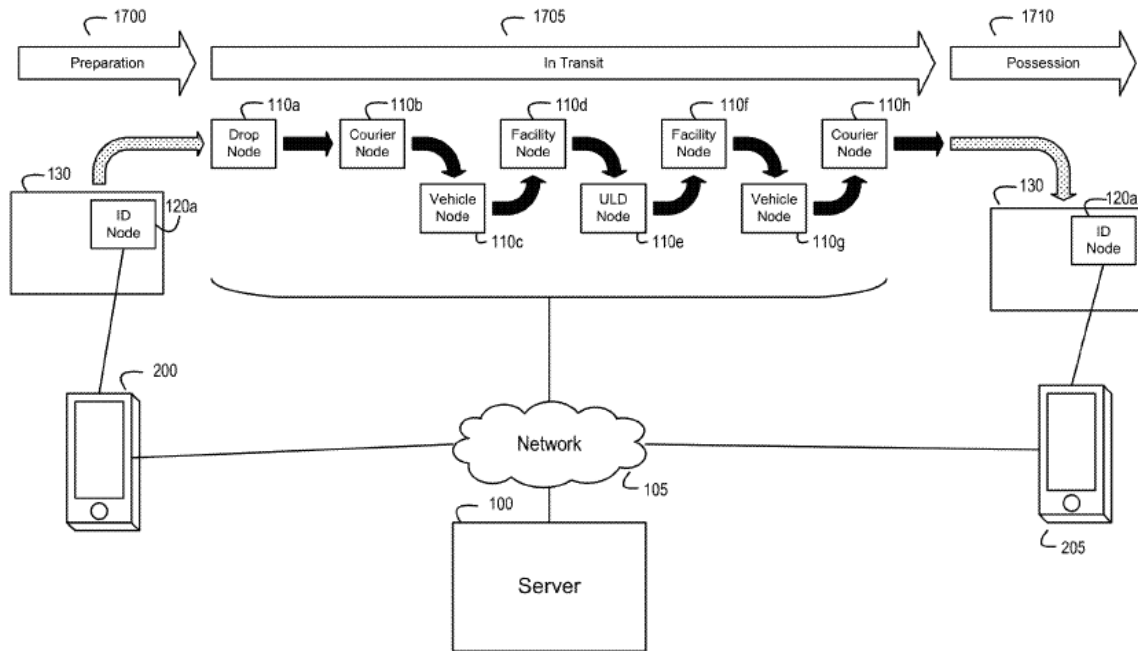


Figure 17 of FedEx ’231 depicts “an example logistics operation using exemplary components of a wireless node network.” Ex. 1015, 80:41–43, Fig. 17. As shown in Figure 17, ID node 120a communicates with devices 200, 110a–110h, and 205 in turn, and each device forwarding information to server 100. *Id.*, Fig. 17.

2. Petitioner’s Challenge

Petitioner contends that “*Sharma* and FedEx ’231 discloses nearly all revised claim limitations, and it was obvious to a POSITA to combine *Sharma*-FedEx ’231 with the listening service (a mobile application running in the background) disclosed in *Kubo*.” Pet. RMTA Opp. 8 (citing Ex. 1002,

14, 17; Ex. 1032 ¶¶ 78–80). Petitioner asserts that in “FedEx ’231 successive mobile devices receive[] tracker information and each forwards data to a server.” *Id.* (citing Ex. 1015, Abstract). Petitioner contends that “Fig. 1 [of FedEx ’231] shows a wireless ID node 120 transmitting a wireless signal including ID and sensor data to a mobile master node 110a, which transmits received data to a server 100,” where “ID node 120 communicates with . . . master node 110a” first, and “then later with a second master node 110b.” *Id.* at 8–9 (emphasis omitted) (citing Ex. 1015, Abstract, 11:47–65, 12:13–24). Petitioner also asserts that “[i]n Fig. 2 [of FedEx ’231], multiple master nodes 110 receive and forward data from ID nodes 120 to server 100. *Id.* (citing Ex. 1015, 13:45–14:67). Petitioner further asserts that “[t]he disclosure of an ID node associating with successive mobile devices along a journey is pervasive throughout FedEx ’231” because “[e]ach master node receiving a wireless signal (including the ID and sensor payload) forwards to server 100,” and “[t]he master nodes and user access devices are ‘movable and mobile devices’” such as “smartphones, tablets, wearables, or other devices.” *Id.* at 9 (citing Ex. 1015, Abstract, 11:47–65, 12:13–24, 14:12–67, 25:20–28, 81:45–56, Figs. 2, 12, 17, 22B, 34A–34D, 96, 101A–101B; Ex. 1032 ¶¶ 81–83).

Specifically, Petitioner asserts that FedEx ’231 discloses “multiple successive mobile devices receiv[ing] data from the wireless tracker in turn,” as recited in limitation 21c1, because FedEx ’231 discloses master nodes (which may be mobile or handheld devices) receiving a signal with an ID node address and collected shipment condition information from an ID node, which is handed off to and tracked by another master node within range as the ID node moves along a path from one location to another. Pet. RMTA

Opp. 13–14 (citing Ex. 1015, Abstract, 3:64–4, 12:8–24, 13:17–19, 13:29–51, 14:13–67, 18:53–19:11, 19:24–43, 20:32–39, 25:5–12, 25:19–28, 25:56–65, 80:61–81:15, 83:53–84:36, 85:11–45, 86:38–88:21, 96:1–22, 116:22–24, 138:39–54, 157:50–59, 206:3–37, Figs. 2, 7, 17–19. Ex. 1032 ¶¶ 101–105).

Petitioner asserts that Kubo discloses the “mobile application” limitation 21c2 for reasons similar to those discussed above for the obviousness challenge over Sharma, Cova, and Kubo. Pet. RMTA Opp. 15–16 (citing Ex. 1032 ¶¶ 107–114); *see supra* Section IV.E.2.b.

Petitioner asserts that FedEx ’231 discloses the “forwarding” limitations 21d1 and 21d2 because “FedEx ’231 discloses an ID node disassociating with one master node and associating with another, such that each successive master node receives and forwards information including a sensor payload to a server in turn,” and “[t]he master nodes also determine their location using GPS and communicate the location to the server.” *Id.* at 16 (citing Ex. 1015, 3:43–46, 12:8–17, 13:29–33, 24:56–67, 27:36–49, 29:4–24, 34:12–38, 44:36–39, 74:14–22, 82:24–84:36, 87:42–51, 164:57–65, 169:1–170:13, Fig. 4; Ex. 1032 ¶¶ 115–121).

Petitioner asserts that FedEx ’231 discloses the “monitoring” limitation 21e because “[s]erver 100 . . . tracks master and ID nodes associations as the ID node travels from an origin to destination, tracks locations, and manages IDs.” *Id.* at 17 (citing Ex. 1015, 33:7–35:62, 42:54–63, 80:61–81:15; Ex. 1032 ¶ 125).

Petitioner also asserts that FedEx ’231 is analogous to Sharma and reasons that “[i]t would have been obvious to modify *Sharma* to include the master nodes and user access devices of FedEx ’231 that successively in turn receive data from an ID node and forward the data with a location of the

mobile devices to a server.” Pet. RMTA Opp. 9–10 (citing Ex. 1005 ¶¶ 21, 29, 38, 42, 60, 62, 64, 65, Fig. 1; Ex. 1015, 11:46–12:55, 13:45–15:45, 26:4–62, 29:25–44, 31:22–38, 77:63–78:16, 81:45–56, Figs. 1, 2; Ex. 1032 ¶¶ 84–86); *see also id.* at 14–15 (“A POSITA would have been motivated to modify Sharma’s wireless tracking system with the node architecture disclosed in FedEx ’231, for the reasons discussed above.”). Petitioner contends that “[s]uch a modification involved modifying *Sharma*’s user access devices to relay data as in FedEx ’231, and/or incorporating FedEx ’231’s mobile devices into *Sharma*, because *Sharma* is subject to the problems discussed above that FedEx ’231 was designed to overcome,” and “[a] POSITA would have been motivated to implement FedEx ’231 in *Sharma* to yield predictable and desirable results of lowering tracking device cost while providing robust object tracking.” *Id.* at 10 (citing Ex. 1015, 2:22–37, 3:55–62, 11:1–20, 11:46–12:7, 104:40–46, 110:13–26, 167:24–50; Ex. 1032 ¶ 87). Petitioner also contends that “FedEx ’231 provides an earlier teaching for modifying *Sharma*, by using smaller, simpler, low-cost package tracking devices that ‘may be easily placed into a package,’ . . . in combination with a master node that can communicate with a server,” and “[a] POSITA would have understood that using mobile devices as relays would have reduced tracking devices cost and complexity while enhancing the tracking system capabilities.” *Id.* at 10–11 (citing Ex. 1015, 11:59–63, 12:1–11; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 415–21 (2007)). Petitioner further contends that “[a] POSITA would have been motivated to use FedEx ’231’s architecture to similarly improve *Sharma*’s similar wireless tracking system, to yield predictable and desirable results of mitigating interference during package tracking,” and that “[a] POSITA

would have understood that such a modification would have enhanced transmission capabilities of *Sharma*’s wireless tags, by adding the functionality of FedEx ’231’s master nodes and user access devices (mobile devices).” *Id.* at 11 (citing Ex. 1032 ¶ 89). Petitioner additionally contends that “[a] POSITA would have expected success in implementing FedEx ’231’s mobile devices or relay functionality into *Sharma*.” *Id.* at 11–12 (citing various sections of Ex. 1005; Ex. 1015).

Patent Owner argues that in FedEx ’231, “not every master node that receives the wireless signal periodically emitted from the ID node will forward the sensor payload and an associated location to the server, and instead, only the master node actively paired with the ID node will forward such information,” whereas “according to the substitute claims, multiple mobile devices that receive the sensor payload will also forward the sensor payload and its associated location to the server.” RTMA 20–21. We do not agree with this argument because the claims do not require “every” mobile device to receive the sensor payload and forward it and the device’s associated location to the server. Rather, the claims merely recite that the “receiving” and “forwarding” steps are performed by “successive mobile devices . . . in turn,” which FedEx ’231 satisfies, as discussed above, with its descriptions that, as ID node 120a moves, it is handed off from one associated master node to another, each of which transmits received data to a server 100. We determine that Petitioner has demonstrated that the proposed combination satisfies all the requirements of the “receiving” and “forwarding” limitations.

Patent Owner also argues that a person of ordinary skill in the art “would not think to modify the disclosure of *Sharma* according to the

teachings of *FedEx* '231 because such a modification of *Sharma* would change its principle of operation and render it unsatisfactory for its intended purpose. RMTA 21–22. Patent Owner argues that “*FedEx* '231 requires an extensive infrastructure of master nodes,” impliedly argues that the proposed modification would be costly due to “the required master node infrastructure deployment,” and that “the proposed modification would limit the wireless tracker of *Sharma* to a single shipping platform corresponding to the particular platform’s master node infrastructure.” *Id.* Patent Owner’s characterization of the proposed modification is not consistent with that set out by Petitioner, and Patent Owner’s arguments fail to address adequately Petitioner’s contention that the “a modification involve[s] modifying *Sharma*’s user access devices to relay data as in *FedEx* '231,” not shifting *Sharma*’s system over to a new and specific platform infrastructure. Pet. RMTA Opp. 10; *see also* Ex. 1032 ¶ 95 (Dr. Engels testifying that “[t]he combination of *Sharma* with *FedEx* '231 does not require incorporation of all infrastructure disclosed in *FedEx* '231.”). Also, as Petitioner points out, the proposed modification will not render *Sharma* unsatisfactory “because *Sharma* and *FedEx* '231 disclose common wireless networks,” and the proposed “[m]odifications to *Sharma* would enhance *Sharma*’s ability to communicate with a server in areas where a tracker cannot directly reach the server.” *Id.* at 12–13 (citing, e.g., Ex. 1032 ¶¶ 94–96).

Patent Owner further argues that, “[i]f the wireless tracker of *Sharma* retained its ability to communicate with the server over the network *and* was designed to also communicate with master nodes, then *Sharma*’s system is rendered unsatisfactory for the purpose of regulating battery usage to prevent exhaustion of battery life because *Sharma* would have to constantly

broadcast a signal for any potentially available master nodes, draining the battery life Sharma intends to save.” RMTA 23; *see also* PO RMTA Reply 8. According to Patent Owner, “[i]mplementing the *FedEx* ’231 relay system would . . . discard the battery regulation function of *Sharma* altogether.” PO RMTA Reply 8. We do not find this argument persuasive because Patent Owner makes this technical and conclusory argument without any evidentiary support. And, even if Patent Owner’s scenario did result in increased battery usage, “[a] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Allied Erecting and Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016).

Patent Owner argues that a person of ordinary skill in the art would not be motivated to combine Sharma and FedEx ’231 because FedEx ’231’s system is more specific and complex than Sharma’s, such that the proposed combination of these two incongruous systems would, in effect, discard the teachings of Sharma altogether and undermine its purpose, abandoning its principle of operation. PO RMTA Reply 5–8. Patent Owner, similar to before, argues that the modification would be to replace Sharma’s “platform-agnostic” communications network with the “hierarchical architecture” of a “system [that] is specific to the FedEx platform.” *Id.* at 6; *see also id.* at 7 (“To implement the ’231 FedEx system would require replacing Sharma’s feature of direct communication with one of short-range communication.”). Patent Owner is creating its own proposed modification on the way to arguing that it would require changing Sharma’s principle of operation. *See id.* We do not agree with Patent Owner’s argument because it does not address the proposed combination as articulated by Petitioner, which does

not change the communications platform used in Sharma. Additionally, “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *see also MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1294 (Fed. Cir. 2015).

Patent Owner, in a manner similar to that for the Sharma-Cova challenge to the claims before amendment, argues that modifying Sharma’s user devices to be relays as taught by FedEx ’231 is “incompatible with the purpose of *Sharma*’s user device, which enables the user to *receive* notifications about an asset that is remote from the user,” and “[t]he asset must logically be remote from the user, or else the user would not need to receive the notifications.” PO RMTA Reply 7–8. Even if we were to agree with Patent Owner’s implied assumption that a user standing next to an asset can observe every type of tracker/asset information (even sensor data), we do not agree with Patent Owner’s argument as the data flow in the proposed combination is such that the user device relays the information to the server, which is not necessarily co-located with the moving asset.

Patent Owner additionally argues that combining Sharma and FedEx ’231 would increase costs—rather than lower them—due to the cost of deploying FedEx ’231’s infrastructure. PO RMTA Reply 8–9. But, as discussed above, the physical integration of FedEx 231’s infrastructure into Sharma’s system is not required for a showing of obviousness. As Petitioner points out, Patent Owner makes this allegation without any expert support, “FedEx ’231 operates using the *same communication networks* as *Sharma*,”

and “Dr. Engels directly addressed this argument with reference to FedEx ’231’s teachings.” Pet. RMTA Sur-reply 11 (citing Ex. 1032 ¶¶ 87–88).

We determine that Petitioner has provided adequate reasoning as to why one of ordinary skill in the art would have made the proposed combination and has provided adequate evidence to show that a person of ordinary skill in the art would have had a reasonable expectation of success in doing so. For example, we agree that FedEx ’231 teaches the use of successive devices as relays for tracking assets, and that a person of ordinary skill in the art would have been motivated to modify Sharma’s user devices based on the teachings of FedEx ’231 to serve as relays between the tracker and the server.

We do not agree with Patent Owner’s arguments with respect to Kubo (RMTA 10–11) for reasons similar to those discussed above for the obviousness challenge over Sharma, Cova, and Kubo. *See* RMTA 10 (Patent Owner arguing that Petitioner’s Kubo-related contentions “fail[], for the reasons stated above and because the function of Kubo’s listening service is the opposite of the function of the mobile application in the ’922 patent); *supra* Section IV.E.2.b. We determine that the asserted teachings of Kubo support Petitioner’s contention that Kubo discloses or suggests the “mobile application” elements recited in limitations 21c2, 30c2, and 35c2, and that Petitioner has articulated adequate reason to combine the asserted teachings of Kubo with those of Sharma and FedEx ’231 to arrive at the claimed invention.

3. Conclusion

Patent Owner does not present any arguments for the proposed substitute claims other than those addressed above. We have considered the evidence and arguments of record and determine that Petitioner has

demonstrated by a preponderance of the evidence that the subject matter of proposed substitute claims 21–40 would have been obvious based on Sharma, FedEx ’231, and Kubo.

G. The Alleged Obviousness of the Proposed Substitute Claims Over Sharma, Tile ’254, and Kubo

Petitioner contends that claims 21–40 would have been obvious over Sharma, Tile ’254, and Kubo. Pet. RMTA Opp. 20–25 (citing Ex. 1032 ¶¶ 160–219). Patent Owner argues that a person of ordinary skill in the art would not be motivated to combine Sharma and Tile ’254. PO RMTA Reply 11–12. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–40 are unpatentable for obviousness over Sharma, Tile ’254, and Kubo.

1. Tile ’254 (Ex. 1016)

Tile ’254 is a U.S. Patent titled “User Intervention Opt-In in a Tracking Device Environment.” Ex. 1016, code (54). More specifically, Tile ’254 describes a tracking system including a tracking device 106 from which sensor information may be detected and provided to a mobile device 102, and a plurality of community mobile devices 104, any of which can receive a signal from tracking device 106, including a unique identifier associated with the tracking device, when device 104 is within range. *Id.* ¶¶ 29, 56, 59, 153–157. Tile ’254 further describes that mobile device 102 and community mobile devices 104a . . . n may forward information, such as location information, a unique identifier, or sensor data, to tracking system 100, which may be a cloud server.” *Id.* ¶¶ 3, 21, 26, 28, 30, 34, 51, 54, 59, 153–157. Tile ’254 also describes forwarding information first from mobile device 102 (when tracking device 106 is in the vicinity) and second

from one of community mobile devices 104a . . . n (once tracking device has moved away from mobile device 102 or is lost). *See, e.g. id.* ¶¶ 21, 26, 28, 54, 155–157, Fig. 10 (item 1040). “In one example, the tracking system may receive constant updates of tracking device 106 locations regardless of whether a tracking device 106 is lost.” *Id.* ¶ 28.

2. *Petitioner’s Challenge*

Petitioner contends that (1) “*Sharma* and Tile ’254 disclose most limitations” of the proposed substitute claims (Pet. RMTA Opp. 22), (2) Tile ’254 discloses the additional elements of the “receiving,” “forwarding,” and “monitoring” limitations 21c1, 21d1, 21d2, and 21e (*id.* at 22–24), (3) *Sharma* and Tile ’254 in view of *Kubo* discloses the wireless signal mobile application limitation 21c2 (*id.* at 22–23), and (4) Tile ’254 and *Sharma* are analogous art and it would have been obvious to a POSITA to modify *Sharma* to include the teachings of Tile ’254, with a reasonable expectation of success (*id.* at 20–22).

In particular, Petitioner contends that Tile ’254 discloses the “receiving, by successive mobile devices” limitation 21c1 because it teaches that “[m]obile devices 102 and 104 scan for tracking device 106 and receive the wireless signal one after another as device 106 moves from one location to another on a journey.” Pet. RMTA Opp. 22 (citing Ex. 1016 ¶¶ 3–4, 21, 22–30, 54, 56–89, 98, 149–157). Petitioner asserts that Tile ’254 in view of *Kubo* discloses the mobile application limitation 21c2 because “Tile ’254 discloses mobile devices 102 and 104 using a tracking manager program (a mobile application) with a Bluetooth Low Energy (BLE) manager to detect a signal from a tracking device 106,” and to the extent there are any gaps in *Sharma* or Tile ’254, *Kubo* fills those gaps for reasons similar to those discussed above for the obviousness challenge over *Sharma*, *Cova*, and

Kubo. Pet. RMTA Opp. 22–23 (citing Ex. 1032 ¶¶ 171–177); *see supra* Section IV.E.2.b. Petitioner asserts that Tile ’254 discloses the “forwarding” limitations 21d1 and 21d2 because “Tile ’254 discloses mobile devices 102 and 104 providing updates to a tracking system 100 cloud server for a tracking device 106 including an identifier, a determined location, and sensor data,” with the “tracking system receiv[ing] constant updates of tracking device 106 **regardless of whether a tracking device 106 is lost.**” Pet. RMTA Opp. 23–24 (quoting Ex. 1016 ¶ 28; citing *id.* ¶¶ 3, 21, 26–30, 34, 35, 51, 54, 59). Petitioner asserts that Tile ’254 discloses the “monitoring” limitation 21e because “Tile ’254’s tracking system 100 server includes a ‘tracking device location manager,’ receives automatic updates from mobile devices, predicts a state of the tracking device, stores and manages information associated with mobile and tracking, and sends notifications, ‘regardless of whether a tracking device 106 is lost.’” *Id.* at 24 (quoting Ex. 1016 ¶ 28; citing *id.* ¶¶ 21, 28, 34–38, 54).

Petitioner also asserts that Tile ’254 is analogous to *Sharma* (Pet. RMTA Opp. 20–21) and reasons that “[a] POSITA would have been motivated to modify *Sharma* based on Tile ’254” because persons of ordinary skill in the art “also understood that tracking devices were prone to interference and communication gaps while in transit,” and “Tile ’254 overcomes such challenges with community mobile devices providing constant updates,” so “[i]t would have been obvious to modify *Sharma* based on Tile ’254 to improve wireless tracker communication range and increase status updates consistency.” *Id.* at 21 (citing Ex. 1016 ¶¶ 4, 5, 20, 21, 28, 38). Petitioner adds that a person of ordinary skill in the art “would have expected success in modifying *Sharma*,” as “*Sharma*’s server would

only need minor modifications, if any, to process tracker data relayed from mobile devices.” *Id.* (citing Ex. 1005 ¶¶ 28, 29; Ex. 1016 ¶¶ 21, 25, 32–52, 56, 98; Ex. 1032 ¶¶ 164–165).

Patent Owner argues that “*Tile* ’254 relate[s] to a system for locating a tracking device that has been lost . . . and not to a system of continuous inventory management.” PO RMTA Reply 11; *see also* RMTA 23–25 (arguing that “Petitioner’s arguments with respect to *Tile* ’254 are flawed because *Tile* ’254 is not related to continuous inventory management,” and “*Tile* ’254 is not a monitoring system but a finding system, and such finding would not be necessary with continuous monitoring.”). Patent Owner further argues that “[e]ven if *Sharma* were to utilize the system for locating lost trackers in *Tile* ’254, the use would just be to fill in potential communication gaps during the journey,” which “is distinct from the consistent tracking enabled by the ’922 patent. PO RMTA Reply 11–12.

As Petitioner responds, however, (1) “*Tile* ’254 discloses continuous tracking and location updates, and does not only activate to look for lost devices,” and (2) Petitioner’s “Oppositions [to the original motion to amend and the revised motion to amend] and Dr. Engels’s supplemental declarations explain[] (i) that *Sharma*’s tracking device is prone to interference and communication gaps, and (ii) how *Tile* ’254’s community mobile devices would have improved tracker communication range and increased status update consistency.” Pet. RMTA Sur-reply 12 (citing Paper 19 (Petitioner’s opposition to Patent Owner’s original motion to amend), 21–21; Ex. 1017; Pet. RMTA Opp. 21–22; Ex. 1032). We find Petitioner’s arguments and evidence persuasive. We disagree with Patent Owner’s characterization of *Tile* ’254 as only applicable to finding lost

trackers and, by extension, having no applicability in a continuous tracking system where the purpose is to not lose an asset. As Petitioner notes (*e.g.*, Pet. RMTA Opp. 24) and as Patent Owner fails to adequately address, Tile '254 explicitly states that “the tracking system may receive constant updates of tracking device 106 locations *regardless of whether a tracking device 106 is lost.*” Ex. 1016 ¶ 28 (emphasis added). A person of ordinary skill in the art would have appreciated the applicability of the teachings of Tile '254 to Sharma’s asset tracking system.

We determine that Petitioner has provided adequate reasoning as to why one of ordinary skill in the art would have made the proposed combination and has provided adequate evidence to show that a person of ordinary skill in the art would have had a reasonable expectation of success in doing so.

3. Conclusion

Patent Owner does not present any arguments for the proposed substitute claims other than those addressed above. We have considered the evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of proposed substitute claims 21–40 would have been obvious based on Sharma, Tile '254, and Kubo.

H. The Alleged Indefiniteness of the Proposed Substitute Claims

Petitioner contends that the proposed substitute claims are indefinite. Pet. RMTA Opp. 2–3. Specifically, Petitioner focuses on three claim terms. *Id.*

A patent claim is indefinite when that claim, “viewed in light of the specification and prosecution history, [does not] inform those skilled in the

art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. BioSig Instruments, Inc.*, 572 U.S. 898, 910 (2014).

1. An asset “passing/that passes” a plurality of mobile devices

Proposed substitute independent claim 21 recites, in part, “[a] method of continuously tracking an asset on a journey from a shipment origin to a shipment destination, the asset passing a plurality of mobile devices on the journey.” RMTA 29 (App. A). Proposed substitute independent claim 35 recites, in part, “[a] non-transitory computer readable medium comprising instructions for continuously tracking an asset on a journey from a shipment origin to a shipment destination in which the asset passes a plurality of mobile devices on a journey.” *Id.* at 35 (App. A).

Petitioner contends that “[c]laims 21 and 35 are indefinite because” “the ’922 [patent] discloses mobile devices co-located with an asset” but “does not mention or disclose an asset ‘passing/that passes’ a plurality of mobile devices,” so “[a] POSITA would not have been able to ascertain the boundaries of claims 21 and 35 due to the ‘passing/passes’ phrases.” Pet. RMTA Opp. 2–3 (citing Ex. 1001, 4:30–35, Figs. 1, 6, 7; Ex. 1032 ¶¶ 32–35).

We are not persuaded by Petitioner’s argument. Rather, as Patent Owner correctly notes, “[t]he ’922 patent describes an asset moving throughout its journey and entering into proximity with multiple mobile devices in turn.” PO RMTA Reply 1–2 (citing Ex. 1001, 2:16–22, 14:41–45). For example, Figure 7 of the ’922 patent shows asset 610 communicating with mobile device 710 while located in origin area 110, asset 610 communicating with mobile device 714 after moving past mobile device 710 to an intermediate area, and asset 610 communicating with mobile device 720 after moving past mobile device 714 from the

intermediate area to destination area 718. Ex. 1001, Fig. 7, 14:35–49. Thus, contrary to Petitioner’s arguments, the Specification of the ’922 patent does disclose an asset passing a plurality of mobile devices. Petitioner does not persuasively show that the scope of the claimed invention having the subject language cannot be discerned with reasonable certainty. Accordingly, Petitioner has not shown by a preponderance of the evidence that proposed substitute independent claims 21 and 35 are indefinite.

2. *“mobile” device versus “user” device*

Proposed substitute dependent claim 24 recites “[t]he method of claim 23, further comprising sending an alarm to a predetermined ~~mobile~~ user device if the alert is set.” RMTA 29 (App. A). Proposed substitute dependent claim 38 recites a similar limitation. *Id.* at 36 (App. A).

Petitioner contends that “[c]laims 24 and 38 are indefinite for changing ‘mobile’ to ‘user.’” Pet. RMTA Opp. 3. More specifically, Petitioner argues that “[t]he ’922 uses both ‘user’ and ‘mobile’ when referring to the same device in Fig. 5,” and that “the Board recognized the lack of distinction between ‘user’ and ‘mobile’ device in the ’922” in the Preliminary Guidance. *Id.* (citing Ex. 1001, Fig. 5, 12:51–56, 13:63–14:3, 15:56–59; Ex. 1032 ¶¶ 36–37; Paper 21, 20–21).

In the Preliminary Guidance, we expressed concern that Patent Owner’s proposed amendment of “mobile device” to “user device,” in conjunction with Patent Owner’s argument about a possible distinction between the two terms, renders the dependent claim indefinite and encouraged the parties to address this concern in future briefing. Specifically, we noted that Patent Owner had asserted that “substitute claims 24 and 38 are amended to enhance the distinction between ‘user device’ and ‘mobile device,’” but we also stated our understanding that no

such distinction existed in the Specification. Paper 21, 20–21 (citing Paper 16 (original Motion to Amend), 21). We determined that the scope, at least as argued by Patent Owner, was unclear. *Id.*

Petitioner effectively concedes that scope of the term in the amended claims are clear, contending that “the ’922 [patent] uses ‘user device’ and ‘mobile device’ interchangeably.” Pet. RTMA Sur-reply 3 (citing Ex. 1001, 15:56–59). We agree. The Specification defines the terms as such, stating “the terms user device and mobile device called out within this document refer to a mobile device which the user utilizes.” Ex. 1001, 15:56–59. In other words, the Specification defines both terms as “refer[ing] to a mobile device which the user utilizes.” *Id.* Thus, the claim scope is reasonably ascertainable, regardless as to any purported distinction argued by Patent Owner.

Petitioner has not shown by a preponderance of the evidence that proposed substitute dependent claims 24 and 38 are indefinite.

3. “*wireless tracker*”

Petitioner contends that claim 30 is indefinite for inconsistently reciting ‘[a/the] wireless tracker’ in two versions of the claim.” Pet. RMTA Opp. 3. More specifically, Petitioner argues that “[i]n a first [version of claim 30], ‘a wireless tracker’ was changed to ‘the wireless tracker,’ without antecedent basis support,” and “[t]he second version recites ‘a wireless tracker’ twice, . . . and it is unclear whether the two recitations refer to two different wireless trackers.” *Id.* (citing RMTA 7, 32–33; Ex. 1032 ¶¶ 38–40).

We are not persuaded by Petitioner’s arguments. First, Patent Owner makes clear in its revised motion to amend that Appendix A sets forth the proposed substitute claims for review. *See, e.g.*, RMTA 1 (“If any of the

challenged claims of the '922 patent is found unpatentable, Roambee moves to replace each of those claim(s) with its respective substitute claim, as presented in the Proposed Claim Amendments, attached as Appendix A.”), 2 (“As set forth in Appendix A, Roambee proposes only one substitute claim for each of the claims challenged by the Petitioner), 25, App. A.

Accordingly, Petitioner’s first argument is moot because the version of claim 30 recited on pages 6 to 9 of the RMTA is not under review. *See* PO RMTA Reply 2–3. Petitioner’s second argument also is not persuasive. We find the recitations of “a wireless tracker” sufficiently clear because, as Patent Owner points out, “a [person of ordinary skill in the art] would understand from reading . . . claim [30] in context that the first mention of ‘a wireless tracker’ is in a statement regarding the capabilities of the server of the system, whereas the second mention of ‘a wireless tracker’ refers to a specific wireless tracker that is an element of the system.” *Id.* at 3 (citing Ex. 2016 ¶ 5); *see* RMTA, App. A 32–33 (claim 30 reciting “a server configured to associate a wireless tracker . . .” and “a wireless tracker configured to receive a code”).

Petitioner has not shown by a preponderance of the evidence that proposed substitute independent claim 30 is indefinite.

4. Summary of the Indefiniteness Arguments

Petitioner fails to demonstrate by a preponderance of the evidence that any of claims 21–40 is indefinite.

V. CONCLUSION¹¹

Petitioner has shown by a preponderance of the evidence that claims 1–20 of the '922 patent are unpatentable over Sharma and Cova. In addition, we determine that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–40 would have been obvious over: 1) Sharma, Cova, and Kubo; 2) Sharma, FedEx '231, and Kubo; and 3) Sharma, Tile '254, and Kubo. We determine that Petitioner has *not* shown by a preponderance of the evidence that proposed substitute claims 21–40 are unpatentable as being indefinite. Because Petitioner has met its burden as to every proposed substitute claim, we *deny* Patent Owner's Revised Motion to Amend. We also *grant* Petitioner's motion to exclude exhibits 2013, 2014, and 2015.

We provide the following tables summarizing our disposition.

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–20	103	Sharma, Cova	1–20	
Overall Outcome			1–20	

¹¹ 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).

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	21–40
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–40
Substitute Claims: Not reached	

VI. ORDER

For the foregoing reasons, it is

ORDERED that claims 1–20 of the '922 patent have been proven to be unpatentable;

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

FURTHER ORDERED that Petitioner's Motion to Exclude is granted; and

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

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