

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GENERAL MOTORS LLC,
Petitioner,

v.

EDWARD H. NORTRUP,
Patent Owner.

IPR2023-00994
Patent 10,444,028 B2

Before JEFFREY S. SMITH, GEORGIANNA W. BRADEN, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

WORMMEESTER, *Administrative Patent Judge*.

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

I. INTRODUCTION

General Motors LLC (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–31 of U.S. Patent No. 10,444,028 B2 (Ex. 1001, “the ’028 patent”). Edward H. Nortrup (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of all challenged claims based on all asserted challenges in the Petition. Paper 9 (“Inst. Dec.”). Thereafter, Patent Owner filed a Response (Paper 13, “PO Resp.”) to the Petition, Petitioner filed a Reply (Paper 14, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 19, “PO Sur-reply”). On August 29, 2024, we conducted an oral hearing. A copy of the transcript (Paper 29, “Tr.”) is in the record.

We have jurisdiction under 35 U.S.C. § 6(b). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–31 of the ’028 patent are unpatentable.

II. BACKGROUND

A. Related Proceedings

The parties do not identify any related proceedings. *See* Pet. 66; Paper 7, 2 (Patent Owner’s Updated Mandatory Notices).

B. The ’028 Patent

The ’028 patent describes systems in which “[l]ocation technologies are combined with other information systems to provide augmented information for individuals such as a traveler in an automobile.” Ex. 1001,

code (57). For example, the '028 patent describes a system for determining route information and providing the information to a user (or traveler). *Id.* at 1:25–32. To illustrate one embodiment, Figure 39 of the '028 patent is reproduced below.

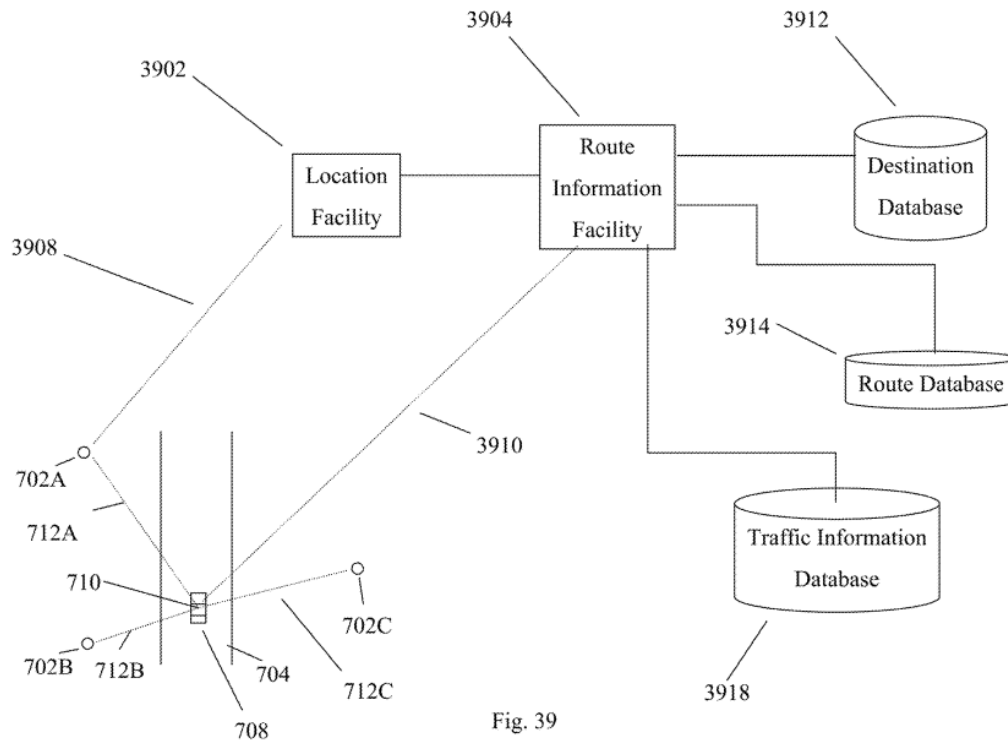


Figure 39 is a block diagram that shows a travel information system, which includes location facility 3902, route information facility 3904, destination database 3912, route information database 3914, and traffic information database 3918. *Id.* at 29:46–30:7. Destination database 3912 includes information on destination locations. *Id.* at 29:56–57. A traveler may preload destination information for later retrieval. *Id.* at 29:61–64. Route information database 3914 includes information on travel routes, such as maps, traffic information, travel times, and other information on routes, navigation, and directions. *Id.* at 29:65–30:3. Traffic information database 3918 includes information on route traffic, alternate routes, route

times, typical route performance, and other information on routes and directions. *Id.* at 30:3–7.

In another embodiment of the '028 patent, a traveler uses cell phone 710 to connect with route information facility 3904 to obtain directions to a preloaded destination. Ex. 1001, 30:16–18. Location facility 3902 then locates the traveler's position using cell phone triangulation. *See id.* at 20:11–14, 30:30–33, 31:22–25. More specifically, cell towers 702A, 702B, 702C “listen” to cell phone transmissions 712A, 712B, 712C, which may be timed or power measured, to determine the position of cell phone 710 on roadway or route 704. *Id.* at 20:19–27.

Once the position of cell phone 710 is located, route information facility 3904 provides the traveler with directions. Ex. 1001, 30:30–36, 31:22–25. Route information facility 3904 may use information from databases 3912, 3914, 3918 and information from location facility 3902 to provide information to the traveler. *Id.* at 30:13–16. For example, the cell phone location may be mapped onto a roadway map to provide location, speed, and other travel information. *Id.* at 20:17–19.

The system of the '028 patent may also include a warning facility, where an onboard mapping system displays a warning to a driver (or traveler) about traffic conditions. Ex. 1001, 27:52–58. In use, the system tracks vehicle positions based on cell phone locations, identifies a traffic condition based on the cell phone locations, identifies vehicles in close proximity to the traffic condition through cell phone identification, and warns those vehicles about the traffic condition. *Id.* at 27:64–28:6. Thus, according to the '028 patent, the system may identify slower traffic in the

traveler's planned route and generate an indication on the map showing the slower traffic. *Id.* at 27:58–62.

Although a traveler's cell phone may be used to provide location information, it may also be equipped with a security facility to provide secure or limited access to the location information. *See* Ex. 1001, 44:47–58. For example, the security facility may provide the traveler with a user interface on the cell phone, where the traveler may select security settings via a menu of options. *Id.* at 45:12–25. The options may relate to “different location based services, different entities, different people, and different locations.” *Id.* at 45:22–25. To illustrate, Figure 54 of the '028 patent is reproduced below.

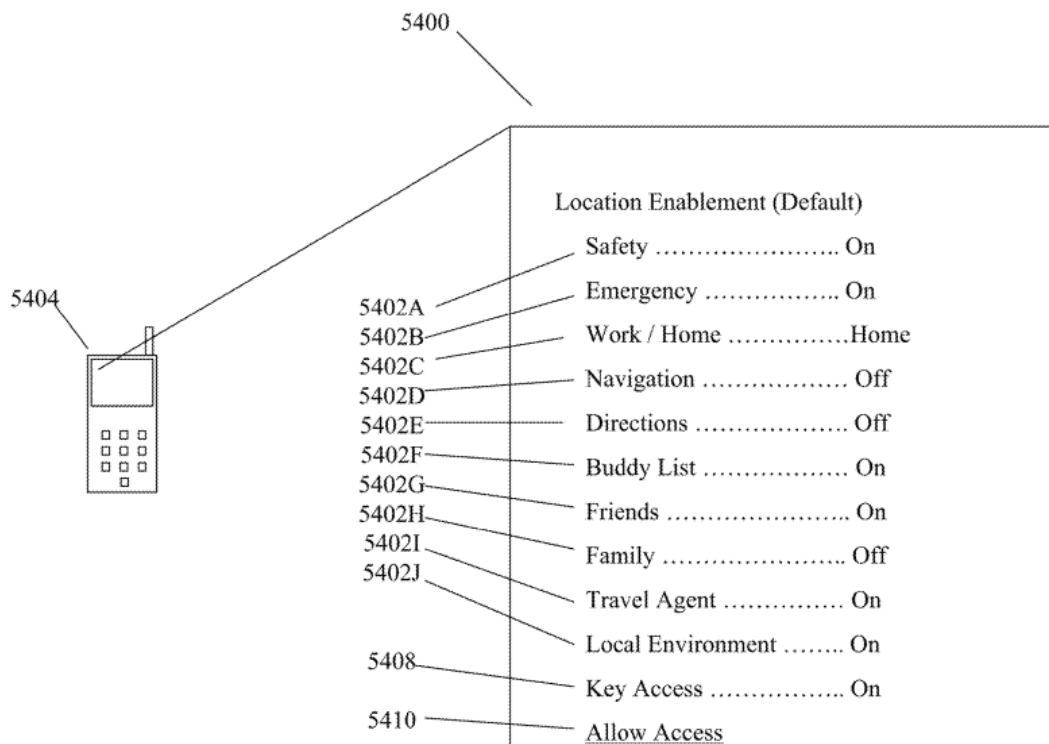


Fig. 54

Figure 54 is a diagram showing a list from secure location based service user interface 5400. *Id.* at 45:26–27. The traveler may use a link to enable,

disable, or otherwise control access to the cell phone location. *Id.* at 45:31–33. As shown in Figure 54, the traveler may have a “buddy list” that includes known people or entities. *Id.* at 45:34–37. The traveler may enable or disable this group’s access to cell phone information, such as location information. *Id.* at 45:37–39.

C. Illustrative Claim

Petitioner challenges claims 1–31 of the ’028 patent, where claim 1 is the only independent claim. Claim 1 is reproduced below, with brackets added to show Petitioner’s designations for the recited limitations. *See* Pet. 16–25.

1. A computer program product that, when executing on one or more computers performs the steps of:

[1.1] automatically receiving a current location; and

[1.2] presenting a roadway map of an area proximate the current location,

[1.3] wherein the map includes at least one route from the current location to a destination based at least in part on a traffic condition,

[1.4] wherein the traffic condition is at least in part based on a plurality of cell phone speeds estimated through an assessment of multiple locations of each of a plurality of cell phones,

[1.5] wherein each of the plurality of cell phones further has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data.

We use Petitioner’s designations in this Decision for referencing convenience. The designations do not impact our analysis.

D. Asserted Challenges to Unpatentability

Petitioner asserts the following seven challenges to claims 1–31 of the '028 patent. Pet. 1–2, 6–66. We instituted *inter partes* review on each challenge. Inst. Dec. 35–36.

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–7, 9, 10, 12–21, 25, 26, 29, 31	103(a) ¹	Knockeart, ² Feldman ³
7, 8	103(a)	Knockeart, Feldman, Simske ⁴
10, 11, 30	103(a)	Knockeart, Feldman, Whitsell ⁵
14, 22–24	103(a)	Knockeart, Feldman, Boies ⁶
14	103(a)	Knockeart, Feldman, Boies, Peterson ⁷
27, 28	103(a)	Knockeart, Feldman, Peterson
31	103(a)	Knockeart, Feldman, Craine ⁸

In support of its asserted challenges, Petitioner relies on a Declaration of Dr. Michael S. Braasch (Ex. 1003). A transcript of the deposition of Dr. Braasch (Ex. 2001) is in the record.

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the '028 patent issued claims priority to an application filed before this date, the pre-AIA version of § 103 applies.

² Knockeart et al., U.S. Publ’n No. 2003/0055542 A1, published Mar. 20, 2003 (Ex. 1004).

³ Feldman et al., U.S. Publ’n No. 2002/0026278 A1, published Feb. 28, 2002 (Ex. 1005).

⁴ Simske, U.S. Publ’n No. 2005/0096840 A1, published May 5, 2005 (Ex. 1006).

⁵ Whitsell, U.S. Patent No. 7,203,598 B1, issued Apr. 10, 2007 (Ex. 1007).

⁶ Boies et al., U.S. Patent No. 6,615,133 B2, issued Sept. 2, 2003 (Ex. 1008).

⁷ Peterson, U.S. Patent No. 5,845,227, issued Dec. 1, 1998 (Ex. 1009).

⁸ Craine, U.S. Patent No. 7,027,915 B2, issued Apr. 11, 2006 (Ex. 1010).

III. DISCUSSION

A. Claim Construction

In an *inter partes* review proceeding, we construe a claim of a patent “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” *See* 37 C.F.R.

§ 42.100(b). That standard involves construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc).

In our Institution Decision, we addressed the “list of authorizations” phrase (i.e., “each of the plurality of cell phones further has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data”), which appears in claim 1. Inst. Dec. 7–13. We determined that the “list of authorizations” phrase is not limited to “selectively enabl[ing] or disabl[ing] the *entities’ set forth in the list of authorizations* access to user cell phone location data,” as Patent Owner had proposed in its Preliminary Response. *Id.* at 13 (citing Prelim. Resp. 8). The parties do not dispute our construction. *See* PO Resp.; Pet. Reply; PO Sur-reply. Nor do they propose other terms for construction. *See* PO Resp.; Pet. Reply; PO Sur-reply. Based on the complete record developed during trial, we see no reason to modify our previous construction of the “list of authorizations” phrase and conclude that no other claim term requires express interpretation to resolve any controversy in this proceeding. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

B. Alleged Obviousness over Knockeart and Feldman

Petitioner asserts that claims 1–7, 9, 10, 12–21, 25, 26, 29, and 31 of the '028 patent would have been obvious over Knockeart and Feldman. Pet. 6–47. Patent Owner disputes certain aspects of Petitioner's analysis. PO Resp. 10–17. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1–7, 9, 10, 12–21, 25, 26, 29, and 31 would have been obvious over Knockeart and Feldman.

1. Overview of Asserted References

We start with an overview of the asserted references, Knockeart and Feldman.

a. Knockeart

Knockeart describes an information system for motor vehicles. Ex. 1004 ¶ 2. To illustrate, Figure 1 of Knockeart is reproduced below.

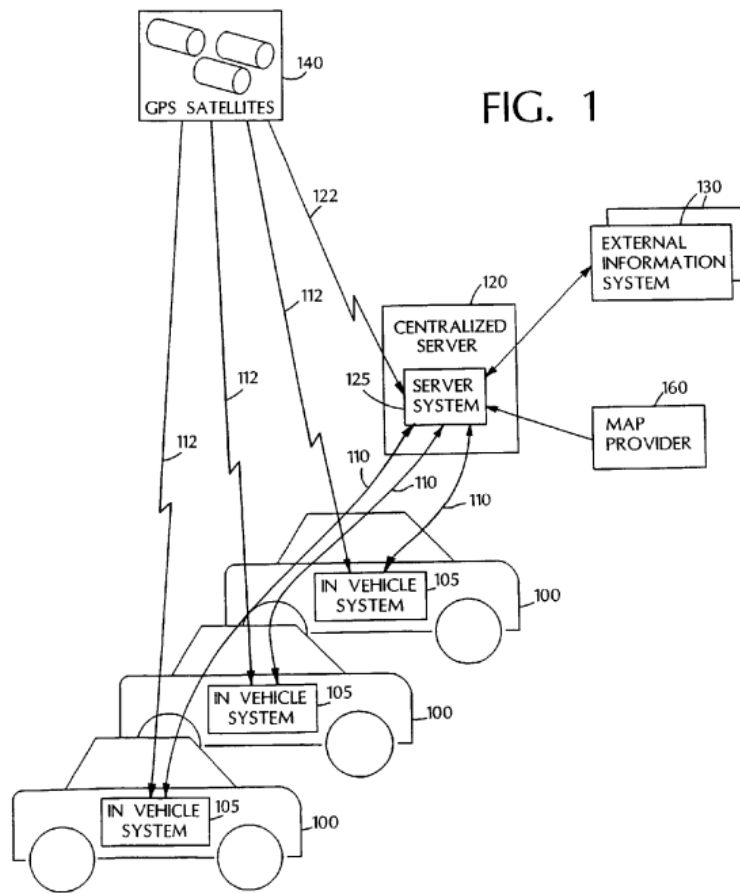


Figure 1 of Knockcart shows a vehicle navigation system that provides a route planning and guidance service to the operators of vehicles 100. *Id.* ¶¶ 44, 71. The navigation system includes server system 125 at centralized server 120 and in-vehicle systems 105 installed in vehicles 100. *Id.* ¶ 71. Server system 125 stores a graphic representation of the road network, which includes nodes interconnected by links that correspond to road segments. *Id.* ¶ 87, Fig. 7. The navigation system also includes a positioning system, where global positioning system (GPS) satellites 140 send signals to the vehicles, enabling the in-vehicle systems to estimate their locations. *Id.* ¶ 71.

Through the navigation service, an operator of a vehicle may specify a destination and then be guided by the system to that destination while

driving the vehicle. Ex. 1004 ¶ 72. Specifically, the operator enters a destination into in-vehicle system 105, which sends the destination to server system 125. *Id.* ¶¶ 85–86. In-vehicle system 105 also sends the vehicle’s starting location to server system 125. *Id.* ¶ 86. Based on the information from in-vehicle system 105, server system 125 finds the vehicle’s starting link in the graph representation of the road network and computes a “best” path to the destination. *Id.* ¶¶ 88–89. Deciding the “best” path can depend on criteria such as the shortest distance, the shortest time, or the shortest expected speed of travel along links of the roadway graph. *Id.* ¶¶ 89, 317. The planned route is then downloaded from server system 125 to in-vehicle system 105, which tracks the position of the vehicle as it travels to the destination and provides instructions to the operator to guide the operator to the destination. *Id.* ¶¶ 72, 74. In-vehicle system 105 can provide audio and map-based directions to the operator. *Id.* ¶ 117.

When planning routes based on expected travel time, server system 125 uses a traffic database. Ex. 1004 ¶ 317. To populate the traffic database, server system 125 may rely on some or all vehicles 100 as “probes” for collecting traffic information. *Id.* ¶ 318. Knockeart describes two modes of data collection. *Id.* ¶ 319. The first mode involves collecting traffic profile data of each probe vehicle. *Id.* ¶ 321. In-vehicle system 105 of each probe vehicle collects a history (or profile) of the vehicle speed along links of the road network and stores the information in a link speed log. *Id.* ¶ 321. Server system 125 receives the log information from the probe vehicles, stores it in the traffic database, and uses it to determine the average speed for different links at different times throughout the day. *Id.* ¶¶ 325–327.

The second mode of traffic data collection involves exception reporting. Ex. 1004 ¶ 330. In-vehicle system 105 of each probe vehicle tracks the location of the vehicle as it travels along links of the road network and detects whether a traffic exception has occurred. *Id.* ¶ 337. A traffic exception has occurred if, for example, the travel speed along a link is substantially slower or faster than expected for that link at that time of day. *Id.* When in-vehicle system 105 detects a traffic exception, it sends a message to server system 125 identifying the link and travel speed. *Id.* ¶ 338. Server system 125 receives the exception message and updates the traffic database. *Id.* ¶ 340.

Knockart explains that “[t]he operator of the vehicle has the option of enabling or disabling either mode of data collection through the user interface of the in-vehicle system.” Ex. 1004 ¶ 324; *see also id.* ¶ 342 (“The operator of a probe vehicle can explicitly enable or disable exception reporting.”).

b. Feldman

Feldman describes “modeling and processing vehicular traffic data and information, and using the modeled and processed vehicular traffic data and information for providing a variety of vehicular traffic related service applications to end users.” Ex. 1005 ¶ 2. Feldman explains that “prior art techniques are either based on, or, at least include, the use of mobile sensors or electronic devices physically located in or attached to vehicles,” where the “mobile sensors or electronic devices automatically transmit vehicle locations to the computerized central traffic data and handling system” so

that “vehicle velocities are relatively simple to calculate.” *Id.* ¶ 7. Feldman further explains,

For obtaining dynamic vehicle location and velocity data and information, . . . such prior art techniques make use of well known global positioning system (GPS) and/or other types of mobile wireless communication or electronic vehicular tracking technologies, such as cellular telephone or radio types of mobile wireless communications networks or systems, involving the use of corresponding mobile wireless devices such as cellular telephones, . . . which are uniquely or specifically designated or assigned to a particular vehicle.

Id. ¶ 8.

Similarly, Feldman’s own system “features mobile sensors . . . for acquiring vehicular traffic data and information.” Ex. 1005 ¶ 53. These mobile sensors “are capable of transmitting vehicular locations to a computerized central data and information receiving and processing system,” and may include telemetric devices with GPS capabilities, anti-theft devices, as well as driver-carried devices such as cellular phones. *Id.* In Feldman’s system, “[a]cquiring the vehicular traffic data and information from a mobile sensor system is performed by tracking a sample of mobile sensors.” *Id.* ¶ 54. When choosing the sample of mobile sensors, the system may use handovers to track mobile sensors. *Id.* ¶¶ 58–62. Once the sample of mobile sensors has been identified, the system may use push or pull procedures to track the mobile sensors. *Id.* ¶ 63. A push procedure involves “receiving the vehicular traffic data and information that is initiated by . . . the mobile sensors,” whereas the pull procedure involves “receiving the vehicular traffic data and information when the initiator is [a] [s]ampler software module.” *Id.*

2. *Analysis of Independent Claim 1*

Claim 1 is directed to a “computer program product” and recites various limitations, which Petitioner designates as limitations 1.1 through 1.5. We address these limitations, starting with Petitioner’s arguments, and then turning to the parties’ disputes.

a. Limitation 1.1: “automatically receiving” step

Claim 1 recites “automatically receiving a current location.” Petitioner asserts that “Knockeart’s in-vehicle system ‘track[s] the location of the vehicle’ such as by ‘receiving a reference signal from a positioning system, for example receiving signals from GPS satellites, and computing position data related to the location of the vehicle using the received reference signal.’” Pet. 16–17 (quoting Ex. 1004 ¶¶ 10, 12). Petitioner directs us to where Knockeart describes a GPS receiver that receives signals from GPS satellites and “repeatedly provides location-related information” to an onboard computer. *Id.* at 17 (citing Ex. 1004 ¶ 122). Petitioner additionally asserts that, “[i]n another example, Knockeart describes receiving ‘location data related to the vehicle’s current location’ and by the in-vehicle system communicating this information to the server system.” *Id.* (quoting Ex. 1004 ¶ 176).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Based on Petitioner’s argument and evidence discussed above, we find that Knockeart

teaches the recited “automatically receiving” step of claim 1. *See* Pet. 16–17.

b. Limitation 1.2: “presenting” step

Claim 1 further recites “presenting a roadway map of an area proximate the current location.” Petitioner asserts that “Knockeart’s server downloads a ‘spot map’ to the vehicle such that ‘[t]he planned route is shown in conjunction with the spot map, as is the vehicle’s DGPS [differential GPS] based location.” Pet. 17 (quoting Ex. 1004 ¶ 282); Ex. 1004 ¶¶ 138–140 (explaining that “[d]ifferential GPS is based on receiving signals from GPS satellites at a receiver that is at a known location” to “overcom[e] the inaccuracies” in estimated or pseudorange measurements). In Knockeart, a “spot map typically covers only two or three intersections in any direction from the starting location” of the vehicle. Ex. 1004 ¶ 282. Petitioner further directs us to where Knockeart teaches “displaying the received map in conjunction with a representation of the planned route, and a location of the vehicle.” Pet. 17 (citing Ex. 1004 ¶ 10).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that Knockeart teaches the recited “presenting” step of claim 1. *See* Pet. 17; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

c. Limitation 1.3: “map”

Claim 1 further recites “wherein the map includes at least one route from the current location to a destination based at least in part on a traffic

condition.” Petitioner directs us again to where Knockeart teaches “displaying the received map in conjunction with a representation of the planned route, and a location of the vehicle.” Pet. 18 (citing Ex. 1004 ¶ 10). Petitioner also directs us to where Knockeart teaches “receiving traffic related data from a set of vehicles and updating a traffic database using the received traffic related data,” where “[u]pdating the database includes updating speed information associated with multiple road segments in a road network.” *Id.* (citing Ex. 1004 ¶ 30); Ex. 1004 ¶ 30. Petitioner points to Knockeart’s teaching that its system “plan[s] a route through the road network from a starting to a destination location using the speed information associated with the road segments.” *Id.* (quoting Ex. 1004 ¶ 30) (emphases omitted). Petitioner adds that Knockeart further teaches that its “server system may know that certain links are congested with slower than expected speeds for their road classes,” and that “[t]he route planning algorithm would then tend to avoid such a congested link if there are alternative routes that can be taken.” *Id.* at 19 (quoting Ex. 1004 ¶ 254). As discussed above, a link in Knockeart refers to a road segment. Ex. 1004 ¶ 87.

Patent Owner does not specifically dispute Petitioner’s contentions regarding this limitation. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that Knockeart teaches the recited “map” of claim 1. *See* Pet. 17–19; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

d. Limitation 1.4: “traffic condition”

Claim 1 further recites “wherein the traffic condition is at least in part based on a plurality of cell phone speeds estimated through an assessment of

multiple locations of each of a plurality of cell phones.” Petitioner relies on the combined teachings of Knockeart and Feldman. Petitioner asserts that “Knockeart discloses use of a ‘traffic database,’ which includes typical speeds that can be used in route planning, and can also include real-time data ‘obtained from probe vehicles[.]’” Pet. 20 (citing Ex. 1004 ¶¶ 170, 318–319, 325). Petitioner points us to where Knockeart teaches that in-vehicle system 105 of each probe vehicle “collects on an ongoing basis a history (a profile) of the speed that the vehicle travels on links of the main roads network (or equivalently the transit times on the links).” *Id.* (quoting Ex. 1004 ¶ 321). Petitioner also points us to where Knockeart teaches that “the in-vehicle system ***tracks the vehicle’s location*** on main roads network,” thereby detecting when the vehicle is traveling along a road segment (i.e., link), and “records the time the vehicle takes to travel from one end to the other of the link and stores a reference to the link, the time of day, and the speed traveled along the link in the link speed log.” *Id.* at 21 (quoting Ex. 1004 ¶ 322).

Petitioner does not point to any teaching in Knockeart for the “cell phone” aspect of this limitation. Instead, Petitioner relies on Feldman’s description of prior art techniques that use “mobile sensors or electronic devices physically located in or attached to vehicles,” and that obtain “dynamic ***vehicle location and velocity data*** and information,” where the mobile sensors or electronic devices may be cellular telephones. Pet. 22 (quoting Ex. 1005 ¶¶ 7–8). Petitioner further directs us to Feldman’s disclosure that these prior art techniques involve “***calculating velocities of vehicles***, for example, by ***acquiring series of exact locations*** of the vehicles located along roads in known time intervals.” *Id.* (quoting Ex. 1005 ¶ 5).

Petitioner also relies on Feldman’s description of its own system, adding that Feldman teaches that “cellular phones that are suspected as being ‘vehicle-carried’ are immediately *tracked for their locations*,” and that “[t]he tracking of the ‘moving’ phones is done by *polling their locations in known time intervals*.” Pet. 22 (quoting Ex. 1005 ¶¶ 61–62). According to Petitioner, an ordinarily skilled artisan “would have recognized that such road link travel times would have been used to determine probe vehicle speeds in the combined system, . . . as ‘speed’ is a comparison of time to distance.” *Id.* (citing Ex. 1003 ¶ 81).

Petitioner proposes combining Knockeart and Feldman in two different ways to satisfy claim 1. Pet. 9–10 (discussing “either case”). For purposes of clarity, Petitioner designated during trial one way as the “primary configuration” and the other way as the “alternative configuration.” Pet. Reply 2–6 (discussing “primary configuration”); *id.* at 6–7 (discussing “alternative configuration”). Petitioner asserts that “[i]n either case, the resulting system would have used Feldman’s techniques for collecting traffic information using vehicle-carried cellular phones to populate Knockeart’s traffic database used to determine fastest routes between starting points and destinations.” Pet. 10; *see also id.* at 21–22 (“[I]n the Knockeart-Feldman combination, vehicle-carried cellular phones are used as probes to populate at least some of the traffic information in the traffic database.”).

According to the primary configuration, Petitioner proposes “apply[ing] the teachings of Feldman to Knockeart to implement all or a portion of Knockeart’s in-vehicle systems as cellular phones for the purpose of collecting probe vehicle traffic data.” Pet. 9. During trial, Petitioner

explained that implementing Knockeart's in-vehicle systems as cellular phones means the proposed primary configuration "retain[s] all functionality of Knockeart's navigation system and add[s] cellular phone capability." Pet. Reply 3; *see also* Tr. 15:7–12 (Petitioner's counsel explaining that "[t]he primary configuration[] . . . is you take Knockeart's in-vehicle system, keep all the functionality of Knockeart's in-vehicle system, and simply implement it as a cell phone"). Thus, in the proposed combination the vehicle-carried cell phones (including Knockeart's in-vehicle system functionality) provide traffic data for populating the traffic database.

According to the alternative configuration, Petitioner proposes "implement[ing] Knockeart's system to utilize Feldman's vehicular traffic data collected by tracking 'vehicle-carried' cellular telephones as one of the external traffic information sources expressly described in Knockeart." Pet. 9; *see also* Pet. Reply 7 (reiterating that "Feldman's cellphone probes are used to provide an additional traffic information source to Knockeart's system" in the alternative configuration). In other words, each of Knockeart's in-vehicle systems and each of Feldman's vehicle-carried cellular phones serves as a separate source of traffic data for populating the traffic database.

Petitioner argues that an ordinarily skilled artisan at the critical time would have had reason to combine Knockeart and Feldman to provide either of the proposed configurations. Pet. 9–15. As support, Petitioner asserts "cell phone use was becoming more widespread" and "it would have been beneficial to replace, enhance, or supplement at least some of the in-vehicle location tracking systems described in Knockeart with cell phone based location tracking (as taught by Feldman) because, as Feldman expressly

recognizes, ‘there is a significantly larger potential number of vehicles associated with cellular telephone types of a mobile wireless communication network or system.’” *Id.* at 11–12. Petitioner further notes,

[B]oth Knockeart and Feldman disclose navigation systems that collect traffic information from probe vehicles to calculate fastest travel routes, and a [person of ordinary skill in the art (POSITA)] would have recognized that applying Feldman’s suggestions to Knockeart’s navigation system would have led to predictable results with a reasonable expectation of success in modifying Knockeart’s system in view of Feldman without significantly altering or hindering the functions performed by Feldman’s system. . . . Indeed, Knockeart expressly contemplates “[o]ther embodiments” not expressly described and Feldman’s cell phone-based traffic data collection technique provides just such an embodiment.

Id. at 15 (citing Ex. 1004 ¶ 420). Petitioner relies on the declaration testimony of Dr. Braasch. *Id.* (citing Ex. 1003 ¶ 66).

Although Patent Owner does not in its Response specifically dispute Petitioner’s contentions that the proposed combination of Knockeart and Feldman teaches this limitation, Patent Owner does dispute Petitioner’s proffered reasoning for combining Knockeart and Feldman. PO Resp. 10–17. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either configuration teaches the recited “traffic condition” of claim 1. *See* Pet. 9–15, 19–23; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). As for Petitioner’s proffered reasoning for combining Knockeart and Feldman, we address the parties’ arguments below in a separate section. *See infra* Part III.B.2.f.ii.

e. Limitation 1.5: “cell phones”

Claim 1 further recites “wherein each of the plurality of cell phones further has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data.”

Petitioner asserts that “Knockeart discloses that ‘[t]wo modes of data collection are used’ for collecting probe vehicle location/speed data,” and that “[t]he operator of the vehicle has the option of **enabling or disabling either mode of data collection through the user interface** of the in-vehicle system.” Pet. 23 (quoting Ex. 1004 ¶¶ 319, 324). Petitioner also notes Feldman’s concern that “[t]racking vehicles without the knowledge and consent of their drivers may be considered as violation of privacy.” Pet. 23 (citing Ex. 1005 ¶ 64); *see also* Ex. 1005 ¶ 64 (expressing interest in “protecting the privacy of individuals associated with, or hosting, the sources 62 . . . of the mobile sensors or electronic devices, of the vehicular traffic data and information which are acquired, collected, or gathered, using techniques based on GPS and/or cellular telephone types of mobile wireless communications networks or systems”). According to Petitioner, “a POSITA would have recognized from th[ese] disclosure[s] that Knockeart provides that each cell phone in the Knockeart-Feldman combination has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data.” Pet. 23–24.

Petitioner additionally asserts that “Knockeart further describes that the user interface . . . ‘includes multiple push buttons associated with display 242’ that allow the user ‘to ***select alternatives*** shown on display 242,

or to scroll the list of displayed alternatives’ when selecting between multiple available options.” *Id.* at 24 (quoting Ex. 1004 ¶ 118). Petitioner contends that “a POSITA therefore would have recognized that the multiple available options for ‘enabling or disabling’ probe location data collection described by Knockeart would have been provided as a ‘list of displayed alternatives’ in the Knockeart-Feldman combination to allow the user to scroll the available options to select one of the available options.” *Id.* at 24–25.

Petitioner adds,

Alternatively, it would have been obvious to provide the options provided by Knockeart’s user interface for enabling or disabling the multiple modes of location data collection as a “list” based on Knockeart’s teachings for scrolling lists of available options presented by the user interface because the in-vehicle systems of probe vehicles (implemented as cell phones in the Knockeart-Feldman combination) are expressly described as presenting lists for allowing users to make selections and therefore implementing the “enabling or disabling” options using such lists would have eliminated the need for developing another method of allowing such user selection.

Id. at 25. Petitioner relies on the declaration testimony of Dr. Braasch to support its position. *Id.* at 24–25 (citing Ex. 1003 ¶¶ 84–87).

Patent Owner disputes Petitioner’s contentions regarding this limitation. PO Resp. 10–17. We address the parties’ arguments below. *See infra* Part III.B.2.f.i.

f. The Parties’ Dispute

In its Response, Patent Owner makes three arguments. First, Patent Owner argues that “[a] POSITA would not modify Feldman with user-initiated permissions to selectively enable or disable access to cellphone

location data.” PO Resp. 10 (capitalization and emphases omitted). Second, Patent Owner argues that “[m]odifying Feldman to use cellphones to collect location data would contravene the invention of Feldman and destroy its principle of operation.” *Id.* at 12 (capitalization and emphases omitted). Third, Patent Owner argues that “[m]odifying Feldman to specialize the cellphone to collect and transmit location data would contravene an objective of Feldman, and, thus, there can be no motivation to do so.” *Id.* at 14 (capitalization and emphases omitted).

The first argument relates to Petitioner’s showing for limitation 1.5, whereas the latter two arguments relate to Petitioner’s proffered reasoning for combining Knockeart and Feldman (discussed above with respect to limitations 1.4 and 1.5). We address these arguments in turn.

i. User-Initiated Permissions to Selectively Enable or Disable Access to Cell Phone Location Data

As discussed above, limitation 1.5 recites “wherein each of the plurality of cell phones further has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data.” Petitioner relies on Knockeart’s disclosure of enabling and disabling data collection modes as well as Feldman’s disclosure of cellular phones. Pet. 23–25; *see supra* Part III.B.2.e. Based on these disclosures, Petitioner argues that an ordinarily skilled artisan “would have recognized . . . that each cell phone in the Knockeart-Feldman combination has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable

or disable access to user cellphone location data.” Pet. 23–24; *see supra* Part III.B.2.e.

Patent Owner contends that an ordinarily skilled artisan would not have found limitation 1.5 “obvious in light of Knockeart’s ability to enable/disable its data collection modes and Feldman’s phones.” PO Resp. 10. Patent Owner asserts that Knockeart describes “an in-car navigation system utilizing its GPS receiver to determine the car’s location,” which “can be sent to the network by the in-car navigation system.” *Id.* Patent Owner further asserts that “[i]t is this collecting and reporting that can be enabled and disabled.” *Id.* According to Patent Owner, an ordinarily skilled artisan “would not combine this functionality with Feldman’s cellphones because Feldman’s phones do not themselves collect, report, or control any location information.” *Id.* In other words, “there is no collection or transmission of location information in Feldman’s phones to be enabled or disabled.” *Id.* Patent Owner adds that “the only location information derived from Feldman’s phones is based on handovers and control messages and is managed by the network and not the cellphone,” and so “a feature that would allow a user of a Feldman cellphone to optionally allow or prevent transmission of the phone’s self-determined location has no place in one of Feldman’s phones . . . because Feldman’s phone cannot generate or provide such information.” *Id.* at 10–11; *see also id.* at 4–9 (discussing Dr. Braasch’s deposition testimony on Feldman’s disclosure of cell phone tracking).

Petitioner acknowledges that Feldman describes tracking cell phones based on cell tower handovers, but argues that “Feldman describes several other sources of traffic data, including the use of cellphones that self-report

location information.” Pet. Reply 12. As support, Petitioner directs us to where Feldman describes prior art techniques using “mobile sensors or electronic devices physically located in or attached to vehicles” that “automatically transmit vehicle locations to the computerized central traffic data and handling system.” *Id.* (quoting Ex. 1005 ¶ 7). Petitioner also directs us to where Feldman says that “such prior art techniques make use of well known global positioning system (GPS) and/or other types of mobile wireless communication or electronic vehicular tracking technologies[] . . . involving the use of corresponding mobile wireless devices such as cellular telephones” to “obtain[] dynamic vehicle location and velocity data and information.” *Id.* (citing Ex. 1005 ¶ 8).

As further support, Petitioner directs us to where Feldman describes its own system. Pet. Reply 14 (citing Ex. 1005 ¶ 53). Paragraph 53 in particular states that “[a] growing number of mobile wireless communication devices are increasingly being installed or carried in vehicles, ***and are capable of transmitting vehicular locations to a computerized central data and information receiving and processing system,***” where such devices include “driver-carried devices such as computer laptops ***and cellular phones.***” *Id.* (quoting Ex. 1005 ¶ 53). Petitioner additionally directs us to where Feldman teaches that its system “obtains the vehicular traffic data and information by ‘push’ or ‘pull’ procedures,” where the push procedure involves “receiving the vehicular traffic data and information that is initiated by source 62 of the mobile sensors.” *Id.* (quoting Ex. 1005 ¶ 63).

In response, Patent Owner reiterates its position that “[n]owhere does Feldman disclose cell phones transmitting location data as part of its technique for collecting traffic information.” PO Sur-reply 7–8; *see also id.*

at 10–17 (“Feldman does not disclose self-reporting of cell phone location data.”) (capitalization and emphasis omitted). Patent Owner asserts that Feldman instead discloses that “location data is calculated by a server using administrative messages collected by the network (e.g., cell tower handovers).” *Id.* at 14. As support, Patent Owner directs us to where Feldman teaches,

Data acquisition from cellular phones is controlled by a server connected to a particular cellular phone network. The operation of cellular phones provokes a large amount of administrative and control messages that flow in the cellular phone network whenever any cellular event occurs. For example, initiation of a call, completion of a call, transmission of a short message Service (SMS) message, a cell transition or handover, etc. The server of the cellular phone network monitors these messages and intercepts those that indicate movement of cellular phone holders, for example, phones whose cell handovers rate can point to a vehicle speed.

Id. (quoting Ex. 1005 ¶ 60). According to Patent Owner, “Feldman relies on cellular wireless network interpretation of administrative messaging to calculate the locations of cell phones as its only method of tracking cell phones.” *Id.* at 15.

As to paragraph 53 of Feldman, Patent Owner asserts “[t]here is no disclosure in Feldman para[graph] 0053 disclosing GPS enabled cell phones.” PO Sur-reply 16; *see also id.* at 11 (“It should be understood that nowhere does Feldman disclose GPS in cell phones.”); *id.* at 15 (“Nowhere does Feldman disclose . . . cell phones that self-report using GPS or other technology.”). Patent Owner reads paragraph 53 as “disclosing wireless communication devices that transmit data,” where such devices include

“telemetric GPS devices and, separately, driver-carried cell phones.” *Id.* at 16–17 (citing Ex. 1005 ¶ 53).

We disagree with Patent Owner’s position that “there is no collection or transmission of location information in Feldman’s phones to be enabled or disabled.” *See* PO Resp. 10. Referring to its own system, Feldman describes “acquiring a variety of vehicular traffic data and information associated with the oriented road section network, from a variety of sources.” Ex. 1005 ¶ 51 (cited by Pet. Reply 12). Feldman says these sources include mobile sensors. *Id.* ¶ 52 (cited by Pet. Reply 12). Feldman explains,

[T]he *present invention features mobile sensors* as most advantageous for acquiring vehicular traffic data and information, even though they have lower confidence levels. A growing number of *mobile wireless communication devices* are increasingly being installed or *carried in vehicles*, and are *capable of transmitting vehicular locations* to a computerized central data and information receiving and processing system. *Such mobile wireless communication devices are* telemetric devices with GPS capabilities, anti-theft devices, and, driver-carried devices such as computer laptops and *cellular phones*.

Id. ¶ 53 (emphases added) (cited by Pet. 22; Pet. Reply 14; PO Sur-reply 16–17). Thus, paragraph 53 of Feldman explicitly teaches vehicle-carried cellular phones that “transmit[] vehicular locations.” Whether Feldman’s cell phones use GPS or other tracking technology is of no moment here; at bottom, the cellular phones transmit location information. *See* PO Sur-reply 16 (“There is no disclosure in Feldman para[graph] 0053 disclosing GPS enabled cell phones”).

We note Patent Owner’s contention that “Feldman relies on cellular wireless network interpretation of administrative messaging to calculate the

locations of cell phones as its *only* method of tracking cell phones.” PO Sur-reply 14–15 (citing Ex. 1005 ¶ 60) (emphasis added). We disagree. As discussed above, Feldman explicitly teaches vehicle-carried cell phones that “*transmit*[] vehicular locations,” thereby providing another way of tracking cell phones. Ex. 1005 ¶ 53 (emphasis added).

Moreover, Feldman relies on cellular wireless network interpretation of administrative messaging specifically in the context of choosing a sample population of moving cell phones, not as its only way of tracking cell phones. Feldman explains that “a very small percentage[] . . . of moving vehicles provide[s] a sufficient base to obtain the necessary data,” and that “there is [a] need to efficiently choose the sample population[] . . . so that the data collected will be as relevant as possible for the purpose of vehicular traffic assessment.” *Id.* ¶ 58. Feldman further explains that choosing the sample population “[i]n cellular telephone networks . . . is done by identifying phones whose cell-handover rates indicate a relatively fast movement.” *Id.* ¶ 59. Thus, in this context, “[d]ata acquisition from cellular phones is controlled by a server connected to a particular cellular phone network,” where the server “monitors [administrative and control] messages and intercepts those that indicate ‘movement’ of cellular phone holders, for example, phones whose cell handovers rate can point to a vehicle speed.” *Id.* ¶ 60. This avoids “confusion between walking pedestrians and slowing traffic due to heavy congestion.” *Id.* ¶ 59.

Feldman notes that “[o]nce the ‘moving’ sensors are identified, [Feldman’s system] includes them in the sample population and controls the flow of the vehicular traffic data and information” that is “obtain[ed] . . . by ‘push’ or ‘pull’ procedures.” *Id.* ¶ 63. A push procedure involves

“receiving the vehicular traffic data and information that is initiated by source 62 of the mobile sensors.” *Id.* (emphasis added). In other words, outside of choosing a sample population of moving cell phones, Feldman further uses a push procedure as a way of tracking cell phones by “receiving” vehicular traffic data and information from the cell phones. *See id.* (referring to push and pull procedures as a “tracking operation”).

Patent Owner further contends that Petitioner improperly “attempts to change its . . . argument to include new prior art references,” namely Simske and Whitsell. *See* PO Sur-reply 9–10 (citing Pet. Reply 12–13). Although Petitioner cites Simske and Whitsell in its Reply, our analysis does not rely on Simske or Whitsell. Moreover, Petitioner cites Simske and Whitsell to support its assertion that “using GPS enabled cellphones as traffic probes w[as] well known in prior art navigation systems by the ’028 patent’s 2004 priority date,” not to supply a missing limitation. *See* Pet. Reply 12–13. For these reasons, Patent Owner’s contention is unavailing.

Based on the record before us, we find that the proposed combination of Knockeart’s enabling and disabling of data collection modes as well as Feldman’s vehicle-carried cellular phones that are capable of transmitting location data teaches the recited “cell phones” of limitation 1.5. *See* Pet. 23–25 (citing, e.g., Ex. 1003 ¶¶ 39–45, 82–88; Ex. 1004 ¶¶ 32, 118, 211, 219, 230, 318–319, 324; Ex. 1005 ¶¶ 61–66); Pet. Reply 14 (citing, e.g., Ex. 1005 ¶ 53); *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

ii. Reasoning for Combining the Teachings of Knockeart and Feldman

As discussed above with respect to limitation 1.4, Petitioner proposes combining Knockeart and Feldman to provide a navigation system where “vehicle-carried cellular phones are used as probes to populate at least some of the traffic information in the traffic database.” Pet. 21–22. Petitioner proposes combining Knockeart and Feldman in two ways, one way according to a primary configuration and the other way according to an alternative configuration.⁹ Pet. 9–10; Pet. Reply 2–7. In the primary configuration, Feldman’s vehicle-carried cellular phones provide a way to implement Knockeart’s in-vehicle systems. Pet. 9. In the alternative configuration, Feldman’s vehicle-carried cellular phones supplement Knockeart’s in-vehicle systems as additional sources of traffic data for populating Knockeart’s traffic database. *Id.*

Petitioner argues,

[I]t would have been beneficial to replace, enhance, or supplement at least some of the in-vehicle location tracking systems described in Knockeart with cell phone based location tracking (as taught by Feldman) because, as Feldman expressly recognizes, “there is a significantly larger potential number of vehicles associated with cellular telephone types of a mobile wireless communication network or system.”

Pet. 11–12. Petitioner asserts that “both Knockeart and Feldman disclose navigation systems that collect traffic information from probe vehicles to calculate fastest travel routes,” and that “Knockeart expressly contemplates

⁹ Patent Owner reads the Petition as proposing “a single Knockeart-Feldman combination.” PO Sur-reply 3–7. As explained above, however, the Petition proposes combining Knockeart and Feldman in two ways. Pet. 9–10; see Part III.B.2.d.

‘[o]ther embodiments’ not expressly described and Feldman’s cell phone-based traffic data collection technique provides just such an embodiment.” *Id.* at 15. Petitioner also asserts that an ordinarily skilled artisan “would have recognized that applying Feldman’s suggestions to Knockeart’s navigation system would have led to predictable results with a reasonable expectation of success in modifying Knockeart’s system in view of Feldman without significantly altering or hindering the functions performed by Feldman’s system.” *Id.*

With respect to limitation 1.5, Petitioner adds that “a POSITA would have recognized . . . that Knockeart provides that each cell phone in the Knockeart-Feldman combination has a user initiated permission set comprised of a list of authorizations that permit a user to selectively enable or disable access to user cellphone location data,” based on Knockeart’s enabling and disabling of data collection modes and Feldman’s concern that “[t]racking vehicles without the knowledge and consent of their drivers may be considered as violation of privacy.” Pet. 23–24.

That Knockeart and Feldman describe mechanisms for traffic data collection, and that the use of Feldman’s vehicle-carried cellular phone was a known way to do that, is sufficient reason for combining Knockeart and Feldman. *See* Ex. 1004 ¶¶ 318–319 (describing the use of in-vehicle systems to collect traffic data); Ex. 1005 ¶¶ 7–8, 53, 61 (describing the use of vehicle-carried cellular phones to collect traffic data). Petitioner need only show that Feldman’s vehicle-carried cellular phone would have been a “suitable option” for implementation in Knockeart’s navigation system either as Knockeart’s in-vehicle system according to the proposed primary configuration or in addition to Knockeart’s in-vehicle system according to

the proposed alternative configuration. *See Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023). Also, protecting the privacy of individuals provides further reason for combining Knockeart and Feldman. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”).

Patent Owner contends that “Petitioner erroneously claims that the cellphones of Feldman do contain . . . location data and are capable of transmitting such data,” and that now arguing “it would be obvious for cellphones in Feldman to collect and transmit location data” would not only be untimely but also “contrary to the invention and principle of operation in Feldman.” PO Resp. 12; *see also id.* at 14 (“[T]he cellphones of Feldman do not collect and share location data.”). According to Patent Owner, “[a] main aspect of Feldman’s invention is using network level data to determine traffic patterns even though such data is not as accurate as GPS-derived location data.” *Id.* at 12–14 (citing Ex. 1005 ¶¶ 34, 54, 60–61). Patent Owner asserts that “[d]iscarding this approach and using instead cellphones with their own location data collecting mechanisms (e.g., GPS receivers), would contravene the invention of Feldman and destroy its principle of operation.” *Id.* at 14.

We disagree with Patent Owner. As discussed above, Feldman describes “mobile wireless communication devices . . . being installed or carried in vehicles, and . . . **capable of transmitting vehicular locations**,” where “[s]uch mobile wireless communication devices are . . . **cellular phones**.” Ex. 1005 ¶ 53 (emphases added). Contrary to Patent Owner’s position, Feldman’s vehicle-carried cellular phones are capable of

transmitting location data. *See* PO Resp. 12, 14. Petitioner, therefore, need not argue that “it would be obvious for cellphones in Feldman to collect and transmit location data,” because they can already do that. *See id.* at 12.

That Feldman’s vehicle-carried cellular phones can transmit location data undermines Patent Owner’s contention that using cell phones with their own location data collecting mechanisms, such as GPS receivers, would contravene Feldman’s invention and destroy its principle of operation. *See* PO Resp. 14. Although Patent Owner asserts that “[a] main aspect of Feldman’s invention is using network level data to determine traffic patterns even though such data is not as accurate as GPS-derived location data,” Patent Owner acknowledges Feldman’s explicit teaching that its system “is independent of specific locating techniques and systems, and is suited to a variability of accuracy and precision levels.” *Id.* at 12, 14 (quoting Ex. 1005 ¶ 61); *see also* Ex. 1005 ¶ 54 (“In principle, . . . the present invention is applicable to all types of mobile sensor systems.”) (quoted by PO Resp. 13). Feldman even describes acquiring vehicular traffic data “using a combination of various techniques based on . . . mobile wireless communications networks or systems such as ***GPS and/or cellular telephone*** networks or systems.” Ex. 1005 ¶ 36 (emphasis added). Thus, using cell phones with their own location data collecting mechanisms would not contravene Feldman’s invention and destroy its principle of operation.

Patent Owner further contends that “[a]n objective in Feldman is avoiding the use of limited data from specialized devices.” PO Resp. 14–15. As support, Patent Owner directs us to where Feldman says “the potential number of mobile sensors or electronic devices providing dynamic vehicle location and velocity data and information to the computerized central traffic

data and information handling system is limited, in proportion to the number of vehicles featuring the particular mobile wireless communication or electronic vehicular tracking technology.” *Id.* at 15 (emphasis omitted) (quoting Ex. 1005 ¶ 9). To illustrate, Feldman explains “there is a significantly larger potential number of vehicles associated with cellular telephone types of a mobile wireless communication network or system compared to the potential number of vehicles associated with GPS types of a mobile wireless communication network or system.” *Id.* (quoting Ex. 1005 ¶ 9). According to Patent Owner, “[m]odifying Feldman to use specialized cellphones that collect and transmit location data would therefore be contrary to this objective of Feldman,” especially where “at the time of the ’028 [p]atent, cellphones capable of collecting and sharing location data were rare and not readily commercially available.” *Id.*

We disagree with Patent Owner. As discussed above, Feldman’s vehicle-carried cellular phones can already transmit location data. *See* Ex. 1005 ¶ 53. Accordingly, there is no need to “[m]odify[] Feldman to use specialized cellphones that collect and transmit location data,” as Patent Owner suggests. *See* PO Resp. 15. Moreover, Feldman does not say that avoiding the use of limited data from specialized devices is an objective of its invention. *See* Ex. 1005 ¶ 9 (cited by PO Resp. 15). Feldman instead “note[s]” that “there is a significantly larger potential number of vehicles associated with cellular telephone types of a mobile wireless communication network or system compared to the potential number of vehicles associated with GPS types of a mobile wireless communication network or system.” *Id.* Feldman also discloses acquiring vehicular traffic data “using a combination of various techniques based on . . . mobile wireless

communications networks or systems such as ***GPS and/or cellular telephone*** networks or systems.” *Id.* ¶ 36. Thus, using cell phones that collect and transmit location data would not be contrary to an objective of Feldman.

On the record before us, we find that Petitioner’s proffered reasoning for combining Knockeart and Feldman according to both the primary and alternative configurations supports the legal conclusion of obviousness. *See* Pet. 15 (“Knockeart expressly contemplates ‘[o]ther embodiments’ not expressly described and Feldman’s cell phone-based traffic data collection technique provides just such an embodiment.”); *id.* at 23 (citing Feldman’s concern for privacy); *Khan*, 441 F.3d at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”); *Intel*, 61 F.4th at 1381 (explaining that the petitioner need only show that the proposed combination would have provided a “suitable option”).

iii. New Arguments

In its Sur-reply, Patent Owner argues that “[b]ecause Feldman does not disclose cell phones self-reporting their locations or any way to control the networks messaging and calculations, elements related to cell phone location, location access control by the phone and transmission of location information, such as [1.4], [1.5] and [2], are not found in the combination of Knockeart-Feldman.” PO Sur-reply 6; *see id.* at 7–8, 17. With respect to limitation 1.4 of claim 1 and claim 2, this is a new argument raised for the first time in the Sur-reply, and it does not respond to an issue brought up by Petitioner’s Reply. *See* 37 C.F.R. § 42.23(b) (“A sur-reply may only

respond to arguments raised in the corresponding reply . . .”). In any event, we are unpersuaded by this new argument. As discussed above, Feldman discloses vehicle-carried cellular phones that transmit location data.

Ex. 1005 ¶¶ 53, 63.

Patent Owner also argues that “nowhere does the Knockeart-Feldman combination teach or suggest ‘vehicle carried cellular phones’ being used as probes,” because “nowhere does Knockeart disclose using cell phones as in-vehicle probes,” and “cell phones in Feldman are never disclosed as being able to operate as navigation devices themselves.” PO Sur-reply 20. This also is a new argument raised for the first time in the Sur-reply, and it does not respond to an issue brought up by Petitioner’s Reply. *See* 37 C.F.R. § 42.23(b). In any event, we are unpersuaded by this new argument as well. As discussed above with respect to limitation 1.4, Petitioner relies on the combination of Knockeart and Feldman, not just Knockeart, for teaching the use of cell phones as in-vehicle probes. *See supra* Part III.B.2.d. Additionally, Petitioner does not rely on Feldman for teaching cell phones that operate as navigation devices. Instead, Petitioner relies on Feldman’s cell phones as a way to implement Knockeart’s in-vehicle system or as an additional source of traffic data for populating Knockeart’s traffic database. *See id.*

Accordingly, Patent Owner’s arguments are unavailing.

3. Analysis of Dependent Claim 2

Claim 2 depends from claim 1 and recites “wherein each of the plurality of cell phones communicates its respective locations through a cellular network infrastructure to a server for calculation of the traffic

condition.” Petitioner reasserts that “in the Knockeart-Feldman system, vehicle-carried cell phones are used to provide at least some of the traffic data in the database.” Pet. 25.

Apparently referring to the proposed alternative configuration in particular, Petitioner further asserts that “Feldman discloses that ‘mobile sensors or electronic devices provid[e] dynamic *vehicle location* and velocity data and information *to the computerized central traffic data and information handling system*,’ where the ‘mobile devices include ‘cellular phones.’” *Id.* at 25–26 (quoting Ex. 1005 ¶ 35; citing Ex. 1005 ¶¶ 53, 71). In addition, Petitioner directs us to where Feldman teaches “a server connected to a particular cellular network,” and that the disclosed “processing steps take place in a server that is connected to the mobile sensor source network.” *Id.* (citing Ex. 1005 ¶¶ 60–61, 65–66).

Apparently referring to the proposed primary configuration, Petitioner asserts that “Knockeart discloses that the in-vehicle system (implemented in whole or in part as a cell phone in the Knockeart-Feldman system) ‘*tracks the vehicle’s location* on [the] main roads network’ using ‘GPS location estimates it receives from its GPS receiver[.]’” Pet. 26 (quoting Ex. 1004 ¶ 322). Petitioner also asserts “Knockeart describes that the in-vehicle system uses this location information to determine ‘the time the vehicle takes to travel’ each link and records ‘a reference to the link, the time of day, and the speed traveled along the link in the link speed log.’” *Id.* (quoting Ex. 1004 ¶ 322). Petitioner acknowledges these disclosures in Knockeart indicate the travel time and speed calculations are performed by the in-vehicle system, but argues “it would have been obvious to transmit the raw location data to the server to allow the server to calculate the travel times

and speeds on each link for each vehicle (per Feldman’s suggestion).” *Id.* at 26–27 (citing Ex. 1003 ¶ 91); *see also id.* at 27 (“Knockeart further discloses that [its] in-vehicle system communicates wirelessly with the server over a cellular network.”) (citing Ex. 1004 ¶¶ 74, 78, 86). According to Petitioner, “[s]uch an implementation would have allowed for processing needs to be shifted to the server, thereby reducing the amount of processing and memory capacity required for the in-vehicle system,” which is implemented as a cell phone in the Knockeart-Feldman combination. *Id.* at 27. Petitioner adds that “it [also] would have been obvious to move such functionality to the server” because “when . . . there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.” *Id.* (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 2. *See* Pet. 25–27; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). With respect to the primary configuration in particular, we also find that Petitioner’s proffered reasoning for relocating the calculation of the traffic condition in Knockeart from the in-vehicle system to the server, namely, because it would have been obvious to try based on the finite number of solutions, supports a legal conclusion of obviousness. *See KSR*, 550 U.S. at 421.

4. *Analysis of Dependent Claim 3*

Claim 3 depends from claim 1 and recites “wherein each of the plurality of cell phones communicates its respective speed through a cellular network infrastructure to a server for calculation of the traffic condition.”

Apparently referring to the proposed alternative configuration, Petitioner asserts that Feldman describes “mobile sensors or electronic devices providing dynamic vehicle location and *velocity data* and information *to the computerized central traffic data and information handling system*,” where the mobile sensors or electronic devices are cell phones. Pet. 28 (citing Ex. 1005 ¶¶ 8–9, 35–36, 38, 53). Petitioner also asserts that “[t]his data is communicated over a cellular network infrastructure.” *Id.* (citing Ex. 1005 ¶¶ 60–61).

Apparently referring to the proposed primary configuration, Petitioner asserts that Knockart teaches “the in-vehicle system records ‘a reference to the link, the time of day, and the *speed traveled* along the link in the link speed log’ for each link traversed and ‘sends the logged profile information it has stored in link speed log 1920 *to the server system . . . over a cellular telephone connection* with the server system.” Pet. 28 (citing Ex. 1004 ¶¶ 322–323, 325, 336–338, 347–348). Petitioner additionally asserts that Knockart teaches that its “in-vehicle system transmit[s] data ‘identifying the link and the *travel speed, to the server system*’ to identify ‘traffic exception[s].’” *Id.* (citing Ex. 1004 ¶ 338).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockart and Feldman according to either the primary or alternative

configurations teaches the limitation of claim 3. *See* Pet. 27–28; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

5. *Analysis of Dependent Claim 4*

Claim 4 depends from claim 1 and recites “wherein access to user cellphone location data is granted following a confirmation of at least one entry on the list of authorizations.” Petitioner asserts that Knockeart teaches that its “user devices include a user interface that allows the user to ‘scroll the list of displayed alternatives’ and ‘*select alternatives*’ when navigating menus to make selections.” Pet. 29 (citing Ex. 1004 ¶¶ 32, 118, 211, 219, 230). Petitioner further asserts “[t]his includes ‘*enabling or disabling*’ location data collection for the user’s in-vehicle system,” where “‘*[t]he operator of the vehicle* has the option of *enabling or disabling*’ location data collection.” *Id.* (citing Ex. 1004 ¶ 324). According to Petitioner, an ordinarily skilled artisan “would have recognized that selecting the alternative to enable collection of location data provides confirmation of at least one entry on the list of authorizations and that such a selection would have granted access to user cellphone location data in the Knockeart-Feldman combination in which at least some of the probe devices are vehicle-carried cell phones.” *Id.* (citing Ex. 1003 ¶¶ 97–98).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 4. *See* Pet. 28–29; *see also*

Dynamic Drinkware, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

6. *Analysis of Dependent Claim 5*

Claim 5 depends from claim 1 and recites “wherein the user initiated permission set is accessed through a user interface presented on a user device.” Petitioner directs us to where Knockeart teaches that “[t]he operator of the vehicle has the option of **enabling or disabling** either mode of data collection **through the user interface** of the in-vehicle system.” Pet. 29 (quoting Ex. 1004 ¶ 324). Petitioner asserts that “[t]he claims do not require the ‘user device’ to be distinct from the ‘cell phone’ from which the location data is collected.” *Id.* (citing Ex. 1003 ¶ 99).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 5. *See* Pet. 29–31; *see also* *Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

7. *Analysis of Dependent Claim 6*

Claim 6 depends from claim 1 and recites “receiving a navigation request to assist a driver in navigating to the destination.” Petitioner directs us to where Knockeart teaches “a navigation system for accepting [a] **route planning request** from the vehicle[s].” Pet. 31 (quoting Ex. 1004 ¶ 41). As an example, Petitioner asserts that Knockeart’s “‘user provides a destination

specification to the remote configuration system and the server system downloads a planned route to the destination’ as part of a ‘route planning request[.]’” *Id.* (quoting Ex. 1004 ¶ 408; citing Ex. 1004 ¶¶ 72–74, 84–90).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 6. *See* Pet. 31; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

8. *Analysis of Dependent Claim 7*

Claim 7 depends from claim 1 and recites “wherein the plurality of cell phones is selected from a candidate set of cell phones in an area proximate the route.” Apparently referring to the proposed primary configuration, Petitioner asserts that Knockeart teaches “***enabling a subset of an available set of probe vehicles*** to provide the traffic related data[.]” Pet. 32 (quoting Ex. 1004 ¶ 31).

Apparently referring to the proposed alternative configuration, Petitioner also asserts that Feldman similarly teaches selecting a “sample population” of vehicle-carried cell phones. *Id.* (citing Ex. 1005 ¶¶ 58–59, 61–63). Petitioner notes that “Feldman additionally discloses that the estimated link travel times derived from probe vehicle information [are] used in ‘finding optimal routes between given points.’” *Id.* at 32–33 (quoting Ex. 1005 ¶ 99). According to Petitioner, “a POSITA would have recognized that the subset of probe cell phones would be cell phones located

in an area proximate the route as this link speed information is the information that is relevant to planning the route.” *Id.* (citing Ex. 1003 ¶¶ 104–106; Ex. 1004 ¶¶ 30, 77, 170, 315–319; Ex. 1005 ¶¶ 100–101)

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 7. *See* Pet. 32–33; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

9. Analysis of Dependent Claim 9

Claim 9 depends from claim 1 and recites “wherein the destination is received from a source that is remote from a device on which the roadway map is presented.” Petitioner asserts that “Knockeart’s server system ‘includes a **remote** configuration system’ accessible over the Internet that the user can access to ‘modify their records in user profiles 2232 that are stored at the server system.’” Pet. 33 (quoting Ex. 1004 ¶ 405). Petitioner further asserts that “[t]his information can include ‘a list of frequent destinations [specified] over the Internet[.]’” *Id.* (quoting Ex. 1004 ¶ 405). In addition, Petitioner asserts that “[a] user’s profile is **downloaded** by the server system **to the in-vehicle system** in that user’s vehicle, or can alternatively be stored on the server system,” and that “[t]he user can ‘later in the vehicle choose a particular destination in that list by selecting from a display of the list by the in-vehicle system.’” *Id.* (quoting Ex. 1004 ¶ 405). According to Petitioner, “the destination is received (as part of the user profile) from a remote

source,” where “the roadway map is presented on the in-vehicle system.” *Id.* (citing Ex. 1003 ¶ 107; Ex. 1004 ¶¶ 10–11, 74, 282, 408); *see also id.* (citing Ex. 1003 ¶ 109; Ex. 1004 ¶¶ 181, 230–231).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 9. *See* Pet. 33; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

10. Analysis of Dependent Claims 10 and 12

Claim 10 depends from claim 1 and recites “a triangulation system.” Claim 12 depends from claim 10 and recites “wherein the triangulation system includes global position system (GPS) triangulation.” Petitioner directs us to where Knockeart teaches that “the location of the vehicle can be estimated using the Global Positioning System (GPS),” where “**multiple satellites** emit signals that allow an in-vehicle GPS receiver to **estimate its absolute location**.” Pet. 34 (quoting Ex. 1004 ¶ 7; citing Ex. 1004 ¶¶ 12–14, 71, 75, 86). Petitioner contends that “[a] POSITA would have recognized that estimating an absolute location from signals received from multiple satellites is a form of triangulation and thus Knockeart-Feldman provides claims 10 and 12.” *Id.* (citing Ex. 1003 ¶¶ 110–113); *see also id.* at 35 (citing Ex. 1004, Fig. 1).

Patent Owner does not specifically dispute Petitioner’s contentions regarding these claims. *See* PO Resp. Based on Petitioner’s argument and

evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitations of claims 10 and 12. *See* Pet. 34–35; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

11. Analysis of Dependent Claim 13

Claim 13 depends from claim 1 and recites “wherein the map includes a visual indication of traffic on the route.” Petitioner directs us to where Knockeart describes determining “the ***current traffic conditions on the operator’s trips***,” where “the traffic conditions are categorized into a small number of categories, such as normal, congested, and severely congested, and each category is ***displayed graphically to the operator using a different icon***.” Pet. 35 (quoting Ex. 1004 ¶ 394). Petitioner contends that “[a] POSITA would have recognized that displaying traffic data on the links ‘on the operator’s trips’ provides this claim.” *Id.* at 35–36 (citing Ex. 1003 ¶ 114; Ex. 1004 ¶¶ 6, 10–11, 74).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 13. *See* Pet. 35–36; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

12. Analysis of Dependent Claim 14

Claim 14 depends from claim 1 and recites “providing an estimation of how much time is predicted to travel through the traffic condition.” Petitioner asserts that “Knockeart discloses identifying link travel times for each link in the route.” Pet. 36. As support, Petitioner directs us to where Knockeart teaches that its “server system ‘plan[s] a **route** through the road network from a starting to a destination location **using the speed information associated with the road segments**.” *Id.* (quoting Ex. 1004 ¶ 30; citing Ex. 1004 ¶¶ 77, 89, 254, 315–319, 337–342). Petitioner further directs us to where Knockeart teaches that its “link speeds database . . . includes expected travel speeds for all the links in main roads network 100,” and asserts that Knockeart’s “system can plan routes ‘based on **lowest expected travel time**’ along the route.” *Id.* (quoting Ex. 1004 ¶¶ 254, 330). According to Petitioner, “[a] POSITA would have recognized that the combined expected travel speeds/times for each link along the planned route is one of numerous examples in Knockeart that provide the claimed ‘traffic condition.’” *Id.* (citing Ex. 1003 ¶ 115).

Petitioner adds that “Knockeart further describes ‘display[ing] characteristics’ of available routes, such as ‘time’ to traverse the route.” Pet. 36 (quoting Ex. 1004 ¶ 413). Petitioner contends that “[a] POSITA would have recognized that displaying a traversal time for the route . . . discloses providing an estimation of how much time is predicted to travel through the traffic condition.” *Id.* at 36–37 (citing Ex. 1003 ¶ 116).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of

Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 14. *See* Pet. 36–37; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

13. Analysis of Dependent Claim 15

Claim 15 depends from claim 1 and recites “wherein the traffic condition is a historical traffic condition.” Petitioner asserts that “Knockeart describes that each probe vehicle system ‘collects on an ongoing basis **a history** (a profile) **of the speed that the vehicle travels** on links of the main roads network,’” where the speed as well as the time of day that the link was traveled are stored. Pet. 37 (citing Ex. 1004 ¶¶ 243, 321–322). Petitioner also asserts that “Knockeart further describes that the system stores the ‘expected’ link travel speed according to ‘time of day.’” *Id.* (citing Ex. 1004 ¶ 337). Petitioner adds that “Knockeart discloses that ‘[m]ultiple travel times are stored for each link, for instance, to account for the variations due to **morning and evening busy periods**.’” *Id.* (citing Ex. 1004 ¶¶ 330, 336).

According to Petitioner, “Feldman expands on Knockeart’s disclosure, describing that the system collects ‘**historical and/or event related vehicular traffic data and information**.’” Pet. 37 (quoting Ex. 1005 ¶ 14; citing Ex. 1005 ¶¶ 36, 53, 84–85, 90–93, 100). Petitioner asserts that Feldman’s “link travel time prediction tools ‘are products of the analysis of **historical** vehicular traffic data and information,’” which Feldman uses to “‘identify a traffic ‘behavior pattern’ for each road segment ‘in different circumstances, such as different days of the week, holidays, special events,

weather conditions, and so on.” *Id.* at 37–38 (citing Ex. 1003 ¶ 118; Ex. 1005 ¶¶ 92–93).

Petitioner contends that “[a] POSITA would have recognized that historic travel information for each of (i) time of day, (ii) day of the week, (iii) holidays, (iv) special events, and (v) weather conditions provide examples of the claimed historical traffic condition.” Pet. 38 (citing Ex. 1003 ¶ 119). According to Petitioner,

A POSITA would have applied this teaching of Feldman to the Knockeart-Feldman combination (and would have had a reasonable expectation of success in doing so) to account for each of the historic events described by Feldman when determining link travel speeds/times (in addition to Knockeart’s expressly discussed “morning and evening busy periods”) because doing so would have increased the functionality of the resulting system by allowing predicted travel speeds/times to account for a wider array of historical events, thereby improving the accuracy of travel speed/time predictions.

Id. (citing Ex. 1004 ¶¶ 330–335; Ex. 1005 ¶ 92). Petitioner notes that “such a modification would have provided additional useful information to both the system and drivers when selecting a route to the destination.” *Id.* at 38–39 (citing Ex. 1003 ¶ 119). Petitioner also adds that “[s]uch a modification is also merely the application of a known technique to a known system ready for improvement to yield predictable results.” *Id.*

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 15. *See* Pet. 37–39; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on

the petitioner.”). We also find that Petitioner’s proffered reasoning for further modifying the combination of Knockeart and Feldman to consider Feldman’s historical traffic conditions, namely, to improve the accuracy of travel speed and time predictions, supports a legal conclusion of obviousness. *See Kahn*, 441 F.3d 977 at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

14. Analysis of Dependent Claim 16

Claim 16 depends from claim 15 and recites,

wherein the historical traffic condition includes traffic information based at least in part on an event recorded at a time of the historical traffic condition, and wherein the at least one route from the current location to the destination is further based at least in part on a comparison of the event recorded at the time of the historical traffic condition and a currently occurring event.

Referring to its discussion of claim 15, Petitioner asserts that “the Knockeart-Feldman combination tracks historical traffic conditions (road segment travel time/speed) for . . . events, including time of day[,] ‘different days of the week, holidays, special events, weather conditions, and so on.’” Pet. 39 (quoting Ex. 1005 ¶ 92; citing Ex. 1003 ¶¶ 120–122; Ex. 1004 ¶¶ 321–322, 330–337). Petitioner asserts that Knockeart teaches “comparing the event recorded at the time of the historical traffic condition and a currently occurring event to identify exceptional traffic conditions.” *Id.* at 40. As support, Petitioner asserts “the system records historic travel times according to time of day events (morning and evening ‘busy period[s]’) and then the system ‘detects that a traffic exception has occurred if a travel speed along a link is *substantially slower or faster than expected*

. . . for that link *at that time of day.*” *Id.* (citing Ex. 1004 ¶¶ 330–337). According to Petitioner, “[a] POSITA would have recognized that this disclosure indicates a comparison of the current travel time (currently occurring event) to the historic travel time for that time of day (event recorded at a time of the historical traffic condition) to identify the traffic exception.” *Id.* (citing Ex. 1003 ¶ 123). Petitioner further notes Knockeart’s teaching that “[w]hen the in-vehicle system identifies such a traffic exception, it reports the exception to the server system,” which “uses this traffic exception information and ‘updates traffic database 524, *which it uses to plan routes*[.]’” *Id.* (citing Ex. 1004 ¶¶ 338–340).

Petitioner asserts that “Feldman similarly discloses accounting for historical traffic conditions.” Pet. 41 (citing Ex. 1005 ¶ 92). Petitioner asserts in particular that, “[j]ust as in Knockeart, Feldman discloses that ‘while regular situations are handled with these tools, unexpected vehicular traffic developments are identified from the current vehicular traffic situation pictures by *comparing them to regular vehicular traffic behavior patterns.*’” *Id.* (quoting Ex. 1005 ¶ 95). In Feldman, “[a] ‘significant discrepancy from the pattern activates a respective correction of the [normalized travel time (NTT)] values’ used to calculate fastest routes in the Knockeart-Feldman combination.” *Id.* (citing Ex. 1003 ¶¶ 125–126; Ex. 1005 ¶¶ 95–98).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 16. *See* Pet. 39–42; *see also*

Dynamic Drinkware, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

15. Analysis of Dependent Claim 17

Claim 17 depends from claim 16 and recites “wherein the event is a weather condition.” Petitioner directs us to where Feldman teaches that “[e]very oriented road section has its own behavior pattern, and different behavior patterns describe the behavior in different circumstances, such as different days of the week, holidays, special events, weather conditions, and so on.” Pet. 42 (citing Ex. 1003 ¶ 127; Ex. 1005 ¶¶ 92, 95); Ex. 1005 ¶ 92.

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 17. *See* Pet. 42; *see also* *Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

16. Analysis of Dependent Claim 18

Claim 18 depends from claim 16 and recites “wherein the event is a time of day.” Petitioner asserts that Knockeart teaches “the event can include a ‘time of day’ such as ‘morning and evening busy periods.’” Pet. 42 (citing Ex. 1004 ¶¶ 321–337). Knockeart teaches in particular that “[m]ultiple travel times are stored for each link, for instance, to account for the variations due to morning and evening busy periods.” Ex. 1004 ¶ 330.

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 18. *See* Pet. 42; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

17. Analysis of Dependent Claim 19

Claim 19 depends from claim 16 and recites “wherein the event is a day of a week.” Petitioner directs us again to where Feldman teaches that “[e]very oriented road section has its own behavior pattern, and different behavior patterns describe the behavior in different circumstances, such as different days of the week, holidays, special events, weather conditions, and so on.” Pet. 42 (citing Ex. 1003 ¶ 127; Ex. 1005 ¶¶ 92, 95); Ex. 1005 ¶ 92.

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 19. *See* Pet. 42; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

18. Analysis of Dependent Claims 20 and 21

Claim 20 depends from claim 16 and recites “wherein the event is a day of a year.” Claim 21 also depends from claim 16 and recites “wherein

the event is a holiday.” As discussed above, Feldman teaches that “[e]very oriented road section has its own behavior pattern, and different behavior patterns describe the behavior in different circumstances, such as different days of the week, holidays, special events, weather conditions, and so on.” Pet. 42 (citing Ex. 1003 ¶¶ 130–131; Ex. 1005 ¶¶ 92, 95); Ex. 1005 ¶ 92.

Patent Owner does not specifically dispute Petitioner’s contentions regarding these claims. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitations of claims 20 and 21. *See* Pet. 42–43; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

19. Analysis of Dependent Claim 25

Claim 25 depends from claim 1 and recites “wherein the traffic condition is a real time traffic condition that represents traffic on the route at a time when the roadway map is presented.” Petitioner asserts that “Knockeart discloses that routes are planned at least in part on ‘**current traffic information**’ for the operator’s trips.” Pet. 43 (quoting Ex. 1004 ¶ 392). Petitioner directs us to where Knockeart teaches “[t]he server system uses its traffic database, which include[s] **current link speeds** on segments of the road network, to determine the **current traffic conditions** on the operator’s trips.” *Id.* (quoting Ex. 1004 ¶ 394). According to Petitioner, “[s]uch real time traffic conditions representing traffic on the route at a time when the roadway map is presented include ‘traffic exception[s]’ reflecting that the current ‘travel speed along a link is substantially slower or faster

than expected’ as compared to historic travel data.” *Id.* (quoting Ex. 1004 ¶ 337). Petitioner relies on the declaration testimony of Dr. Braasch. *Id.* (citing Ex. 1003 ¶ 132).

Petitioner asserts that “Feldman similarly discloses identifying ‘**current** vehicular traffic situation pictures’ using ‘several **recently calculated** NTT values on each oriented road section[.]’” Pet. 43 (quoting Ex. 1005 ¶¶ 94–95). According to Petitioner, “[i]n the Knockeart-Feldman combination, this ‘current vehicular traffic situation picture’ is used to ‘provid[e] a variety of vehicular traffic related service applications to end users’ including a fastest route to the destination.” *Id.* at 43–44 (citing Ex. 1005 ¶¶ 18, 94–95, 97–100, 102, code (57), claim 1). Petitioner relies on the declaration testimony of Dr. Braasch. *Id.* (citing Ex. 1003 ¶ 133).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 25. *See* Pet. 43–44; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

20. Analysis of Dependent Claim 26

Claim 26 depends from claim 1 and recites “wherein the roadway map further comprises a second route to the destination such that a user can select the second route as an alternate route through a user interface.” Petitioner asserts that “Knockeart describes an embodiment in which ‘the server system plans and downloads **several routes**, for instance planned according

to different criteria, such as shortest time, shortest distance, etc.,” and that “[t]he in-vehicle system displays characteristics of the alternatives (e.g., time, distance) and *the operator selects one*.” Pet. 44 (quoting Ex. 1004 ¶ 413). Petitioner additionally asserts that “Knockeart further renders obvious displaying the second route on the roadway map.” *Id.* Petitioner relies on the declaration testimony of Dr. Braasch. *Id.* (citing Ex. 1003 ¶ 134).

Dr. Braasch opines that “[a] POSITA would have recognized that ‘display[ing] characteristics of alternatives’ would have included displaying each route on the roadway map,” where Knockeart also “discloses displaying calculated routes on the roadway map.” Ex. 1003 ¶ 134 (citing Ex. 1004 ¶¶ 10, 282). Dr. Braasch further opines,

A POSITA would have recognized that it would have been beneficial and obvious to display each of the alternative routes on the roadway map to give the driver more information when selecting a best route, such as by showing the driver what neighborhoods or what streets each route traverses to allow the user to make a selection based on related criteria (such as selecting a more scenic route or a route with a gas station or grocery store along the way).

Id.

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 26. *See* Pet. 44; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

21. Analysis of Dependent Claim 29

Claim 29 depends from claim 1 and recites “presenting a user interface to save a future destination for future choosing, wherein the future choosing selects the saved future destination and forms the destination.” Petitioner asserts that “Knockeart discloses that the vehicle operator can identify a ‘desired destination’ for a current trip by selecting from ‘**a list of previously stored destinations**’ in a user’s “profile” or ‘a list of recently specified destinations.’” Pet. 44–45 (citing Ex. 1004 ¶¶ 211, 217–218). Petitioner further asserts that “Knockeart explains that ‘profiles that are stored in the vehicle’ or ‘on the server system . . . can **hold typical destinations**, such as “work,” “home,” “airport,” etc. for which **the operator has previously specified particular locations**.’” *Id.* at 45 (citing Ex. 1004 ¶ 237). Petitioner adds that “Knockeart’s system ‘includes a remote configuration system’ accessible over the Internet that the user can access to ‘modify their records in user profiles . . . that are stored at the server system,’ where “[t]he profile can store previously entered destinations that the operator can select to set the destination for a current trip from previously entered destinations or ‘a list of frequent destinations.’” *Id.* (citing Ex. 1004 ¶ 405).

According to Petitioner, “[a] POSITA would have recognized from these disclosures of Knockeart that the user specifies the list of frequent destinations over the Internet using a user interface including an input device such as ‘multiple push buttons’ or ‘an alphanumeric keyboard.’” Pet. 45 (citing Ex. 1003 ¶¶ 135–137; Ex. 1004 ¶ 118, 223). Under an alternative theory, Petitioner contends “it would have been obvious to use a user interface to enter destinations for storage as part of the user profile because

user interfaces were well-known (including being described throughout Knockeart) and would have provided a known and convenient way to enter the frequent destinations.” *Id.* (citing Ex. 1003 ¶ 137).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman teaches the limitation of claim 29. *See* Pet. 44–46; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

22. Analysis of Dependent Claim 31

Claim 31 depends from claim 1 and recites “a warning system adapted to warn a driver traveling on the route of the traffic condition, wherein the warning is based on a proximity of the driver, as determined by the current location, to an adverse traffic condition.” Petitioner directs us again to where Knockeart teaches that its server system “provides current traffic information for the operator’s trips” to the in-vehicle system. Pet. 46 (citing Ex. 1004 ¶ 392). Petitioner further directs us to where Knockeart teaches that “[i]f the received traffic data indicates an exceptional traffic condition on the specified path, ***the user is notified of the traffic condition.***” *Id.* (quoting Ex. 1004 ¶ 42). Additionally, Knockeart’s system may also “actively contact[] a user if an exceptional traffic condition occurs on one of the user’s previously specified trips” through a pager message, an e-mail, or a telephone call. *Id.* (citing Ex. 1004 ¶¶ 42, 395).

Petitioner also asserts that “Feldman describes providing ‘***alerts*** and route alterations when ***unexpected traffic events*** change the vehicular traffic

situation picture.” Pet. 46 (citing Ex. 1005 ¶¶ 99, 101). Petitioner adds that “Feldman describes that ‘an alert is sent to the driver’ for an “‘unexpected’ traffic event’ even if the event is ‘way off the recommended route’ if it is within a close enough proximity to the driver to affect the route.” *Id.* at 46–47 (citing Ex. 1003 ¶¶ 138–139; Ex. 1005 ¶¶ 99, 101).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart and Feldman according to either the primary or alternative configurations teaches the limitation of claim 31. *See* Pet. 46–47; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”).

23. Summary

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1–7, 9, 10, 12–21, 25, 26, 29, and 31 would have been obvious over Knockeart and Feldman.

C. Alleged Obviousness over Knockeart, Feldman, and Simske

Petitioner asserts that claims 7 and 8 of the ’028 patent would have been obvious over Knockeart, Feldman, and Simske. Pet. 47–50. Patent Owner responds that “Simske is not prior art.” PO Resp. 17–18 (capitalization and emphases omitted). For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the

evidence that claims 7 and 8 would have been obvious over Knockeart, Feldman, and Simske.

1. Qualification of Simske as Prior Art

As a preliminary matter, we consider the parties' dispute as to whether Simske qualifies as prior art.

Through a chain of continuation applications, the '028 patent claims priority to a nonprovisional application filed on February 7, 2005, and a provisional application filed on February 5, 2004. Ex. 1001, 1:6–18. Simske is a pre-grant patent application publication with a filing date of November 3, 2003, and a publication date of May 5, 2005. Ex. 1006, codes (22), (43).

Petitioner contends that Simske qualifies as prior art because its filing date of November 3, 2003, predates the '028 patent's claimed priority date of February 5, 2004. Pet. 2.

Patent Owner counters that “*Simske* was published, and thereby made available to the public, on May 5, 2005 — over a year after the priority date of the '028 [p]atent (February 5, 2004).” PO Resp. 17. According to Patent Owner, “*Simske* is simply a published patent application because *Simske*'s underlying application was abandoned before issuing into a U.S. patent,” and, therefore, “*Simske* cannot be used as prior art against the '028 [p]atent because it was not ‘publicly available’ prior to the priority date of the '028 [p]atent.” *Id.* As support, Patent Owner relies on the Federal Circuit's explanation that “[t]he statutory phrase ‘printed publication’ has been interpreted to mean that before the [relevant] date the reference must have been sufficiently accessible to the public interested in the art,” and that

“dissemination and public accessibility are the keys to the legal determination whether a prior art reference was ‘published.’” *Id.* at 18 (quoting *In re Klopfenstein*, 380 F.3d 1345, 1348 n.2 (Fed. Cir. 2004)).

Petitioner replies that “Simske qualifies as a ‘patent[] and printed publication[]’ under § 311(b) at least because it is ‘an application for patent, published under section 122(b), by another *filed* in the United States before the invention by the applicant for patent’ according to § 102(e)(1).”

Pet. Reply 18. Petitioner asserts that “[t]he Supreme Court in *Hazeltine* made clear that the prior art date for patent applications is not the date of publication, but the date of the application’s filing.” *Id.* at 18–19 (citing *Hazeltine Res., Inc. v. Brenner*, 382 U.S. 252, 254–55 (1965)). Petitioner also asserts that “[t]he Federal Circuit echoed that holding in *Becton*, where it rejected the argument that a patent that was subsequently revoked could not be ‘considered . . . to be prior art’ in an [*inter partes* review (IPR)] under pre-AIA § 102(e)(2) as of the ‘filing date of the application,’ even though it ‘was not made public’ until issuance after the priority date.” *Id.* at 18 (quoting *Becton, Dickinson & Co. v. Baxter Corp. Englewood*, 998 F.3d 1337, 1345 n.7 (Fed. Cir. 2021)).

We agree with Petitioner that Simske qualifies as prior art. Section 311(b) permits a challenge in an *inter partes* review “only on the basis of prior art consisting of patents or printed publications.” 35 U.S.C. § 311(b). Petitioner asserts Simske as prior art under pre-AIA 35 U.S.C. § 102(e)(1). The Federal Circuit has explained that, in determining whether a reference qualifies as prior art under pre-AIA § 102(e), we must consider whether “the invention was described in . . . an application for patent, published under section 122(b), by another filed in the United States before

the invention by the applicant for patent.” *See* 35 U.S.C. § 102(e)(1) (pre-AIA); *Medtronic, Inc. v. Teleflex Innovations S.A.R.L.*, 68 F.4th 1298, 1302–03 (Fed. Cir. 2023) (discussing pre-AIA 35 U.S.C. § 102(e)(2)); *see also* *Purdue Pharma L.P. v. Iancu*, 767 F. App’x 918, 921, 925 (Fed. Cir. 2019) (nonprecedential) (affirming *inter partes* review decision involving § 102(e)(1) prior art); *Samsung Elecs. Co. v. Lynk Labs, Inc.*, IPR2022-00149, Paper 33, 10–12 (PTAB June 26, 2023) (determining patent application publication qualifies as prior art under § 102(e)(1)).

Here, *Simske* is a pre-grant patent application publication with a filing date of November 3, 2003, which is *earlier* than the ’028 patent’s earliest possible effective filing date of February 5, 2004. Even if “*Simske*’s underlying application was abandoned before issuing into a U.S. patent,” as Patent Owner alleges, *Simske* still qualifies as prior art under pre-AIA § 102(e)(1). The text of the statute requires only that the application be “published,” meaning that the publication has occurred. 35 U.S.C. § 102(e)(1) (pre-AIA). The statute does not require that the application ever issue as a patent. *See* MPEP § 901.02 (“[A] patent application publication published under 35 U.S.C. 122(b) of an application that has become abandoned may be available as prior art under pre-AIA 35 U.S.C. 102(e) as of the earliest effective U.S. filing date of the published application . . .”). Nor does Patent Owner point to any authority saying otherwise.

As to Patent Owner’s reliance on *Klopfenstein*, we are unpersuaded because that case deals with public accessibility under pre-AIA 35 U.S.C. § 102(b); it does not deal with § 102(e). *See Klopfenstein*, 380 F.3d at 1347–48 (“The only question in this appeal is whether the Liu reference constitutes a ‘printed publication’ for purposes of 35 U.S.C. § 102(b). . . .

The statutory phrase ‘printed publication’ has been interpreted to mean that before the critical date the reference must have been sufficiently accessible to the public interested in the art[.]”).

In view of the foregoing, we determine that Petitioner has shown that Simske qualifies as prior art.

2. Overview of Simske

We provided an overview of Knockeart and Feldman above. *See supra* Part III.B.1. Before addressing the claims, we additionally provide an overview of Simske.

Simske describes navigation routing systems. Ex. 1006 ¶ 1. To illustrate one embodiment, Figure 1 of Simske is reproduced below.

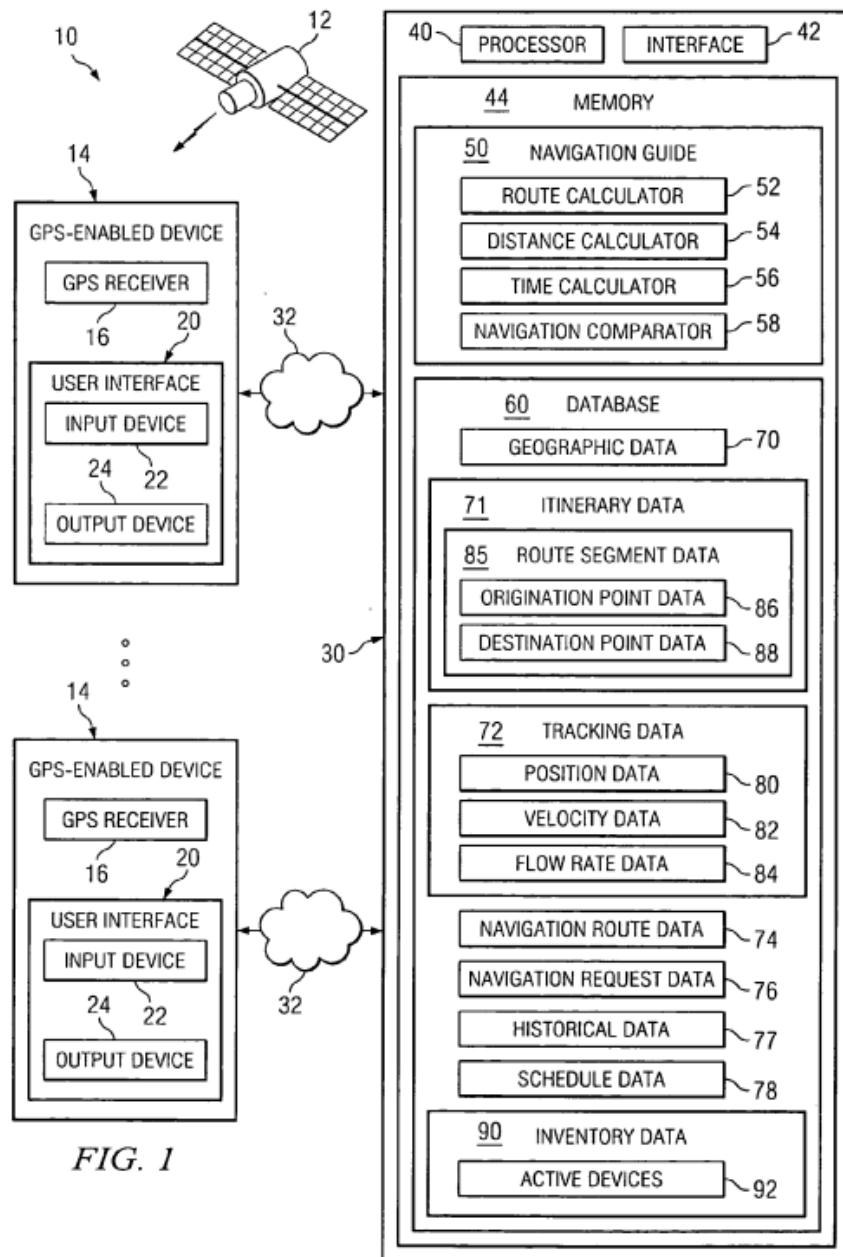


FIG. 1

Figure 1 of Simske shows navigation routing system 10, which allows a user to input or select destinations for a travel itinerary. *Id.* ¶ 12. System 10 includes satellite network 12 that transmits global positioning signals to GPS-enabled devices 14, such as portable telephones. *Id.* ¶ 13.

System 10 also includes navigation controller 30, which includes navigation guide 50 and database 60. Ex. 1006 ¶¶ 14–16, Fig. 1. According

to one embodiment, navigation controller 30 monitors and obtains GPS information for each GPS-enabled device 14 within a particular operating region, and stores the information as tracking data 72 in database 60. *Id.*

¶ 23. When navigation controller 30 receives a request from requesting device 14 regarding travel itinerary 71, navigation guide 50 uses tracking data 72 to determine position data 80 for requesting device 14. *Id.*

Information relating to the travel request from requesting device 14 is stored as navigation request data 76 in database 60. Ex. 1006 ¶ 23. Route calculator 52 uses navigation request data 76 to identify available navigation routes from origination point 86 to destination points 88. *Id.* ¶ 24. These available routes are stored as navigation route data 74 in database 60.

In monitoring each device 14, navigation controller 30 also obtains GPS information for other devices 14 in the operating region of the available navigation routes and stores the information as tracking data 72. Ex. 1006 ¶ 25. Navigation guide 50 uses tracking data 72 and geographic data 70 to determine flow rate data 84 for each available navigation route by identifying particular devices 14 traveling along the available navigation routes to determine their respective position data 80 and velocity data 82. *Id.* ¶¶ 25–26. Navigation guide 50 and route calculator 52 may work together to determine time-optimized navigation routes between origination point 86 and destination points 88. *Id.* ¶ 27.

3. Analysis of Dependent Claims 7 and 8

Claim 7 depends from claim 1 and recites “wherein the plurality of cell phones is selected from a candidate set of cell phones in an area proximate the route.” Claim 8 depends from claim 7 and recites “wherein

the selection of the plurality of cell phones from the candidate set of cell phones is based at least in part on a comparison of a location of each of the plurality of cell phones to a location of the route.”

Petitioner asserts again that “Feldman teaches that the mobile sensors for determining traffic conditions along route segments include ‘mobile wireless devices such as cellular telephones[.]’” Pet. 48 (citing Ex. 1005 ¶¶ 7–10, 35–38, 53, 61–62). In addition, Petitioner asserts that “Simske demonstrates that in the Knockeart-Feldman-Simske combination, the navigation system starts with a set of candidate mobile sensor devices within ‘a particular geographic region’ near the vehicle requesting navigation guidance and then selects a set of *‘particular devices 14 traveling along available navigation routes identified by route calculator’* from the candidate set of devices.” *Id.* (citing Ex. 1003 ¶¶ 145–146; Ex. 1006 ¶¶ 16, 23–26). Petitioner contends that “[t]hese identified routes are ‘routes associated with the desired travel destinations’ calculated ‘from a current location’ of the requesting vehicle and therefore the plurality of probe cell phones from the candidate set is based at least in part on a comparison of the location of the cell phones (along the identified routes) to a location of the route (the current location and one or more destinations for the route).” *Id.* at 48–49 (citing Ex. 1003 ¶ 146; 1006 ¶¶ 12, 15, 20). Petitioner adds that, “[s]imilar to the disclosures of Knockeart and Feldman, Simske confirms that information from the identified probe devices is used ‘to determine flow rate data 84 for each available navigation route.’” *Id.* at 49 (citing Ex. 1006 ¶ 26).

According to Petitioner, an ordinarily skilled artisan “would have been prompted to modify Knockeart-Feldman based on Simske to select cell

phones located in vehicles along the available routes to the destination(s) for measuring traffic flow of various route options from the set of available candidate devices to achieve known benefits and would have had a reasonable expectation of success in applying such a modification.” Pet. 49. As an example, Petitioner asserts that “using only traffic flow data from devices located on or along available routes to the destination (rather than traffic flow data from all available probe devices) would have reduced the amount of traffic data needed to be stored in volatile memory and processed to calculate a best route, thereby saving both memory and processing resources.” *Id.* Petitioner notes that such modification also would have “saved communication resources by reducing the amount of traffic flow data that would need to be transmitted between various devices and processors of the resulting system.” *Id.* Petitioner relies on the declaration testimony of Dr. Braasch. *Id.* at 49–50 (citing Ex. 1003 ¶¶ 142–144).

Patent Owner does not specifically dispute Petitioner’s contentions regarding these claims. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart, Feldman, and Simske teaches the limitations of claims 7 and 8. *See* Pet. 48–50; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). We also find that Petitioner’s proffered reasoning for combining Simske with Knockeart and Feldman, namely, to provide a way to save memory, processing, and communication resources, supports a legal conclusion of obviousness. *See Kahn*, 441 F.3d 977 at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

4. *Summary*

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 7 and 8 would have been obvious over Knockeart, Feldman, and Simske.

D. Alleged Obviousness over Knockeart, Feldman, and Whitsell

Petitioner asserts that claims 10, 11, and 30 of the '028 patent would have been obvious over Knockeart, Feldman, and Whitsell. Pet. 50–53. Patent Owner does not respond specifically to this challenge. *See* PO Resp. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 10, 11, and 30 would have been obvious over Knockeart, Feldman, and Whitsell.

1. Overview of Whitsell

We provided an overview of Knockeart and Feldman above. *See supra* Part III.B.1. Before addressing the claims, we additionally provide an overview of Whitsell.

Whitsell describes traffic information systems that provide route-specific travel information to a vehicle operator. Ex. 1007, 1:6–8. In one embodiment, traffic information system 10 includes traffic information database 20, traffic information server 30, wireless communications network 40, and mobile terminal 50. *Id.* at 4:47–61, Fig. 1. Server 30 acts as a gateway between database 20 and traffic information resources used to update real-time traffic information. *Id.* at 4:47–59. Network 40 links server 30 to one or more mobile terminals 50 carried in respective vehicles 14. *Id.* at 4:59–64, Fig. 1.

Mobile terminal 50 includes traffic information processor 60, which can determine its own location based on triangulating signals from geographically dispersed communication towers 12 associated with network 40. Ex. 1007, 7:39–43, Figs. 1–2. Mobile terminal 50 may alternatively include associated, external location information device 70 that provides location information to processor 60. *Id.* at 7:60–65. Or, mobile terminal 50 may include a GPS system, where location device 70 is incorporated in mobile terminal 50. *Id.* at 7:65–67.

By periodically monitoring and recording the location of mobile terminal 50 over time, system 10 can learn the most frequently traveled routes for a user associated with mobile terminal 50. Ex. 1007, 9:42–45. For example, processor 60 records location information with time information so that clear patterns of travel may emerge over time. *Id.* at 6:22–25. Thus, when a user is traveling in a vehicle with mobile terminal 50, processor 60 uses current location and time information to predict the most likely route of travel and destination. *Id.* at 6:25–30. Processor 60 uses this information to request specific route information from server 30 so that system 10 can provide the user with alternate route information when necessary. *Id.* at 14:8–13; *see also id.* at 3:64–4:1 (“This information may then be used in conjunction with real-time traffic information received from associated traffic information centers to provide motorists with traffic warnings and suggested alternate routes of travel.”).

2. Analysis of Dependent Claims 10 and 11

Claim 10 depends from claim 1 and recites “a triangulation system.” Claim 11 depends from claim 10, and recites “wherein the triangulation system includes cell phone tower triangulation.”

Petitioner asserts that “Whitsell demonstrates that in the Knockeart-Feldman-Whitsell combination, each probe cell phone can ‘determine its own location based on triangulating signals received from geographically dispersed communication towers 12 associated with the wireless communications network 40.’” Pet. 51 (citing Ex. 1003 ¶¶ 154–155; Ex. 1007, 7:39–43). Petitioner contends that an ordinarily skilled artisan “would have been prompted to modify Knockeart-Feldman based on Whitsell to include a cell phone tower triangulation system and would have had a reasonable expectation of success in doing so.” *Id.* (citing Ex. 1003 ¶¶ 148–151). As an example, Petitioner asserts that “cell phone triangulation, as taught by Whitsell, would have allowed the devices to determine their locations in dense urban environments or mountainous regions where buildings or natural features can block GPS signals, making GPS somewhat unreliable.” *Id.* (citing Ex. 1003 ¶ 149). Petitioner also asserts that “[c]ell tower triangulation would have also provided a backup location determination method in the event of failure of the GPS system.” *Id.* (citing Ex. 1003 ¶ 150). Petitioner adds that “[s]uch modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results.” *Id.* (citing Ex. 1003 ¶ 151).

Patent Owner does not specifically dispute Petitioner’s contentions regarding these claims. *See* PO Resp. Based on Petitioner’s argument and

evidence discussed above, we find that the proposed combination of Knockeart, Feldman, and Whitsell teaches the limitations of claims 10 and 11. *See* Pet. 50–51; *see also* *Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). We also find that Petitioner’s proffered reasoning for combining Whitsell with Knockeart and Feldman, namely, to provide an alternative way for a cell phone to determine its own location, supports a legal conclusion of obviousness. *See Kahn*, 441 F.3d 977 at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”); *Intel*, 61 F.4th at 1381 (explaining that the petitioner need only show that the proposed combination would have provided a “suitable option”).

3. *Analysis of Dependent Claim 30*

Claim 30 depends from claim 1 and recites “wherein the route is further based at least in part on a prior recording of an actual route traveled from a location proximate the current location to the destination by a user represented by a device at the current location.” Petitioner asserts that “Whitsell teaches that in the Knockeart-Feldman-Whitsell combination, ‘mobile devices are used to ***learn commonly traveled routes*** by periodically monitoring and ***recording*** location and, optionally, corresponding time-of-day information’ and ‘[t]hus, a mobile device associated with a given motorist or vehicle can be used to ***develop a record of traveled routes, possibly with associated travel times*** and destination information, for the that motorist.’” Pet. 52 (quoting Ex. 1007, 2:62–3:2; citing Ex. 1007, 3:39–48, 3:61–4:11, 6:19–30, 9:42–59, 10:9–39, 17:61–18:10). According to Petitioner, an ordinarily skilled artisan “would have been prompted to

modify Knockeart-Feldman based on Whitsell to record actual routes traveled from a location proximate the current location to the destination by a user represented by a device at the current location and would have had a reasonable expectation of success in doing so.” Pet. 52 (citing Ex. 1003 ¶¶ 152–153). As an example, Petitioner asserts that “applying Whitsell’s suggestion to record routes repeatedly traveled by users of the system from common departure and destination locations would have beneficially allowed the system to gather travel time information for such routes,” which “would have facilitated Knockeart’s route planning functionality by providing a source of travel time information for routes frequently traveled by the user.” *Id.* at 52–53 (citing Ex. 1003 ¶ 152). Petitioner further asserts that “[r]ecording such frequently traveled routes and using that information for future route determination (as suggested by Whitsell) would have improved the system by providing travel time information that includes the driver’s particular driving tendencies and preferences, therefore making the historic travel time information for such routes specific to the user.” *Id.* at 53. Petitioner adds that “[s]uch a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results.” *Id.* (citing Ex. 1003 ¶ 153).

Patent Owner does not specifically dispute Petitioner’s contentions regarding this claim. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart, Feldman, and Whitsell teaches the limitation of claim 30. *See* Pet. 51–53; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). We also find that Petitioner’s proffered reasoning for combining Whitsell with Knockeart and Feldman, namely, to

provide a customized user experience, supports a legal conclusion of obviousness. *See Kahn*, 441 F.3d 977 at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

4. Summary

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 10, 11, and 30 would have been obvious over Knockeart, Feldman, and Whitsell.

E. Alleged Obviousness over Knockeart, Feldman, and Boies

Petitioner asserts that claims 14 and 22–24 of the ’028 patent would have been obvious over Knockeart, Feldman, and Boies. Pet. 53–59. Patent Owner does not respond specifically to this challenge. *See* PO Resp. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 22–24 would have been obvious over Knockeart, Feldman, and Boies.

As discussed above, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 14 would have been obvious over Knockeart and Feldman. Accordingly, we do not address Petitioner’s challenge to this claim based on Knockeart, Feldman, and Boies.

1. Overview of Boies

We provided an overview of Knockeart and Feldman above. *See supra* Part III.B.1. Before addressing the claims, we additionally provide an overview of Boies.

Boies describes a system for determining optimum routing of vehicles based on historical information, user preferences, and current travel conditions. Ex. 1008, code (57). Boies explains that historical data refers to data that may affect the selection of optimum routes. *Id.* at 2:60–61. Examples of historical data include environmental condition information, weather condition information, traffic condition information, road condition information, and accident information. *Id.* at 2:62–66. The system uses historical data to identify characteristics of various legs of possible routes between a starting point and an ending point, so that the system can then estimate times of traversing a leg for various conditions. *Id.* at 3:60–67. For example, the system can estimate times of traversing a leg in normal conditions, rain, snow, flood conditions, night, day, weekday, weekend, and during construction. *Id.* at 3:67–4:3. After determining the various characteristics of the legs of possible routes, other considerations, such as shortest path, shortest travel time, and user preferences, may be used to select between possible routes. *Id.* at 9:28–55.

2. Analysis of Dependent Claims 22–24

Claim 22 depends from claim 16 and recites “wherein the event is a type of road condition.” Claim 23 depends from claim 22 and recites “wherein the type of road condition is roadwork.” Claim 24 also depends from claim 22 and recites “wherein the type of road condition is an accident.”

Petitioner contends “Boies demonstrates that, in the Knockeart-Feldman-Boies combination, the system collects historical traffic data for a variety of road conditions affecting travel time, including ‘accident

information’ and ‘construction.’” Pet. 58 (citing Ex. 1003 ¶ 163; Ex. 1008, 2:59–66, 2:20–25, 3:60–4:8, 9:28–39, 11:17–20, 12:15–18, 1:22–25, Fig. 7). Petitioner refers to its obviousness analysis for the challenge based on Knockeart and Feldman, and asserts that “in the [Knockeart-Feldman] combination, the system compares the event recorded at the time of the historical traffic condition and a currently occurring event to identify exceptional traffic conditions and a POSITA would have understood that this would have included the road condition events of roadwork and accidents in the Knockeart-Feldman-Boies combination.” *Id.* (citing Ex. 1003 ¶ 164; Ex. 1004 ¶¶ 331–337). As support, Petitioner cites a portion of Knockeart that teaches “the in-vehicle system of a probe vehicle tracks the location of the vehicle using GPS location estimates as it traverses links of the main roads network,” and “detects that a traffic exception has occurred if a travel speed along a link is substantially slower or faster than expected . . . for that link at that time of day.” *Id.* (citing Ex. 1004 ¶ 337); Ex. 1004 ¶ 337.

Petitioner also asserts that Feldman similarly teaches that “unexpected vehicular traffic developments are identified from the current vehicular traffic situation pictures by *comparing them to regular vehicular traffic behavior patterns*.” Pet. 59 (quoting Ex. 1005 ¶ 95). Petitioner further notes that Feldman teaches that “[a] ‘significant discrepancy from the pattern activates a respective correction of the NTT values’ used to calculate fastest routes in the Knockeart-Feldman combination.” *Id.* (quoting Ex. 1005 ¶ 95).

Petitioner contends that an ordinarily skilled artisan would have been prompted to “modify Knockeart-Feldman based on Boies to track historical

traffic condition information during road conditions including accidents and construction” in order to “improve the resulting system by taking these road conditions which ‘influence the travel time’ into consideration when determining optimum routes to improve route determination accuracy.”

Pet. 55–56. Petitioner asserts that “the Knockeart-Feldman combination is already configured to track historical traffic conditions (road segment travel time/speed) for . . . events, including time of day[,], ‘different days of the week, holidays, special events, weather conditions, *and so on.*’” *Id.* at 54 (quoting Ex. 1005 ¶ 92; citing Ex. 1004 ¶¶ 321–322, 330–337). According to Petitioner, “Feldman gives several example circumstances, including ‘holidays, special events, [and] weather conditions[,],’ while also expressly contemplating that other undisclosed conditions would also affect travel times on road segments,” and the accidents and construction described in Boies are “additional examples that Feldman suggested a POSITA would have known.” *Id.* at 55. Petitioner adds that “such a modification also would have been merely the application of a known technique to a known system ready for improvement to yield predictable results for which a POSITA would have had a reasonable expectation of success.” *Id.* at 56 (citing Ex. 1003 ¶ 160).

Patent Owner does not specifically dispute Petitioner’s contentions regarding these claims. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart, Feldman, and Boies teaches the limitations of claims 22–24. *See* Pet. 53–56, 58–59; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). We also find that Petitioner’s proffered reasoning for combining Boies with Knockeart and Feldman,

namely, to improve route determination accuracy, supports a legal conclusion of obviousness. *See Kahn*, 441 F.3d 977 at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

3. Summary

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 22–24 would have been obvious over Knockeart, Feldman, and Boies. We do not reach Petitioner’s challenge to claim 14 based on Knockeart, Feldman, and Boies because we have already determined that Petitioner has demonstrated by a preponderance of the evidence that claim 14 would have been obvious over Knockeart and Feldman.

F. Alleged Obviousness over Knockeart, Feldman, and Peterson

Petitioner asserts that claims 27 and 28 of the ’028 patent would have been obvious over Knockeart, Feldman, and Peterson. Pet. 61–63. Patent Owner does not respond specifically to this challenge. *See* PO Resp. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 27 and 28 would have been obvious over Knockeart, Feldman, and Peterson.

1. Overview of Peterson

We provided an overview of Knockeart and Feldman above. *See supra* Part III.B.1. Before addressing the claims, we additionally provide an overview of Peterson.

Peterson describes a system for determining and communicating shortest elapsed time route information to users. Ex. 1009, code (57). The system monitors the user's progress during travel to identify the user's current location and provide further directions and arrival time. *Id.* at 4:13–16. The system also tracks the change in elapsed travel time as a result of traffic buildup for different departure times. *Id.* at 6:55–57; *see also id.* at 12:12–32 (describing consideration of historical data to provide more accurate assessment of elapsed travel time and recommended route depending departure time).

2. Analysis of Dependent Claims 27 and 28

Claim 27 depends from claim 1 and recites “presenting an estimated time of arrival at the destination based at least in part on the traffic condition.” Petitioner asserts that “Peterson demonstrates that in the Knockeart-Feldman-Peterson system, the in-vehicle navigation unit provides ‘[t]he estimated elapsed time to destination’ via audio or visually via a ‘display terminal.’” Pet. 62–63 (citing Ex. 1009, 4:13–16, 11:25–32, 12:2–6, 12:34–49). Petitioner also refers to its obviousness analysis for the challenge based on Knockeart and Feldman, and asserts that “the route to the destination is determined [based] at least in part on the traffic condition.” *Id.* at 63 (citing Ex. 1003 ¶ 175; Ex. 1004 ¶¶ 30, 77, 170, 315–319, 330; Ex. 1009; 3:35–50, 4:35–61, 9:48–10:10).

Claim 28 depends from claim 27 and recites “receiving an intended leave time for the destination, and . . . presenting a user interface to adjust the intended leave time such that a user can understand an effect of leave time on estimated travel time.” Petitioner asserts that “Peterson

demonstrates that the Knockeart-Feldman-Peterson system determines ‘change[s] in elapsed travel time as a result of traffic build-up, for different departure times.’” Pet. 63 (citing Ex. 1009, 6:55–57). Petitioner further asserts that “[t]he resulting system provides a user interface that allows the driver to ‘indicate departure time if the user is not commencing travel immediately’ and uses the indicated departure time along with historical traffic data to ‘provide a more accurate assessment of elapsed travel time.’” *Id.* (citing Ex. 1009, 12:13–25). According to Petitioner, “[a] POSITA would have recognized that such a system would have beneficially allowed the driver to change the departure time and receive an updated ‘elapsed travel time’ for the new departure time and thus would have been able to understand an effect of leave time on estimated travel time.” *Id.* (citing Ex. 1003 ¶ 176).

Petitioner contends an ordinarily skilled artisan “would have [been] prompted . . . to apply the teachings of Peterson to the Knockeart-Feldman combination to present an estimated time of arrival for the suggested route to the driver and to provide a user interface that allows the driver to enter an intended departure time for the destination to hear/view the effect of departure time on travel time and would have had a reasonable expectation of success in doing so.” Pet. 61–62 (citing Ex. 1003 ¶¶ 171–174). As support, Petitioner asserts that “both modifications would have given the driver additional information that would improve the user experience and allow the driver to make informed decisions about which route to travel or whether to switch routes to avoid various traffic conditions.” *Id.* at 62 (citing Ex. 1003 ¶ 171). Petitioner also asserts that “presenting an estimated time of arrival to the driver would have allowed the driver to inform others

of when they will arrive at a destination so that they can plan accordingly.” *Id.* (citing Ex. 1003 ¶ 172). In addition, Petitioner asserts that “allowing the user to enter/change departure time and view the effects on travel time would have allowed a user to select a best or most convenient departure time.” *Id.* (citing Ex. 1003 ¶ 173). Lastly, Petitioner asserts that “[s]uch modifications . . . would have been merely the application of known techniques to a known system ready for improvement to yield predictable results.” *Id.* (citing Ex. 1003 ¶ 174).

Patent Owner does not specifically dispute Petitioner’s contentions regarding these claims. *See* PO Resp. Based on Petitioner’s argument and evidence discussed above, we find that the proposed combination of Knockeart, Feldman, and Peterson teaches the limitations of claims 27 and 28. *See* Pet. 61–63; *see also Dynamic Drinkware*, 800 F.3d at 1378 (“[T]he burden of persuasion is on the petitioner.”). We also find that Petitioner’s proffered reasoning for combining Peterson with Knockeart and Feldman, namely, to improve user experience, supports a legal conclusion of obviousness. *See Kahn*, 441 F.3d 977 at 988 (requiring “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

3. Summary

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 27 and 28 would have been obvious over Knockeart, Feldman, and Peterson.

G. Remaining Challenges

Petitioner asserts that claim 14 would have been obvious over Knockeart, Feldman, Boies, and Peterson. Pet. 59–61. Petitioner also asserts that claim 31 would have been obvious over Knockeart, Feldman, and Craine. *Id.* at 64–66.

As discussed above, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–7, 9, 10, 12–21, 25, 26, 29, and 31 would have been obvious over Knockeart and Feldman, that claims 7 and 8 would have been obvious over Knockeart, Feldman, and Simske, that claims 10, 11, and 30 would have been obvious over Knockeart, Feldman, and Whitsell, that claims 22–24 would have been obvious over Knockeart, Feldman, and Boies, and that claims 27 and 28 would have been obvious over Knockeart, Feldman, and Peterson. *See supra* Parts III.B–III.F. Because these five asserted challenges are dispositive as to all the challenged claims, namely, claims 1–31, we need not reach either the asserted challenge based on Knockeart, Feldman, Boies, and Peterson, or the asserted challenge based on Knockeart, Feldman, and Craine with respect to any of these claims. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (nonprecedential) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”). Accordingly, we do not reach Petitioner’s arguments that claim 14 would have been obvious over Knockeart, Feldman, Boies, and

Peterson, or that claim 31 would have been obvious over Knockeart, Feldman, and Craine.

IV. CONCLUSION

For the reasons given, Petitioner has demonstrated by a preponderance of the evidence that claims 1–31 of the '028 patent are unpatentable as follows.¹⁰

¹⁰ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–7, 9, 10, 12– 21, 25, 26, 29, 31	103(a)	Knockeart, Feldman	1–7, 9, 10, 12– 21, 25, 26, 29, 31	
7, 8	103(a)	Knockeart, Feldman, Simske	7, 8	
10, 11, 30	103(a)	Knockeart, Feldman, Whitsell	10, 11, 30	
14, ¹¹ 22–24	103(a)	Knockeart, Feldman, Boies	22–24	
14 ¹²	103(a)	Knockeart, Feldman, Boies, Peterson		
27, 28	103(a)	Knockeart, Feldman, Peterson	27, 28	
31 ¹³	103(a)	Knockeart, Feldman, Craine		
Overall Outcome			1–31	

¹¹ We do not reach whether claim 14 is unpatentable based on this challenge because we determine that claim 14 is unpatentable based on the challenge of obviousness over Knockeart and Feldman.

¹² We do not reach whether claim 14 is unpatentable based on this challenge because we determine that claim 14 is unpatentable based on the challenge of obviousness over Knockeart and Feldman.

¹³ We do not reach whether claim 31 is unpatentable based on this challenge because we determine that claim 31 is unpatentable based on the challenge of obviousness over Knockeart and Feldman.

V. ORDER

In consideration of the foregoing, it is hereby
ORDERED that claims 1–31 of the '028 patent have been shown to be
unpatentable; and

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

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