

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

MAKOR ISSUES & RIGHTS LTD.,
Patent Owner.

Case IPR2017-00818
Patent No. 6,615,130 B2

Before HYUN J. JUNG, BEVERLY M. BUNTING, and
ROBERT L. KINDER, *Administrative Patent Judges*.

BUNTING, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. BACKGROUND

Google, LLC, (“Petitioner”),¹ filed a Petition pursuant to 35 U.S.C. §§ 311–319 requesting *inter partes* review of claim 6 (the “challenged claim”) of U.S. Patent No. 6,615,130 B2 (“the ’130 patent”). Paper 2 (“Pet.”). Makor Issues & Rights Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 6. Upon consideration of the information presented in the Petition, we determined that there was a reasonable likelihood that Petitioner would prevail with at least one challenged claim, and instituted this trial, pursuant to 35 U.S.C. § 314(a), as to claim 6 of the ’130 patent. Paper 7 (“Decision on Institution” or “Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 14, “PO Resp.”), and Petitioner filed a Reply (Paper 19, “Reply”). We ordered (Paper 9) the parties to concurrently submit a claim construction brief addressing whether any limitation of the challenged claim is subject to § 112 ¶ 6. Papers 11, 12. Petitioner filed evidentiary objections to certain of Patent Owner’s Exhibits (Paper 15) but did not file a motion to exclude, which is required to preserve any evidentiary objection. *See* 37 C.F.R. § 42.64(c). A transcript of the oral hearing held on May 3, 2018 has been entered into the record as Paper 24 (“Tr.”).²

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we conclude that Petitioner has demonstrated, by

¹ Petitioner submitted an updated mandatory notice indicating that Google Inc., changed its name to Google LLC on September 30, 2017. Paper 10.

² Both parties requested to present arguments collectively for IPR2017-00815, IPR2017-00816, IPR2017-00817, and IPR2017-00818. Paper 21.

a preponderance of the evidence, that claim 6 of the '130 patent is unpatentable.

A. Real Party in Interest

Petitioner names itself and Waze Inc. as the real parties-in-interest.
Pet. 1.

B. Related Proceedings

The parties state that the '130 patent has been asserted in *Makor Issues & Rights Ltd. v. Google Inc.*, Case No. 1:16-cv-00100 (D. Del.). Pet. 2; Paper 6, 1. Petitioner filed additional petitions challenging the patentability of both the '130 patent and a related patent:

1. IPR2016-01535 (U.S. Patent No. 6,480,783)
2. IPR2016-01536 (U.S. Patent No. 6,615,130)
3. IPR2016-01537 (U.S. Patent No. 6,615,130)
3. IPR2017-00815 (U.S. Patent No. 6,480,783)
4. IPR2017-00816 (U.S. Patent No. 6,480,783)
5. IPR2017-00817 (U.S. Patent No. 6,480,783)

C. The '130 Patent (Ex. 1001)

The '130 patent is titled “Real Time Vehicle Guidance and Traffic Forecasting System.” Ex. 1001, (54). The '130 patent issued on September 2, 2003, from U.S. Patent Application No. 09/800,116 filed on March 6, 2001, and is a continuation-in-part of application No. 09/528,134, filed on March 17, 2000. *Id.* at (45), (21), (22), and (63).

The '130 patent relates generally to “communication with vehicles for the purpose of supplying traffic condition information and analyzing data relating to traffic conditions.” *Id.* at 1:14–16. The Specification describes a vehicle guidance system, which includes the Central Traffic Unit (“CTU”) and a fleet of vehicles or Mobile Guidance Units (“MGUs”), “i.e., traveling

vehicles with mobile phones connected to the communication system.” *Id.* at 3:27–29. Vehicle position is monitored using a wireless technology, *e.g.*, “GSM/GPS” while the vehicle is moving, and “by concurrent measuring of their current travel times along a broad range of roads.” *Id.* at 3:35–36. The vehicle driver may request route guidance reflecting the fastest route to a destination, as well as an updated route based on real time traffic information as illustrated in Figure 1, reproduced below. *Id.* at 3:37–49.

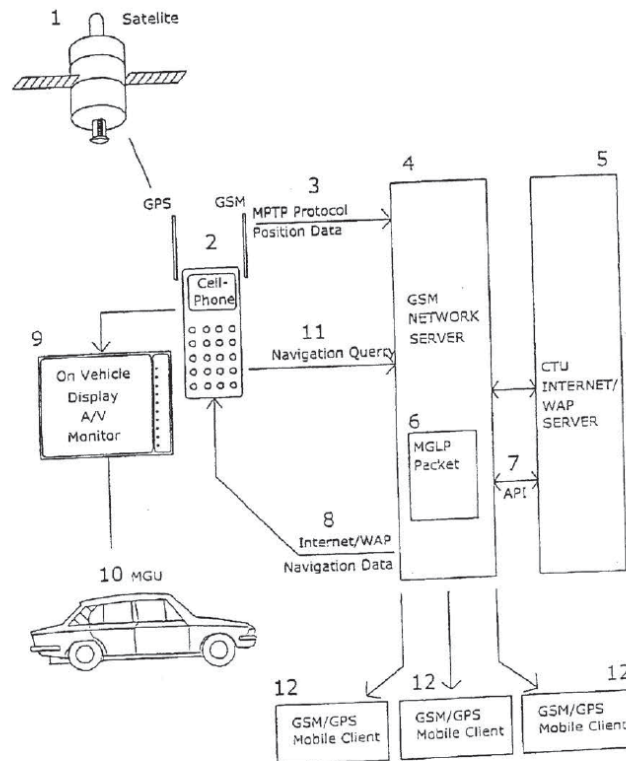


Figure 1 illustrates information exchange in the guidance system.

The CTU collects traffic congestion data using the location of MGUs mounted in a fleet of vehicles traveling throughout a broad range of road systems. *Id.* at 6:45–49. The location data is stored “on the GSM Network

Server in Multiple-GPS Locator Packet (MGLP).” *Id.* at 6:49–51. The CTU processes the location data, converts into travel time data, and stores the travel time data in the database for use as regular travel time data and current travel time data, and for use in calculating the fastest route. *Id.* at 6:54–57.

Updating of planned routes in the CTU is accomplished using “both statistical (empirical) travel times and current travel times.” *Id.* at 11:6–8. The ’130 patent discloses that current travel times are utilized in the vicinity of the present vehicle location and statistical travel times elsewhere. *Id.* at 11:20–23. The ’130 patent also discloses that geographic areas may be subdivided into subregions, referred to as zones. *Id.* at 11:24–31. As a vehicle enters a zone, the IMU database receives updated information pertaining to traffic load in the neighborhood. *Id.* at 11:33–37. Updating of relevant traffic jam information is accomplished based on local zones. *Id.* at 11:49–50.

The ’130 patent describes three techniques for determining travel time over a road segment based on factors categorized as (i) generally stable changes in road conditions, (ii) regular predictable changes in road conditions, and (iii) sudden unpredictable changes in road conditions. Ex. 1001, 11:52–12:11. The stable or theoretical travel times are based on a calculation of road or section length and maximum speed allowed on the section. *Id.* at 11:52–67. Statistical or empirical travel times are considered better approximations to reality than theoretical travel times because factors in the second category of regular predictable changes in road conditions are taken into account. *Id.* at 12:28–32. The statistical or empirical travel times are averaged, transformed into empirical speed coefficients, and stored in a central database. *Id.* at 12:35–42. Eventually, theoretical travel times are

replaced by statistical or empirical travel times. *Id.* To account for traffic conditions arising from sudden and unexpected circumstances, which result in excessive travel times, these slowdowns “are identified and stored in the database for a limited period of time,” and utilized to provide real time capabilities. *Id.* at 12:51–52.

Utilizing GSM/GPS or other wireless technologies, the CTU tracks the positions of MGUs and updates in real time the database of travel times for all roads. *Id.* at 12:57–60. The ’130 patent discloses that

[i]n response to a request from a driver for a route update from his present position to a desired location, it calculates the desired fastest route by utilizing both the regular travel times along segments of roads and predicted current travel times found by using information collected from tracking routines. Thereafter, the route is communicated to the driver.

Id. at 12:60–66.

The ’130 patent discloses that rapid unpredictable changes in road conditions may be accounted for in calculating real time optimal routes. *Id.* at 13:36–40. As described in the ’130 patent, the guidance system maintains special data structures associated with certain road types that make it possible to store information about changed traffic conditions and use the information for predicting future traffic conditions within a short time range by using travel times of vehicles that have recently left the corresponding section in the CTU database. *Id.* Additionally, the ’130 patent describes a method for route planning referred to as algorithm Z that “utilizes stratification of road networks into a hierarchy of layers, executes searches separately on each layer, and then combines the obtained results to produce a solution route.” *Id.* at 16:60–64. According to the ’130 patent,

use of algorithm Z for route planning “leads to considerable reduction in search times.” *Id.* at 16:63–64.

C. The Challenged Claim

Claim 6 is independent and is reproduced below:

6. A system for real time vehicle guidance and forecasting travel times within a predetermined travel region, the system comprising:
central traffic unit (CTU), mobile guidance units (MGU), and communication system (COS) the COS providing wireless communications for communicating with client vehicles;
the CTU operatively connected to the communications system, the CTU performing a computed route search based on current and statistical section data;
a receiving device for collecting GPS data at predetermined time intervals from sample vehicles moving within the predetermined travel region, and operatively connected to the CTU;
map database containing digital road maps of a predefined geographical region together with predetermined relevant data on road factors;
said CTU operatively connected to the communications system capable of processing in real time said GPS data and transforming them into appropriately structured data;
a database suitable for storing and updating statistical data on traffic parameters on individual roads as sensed by the sample vehicles;
statistical application for collecting said structured data, computing individual statistical travel time estimates (regular times) for predetermined roads, and storing the results, the statistical application periodically updating the statistical data using statistical criteria for determining volumes of data necessary for obtaining valid and reliable estimates; and
computational tools for automatic identification of real time traffic jam conditions at various locations of the individual roads by utilizing the sample vehicles for measuring time delays;

the system utilizing wireless mobile telephone telecommunications for the purpose of providing reliable connection among the CTU, telecommunications operator stations, and MGUs wherein:

said COS is capable of transmitting location data from MGUs to CTU via telecommunications service operator stations when relevant handset units are located in the client vehicles;

said COS is capable of transmitting client requests from MGUs to CTU for a fastest route from a given location to a desired destination;

said COS is capable of transmitting appropriately coded information on calculated routes from CTU to MGUs for displaying it on the PC unit screen and communicating it by voice on the car navigational terminal.

Id. at 21:54–22:35.

D. Evidence Relied Upon

Petitioner relies on the following references:

References	Patents	Date ³	Exhibits
Angwin	6,246,688 B1	Jan. 29, 1999	1005
Xu	6,401,027 B1	June 4, 2002	1006
Durocher ⁴	WO 98/45823	Oct. 15, 1998	1007
TravTek	TravTek System Architecture Evaluation, Publ. No. FHWA-RD-94-141, U.S. Dept. of Transportation	July, 1995	1004

³ Petitioner relies on the filing date of Angwin and Xu, asserting that both qualify as prior art under 35 U.S.C. § 102(e). Pet. 3–4.

⁴ Petitioner entered the English translation of Durocher into the record as Exhibit 1008, with citations to Ex. 1007.

Additionally, Petitioner also relies on the declaration and rebuttal declaration of Michael S. Braasch, Ph.D. (Exs. 1003, 1024) and Patent Owner relies on the declaration of Alex A. Kurzhanskiy, Ph. D (Ex. 2003). The parties rely on other exhibits as discussed below.

E. Instituted Grounds of Unpatentability

We instituted the instant trial based on the following grounds of unpatentability (Dec. 33):

References	Basis	Claim Challenged
TravTek and Angwin	§ 103(a) ⁵	6
Xu and Durocher	§ 103(a)	6

II. ANALYSIS

We analyze the instituted grounds of unpatentability in accordance with the principles stated below.

A. Legal Principles

In *inter partes* reviews, petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail in this proceeding, Petitioner must support its challenge by a preponderance of the evidence.

⁵ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (Sept. 16, 2011), took effect on March 16, 2013. Because the application from which the ’130 patent issued was filed before that date, our citations to Title 35 are to its pre-AIA version.

35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Accordingly, all of our findings and conclusions are based on a preponderance of the evidence.

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). Because Patent Owner does not provide evidence regarding secondary considerations, our determination is based on the first three factors. *See generally* PO Resp.

As the Supreme Court explained in *KSR*, an invention “composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” 550 U.S. at 418. Rather, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* In other words, “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.* (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Accordingly, the U.S. Court of Appeals for the Federal Circuit has made clear that a petitioner in an *inter partes* review proceeding cannot “satisfy its burden of proving obviousness” by

“employ[ing] mere conclusory statements” and “must instead articulate specific reasoning, based on evidence of record” to support an obviousness determination. *In re Magnum Oil Tools Int’l*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016).

B. Level of Ordinary Skill in the Art

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

would have had a combination of experience and education in electrical engineering and navigation systems. This typically would consist of a minimum of a bachelor degree in electrical engineering or a related engineering field plus 2-5 years of work and/or research experience in the field of electrical engineering and its subfield of navigation systems.

Ex. 1003 ¶ 19. Patent Owner does not opine on the level of ordinary skill in the art. See PO Resp.

Based on the entire record, we adopt generally Petitioner’s assessment of a person of ordinary skill in the art. Namely, we find that the person of ordinary skill in the art would have (1) a bachelor of science in electrical engineering or a related engineering field, and (2) 2–5 years of experience in the field of navigation systems.

C. Claim Construction

In an *inter partes* review, the Board interprets claims in an unexpired patent according to the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142–46 (2016). Under that standard, and absent any special definitions, we generally give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech. Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definitions for claim terms or phrases must be set forth with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Petitioner proposes a construction for the claim term “GPS data” in its Petition. Pet. 7. In turn, Patent Owner proposes a construction for the claim term “traffic jam.” PO Resp. 4–9. We determined in our Decision on Institution that express construction of the terms “GPS data” and “traffic jam” was necessary. Dec. 9–13. Now, having considered the entire record, we determine that express construction of the terms “GPS data” and “traffic jam” are necessary for purposes of this Final Written Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”).

Additionally, we note Petitioner asserts that some claim elements “recite purely functional software/data untethered from any tangible

medium” and may be subject to construction under 35 U.S.C. § 112 ¶ 6, but does not otherwise identify these claim terms or proffer a construction. Pet. 7–8. Based on this assertion, we requested that the parties submit additional claim construction briefing as to whether certain claim terms such as “receiving device for,” “computational tools for automatic identification of real time traffic jam conditions,” “statistical application for collecting structured GPS data,” and “statistical application for collecting said structured data” could potentially fall within the realm of § 112 ¶ 6. Paper 9, 3–4. Specifically, whether “receiving device for,” “computational tools for,” and “statistical application for” could potentially be “nonce” words—serving the same purpose of “means.” *Id.* at 4–6. The parties each submitted briefing (Papers 11, 12). Petitioner argues that “[n]one of the claim language recites a ‘means for’ (or ‘step for’) performing a recited function, so the law requires that such limitations are presumed to not be in means-plus-function format.” Paper 12, 1 (citing *Inventio AG v. ThyssenKrupp Elevator Ams. Corp.*, 649 F.3d 1350, 1356 (Fed. Cir. 2011)). Patent Owner argues that none of these terms “contains the word ‘means,’ and thus none of the terms carry a presumption that 35 U.S.C. § 112 ¶ 6 may apply.” Paper 11, 2. Having reviewed the parties’ additional claim construction in light of the record developed during trial, we agree that construction of these terms is not necessary to resolve the present controversy.

1. “GPS data”

Claim 6 requires a “receiving device for collecting GPS data at predetermined time intervals from sample vehicles moving within a predetermined travel region.” Ex. 1001, 21:64–67.

Petitioner contends that “GPS data” means “data that was determined using signals received from GPS satellites or that is related to use of such signals.” Pet. 7 (citing Ex. 1003 ¶ 36). Petitioner relies on the Specification for support, which provides examples of GPS data as: “the present position, the position time, and their IDs.” *Id.* (quoting Ex. 1001, 7:3). In view of the specification, Petitioner concludes that “information sent from the vehicles to a centralized computer system that are derived from GPS satellite signals qualify as GPS data.” *Id.* (citing Ex. 1003 ¶ 36).

In our Decision on Institution, we determined that the additional language (“or that is related to use of such signals”) proposed by Petitioner is not reasonable. Dec. 10–11. Namely, because Petitioner had not provided “sufficient arguments or credible evidence demonstrating that the term ‘GPS data’ ‘is intended to have a broad meaning encompassing various types of data beyond pure/raw GPS coordinates.’” *Id.* (citing Pet. 7). Thus, we determined that the additional clause Petitioner proposes “extends the meaning of GPS data to capture data or information in a manner unrelated to the ’130 patent.” *Id.* at 11. Neither party has challenged our initial determination. Based on the final trial record, and for the reasons set forth in the Decision on Institution, we construe “GPS data” to mean *data that was determined using signals received from GPS satellites*. *Id.*

2. “Traffic Jam”

Claim 6 also requires “computational tools for automatic identification of real time traffic jam conditions at various locations of the individual roads by utilizing the sample vehicles for measuring time delays.” Ex. 1001, 22:18–21. In our Decision on Institution, we preliminarily

construed “traffic jam,” “as a slowdown of traffic on a segment as compared to individual statistical travel time estimates (regular times).” Dec. 13.

Patent Owner partially disagrees with this construction, arguing that “traffic jam” means

an abnormal slowdown or bottleneck – one that is worse than a statistically computed, regular travel time on a section of a route. A typical or routine congestion, *e.g.*, the typical daily slowdown during rush hour, does not qualify as a ‘traffic jam’ within the ambit of the ’130 Patent claims.

PO Resp. 4. Patent Owner asserts that its proposed construction distinguishes “traffic jam” and “routine congestion” based on the language of claim 6 as well as the Specification. *Id.* at 4–9. Specifically, Patent Owner argues that “[a] person of ordinary skill in the art would understand that the ‘statistical data on traffic parameters’ refers to regularly-occurring congestion.” *Id.* at 5. Patent Owner supports its position by first noting that “claim 6 goes on to further recite the automatic identification of ‘traffic jams,’ by using ‘the sample vehicles for measuring time delays,’ which a person of ordinary skill in the art would understand is distinct from regular, statistical, congestion.” *Id.* at 5 (citing Ex. 2003 ¶ 7).

Patent Owner also directs us to columns 13–14 of the ’130 patent that distinguish between normal congestion and abnormal traffic jams in its use of “Current Travel Times” and “Regular Travel Times” – the former being used when an unpredictable change in traffic conditions is detected, but the latter being typically used for route guidance. *Id.* (citing Ex. 2003 ¶¶ 8–9). Specifically, that

Current Travel Times are used when (1) there is a sufficient number of vehicles reporting a bottleneck in a sufficiently recent time period (’130 Patent at 14:54-59) and, (2) when “each of [the vehicles] has spent considerably more time

on [a section] S than the corresponding [Regular Travel Time], then the situation can be interpreted as a bottleneck on the section S.” (’130 Patent at 14:59-61.)

Id. Patent Owner notes that in the absence of a bottleneck slowing down traffic more than Regular Traffic Times, the Regular Travel Times will be used for route guidance. *Id.* at 6. Patent Owner argues that “[o]nly during atypical slowdowns are ‘current travel times, which reflect sudden and unpredictable changes in traffic conditions,’ used instead of Regular Travel Times” (*id.* (citing Ex. 1001, 3:17–23)), and that the claimed traffic jam determination “is a determination of an *abnormal* slowdown” (*id.* (citing Ex. 2003 ¶¶ 8–9)).

Patent Owner cites the Abstract of the ’130 patent for support, which describes detecting a bottleneck situation and estimating a current travel time for the corresponding section of road. *Id.* at 6 (citing Ex. 1001, Abstract)). In particular, that the bottleneck situations are when the “times those vehicles have spent on the section differ considerably from a *regular travel time* stored in the database.” *Id.* (citing Ex. 1001, Abstract).

Additionally, Patent Owner contends that the ’130 patent categorizes the data used for route guidance as “(1) temporary changes in road conditions, known in advance, such as construction, (2) ‘Regular predictable changes like everyday slowdowns in rush hours,’ and (3) ‘Sudden unpredictable changes such traffic accidents.’” *Id.* (citing Ex. 1001, 3:14–25; 12:3–11). Patent Owner understand the ’130 patent as “contrast[ing] regular, predictable changes, such as rush hour, with sudden, unpredictable changes, such as accidents.” *Id.* at 6–7 (citing Ex. 2003 ¶ 10). Based on this understanding, Patent Owner defines “traffic jam” as an “unpredictable (irregular or abnormal) slowdown of all traffic on a segment during a time

frame, relative to the regular, statistically established travel time for that segment during that time frame.” *Id.* at 7 (citing Ex. 2003 ¶¶ 10–11).

Petitioner disputes Patent Owner’s position in its Reply. *See* Reply 1–11. Petitioner argues the plain and ordinary meaning of “traffic jam” should be adopted, and not Patent Owner’s narrow construction. *Id.* at 1. Petitioner first contends that Patent Owner’s proposed construction is improper “because it is narrower than Makor’s assertions during litigation.” *Id.* at 2–3 (citations omitted). Petitioner next argues that the Specification does not provide a lexicographer definition for “traffic jam,” nor does it “articulate[] the outermost boundaries to its scope.” *Id.* at 3–4 (citations omitted). Petitioner contends that the Specification’s discussion of “Current Travel Times” and “bottlenecks” cannot be used to import limitations into the claim term “traffic jam” because the claim language does not refer to the former two terms. *Id.* at 4. Also, Petitioner argues that, the ’130 patent does not require that the scope of “traffic jam” and “bottleneck” be identical. *Id.* Thus, according to Petitioner,

[e]ven if it was legally proper to construe ‘traffic jam’ and ‘bottleneck’ as coextensive (which it is not), the narrow construction could still only be proper if the outermost limits of ‘bottleneck’ were narrowly limited in a manner it is sometimes used in the preferred embodiment [] rather than by its ordinary meaning. *Id.* at 4–5. Even still, Petitioner notes that the term “bottleneck” would also have to be construed according to its ordinary meaning, which Petitioner maintains is far broader than Patent Owner’s proposed narrow constructions. *Id.* at 5 (citations omitted).

According to Petitioner, the language of claim 6 does not impart a special meaning to “traffic jam” because the claim “simply recites

‘computing individual statistical travel time estimates,’ a computation which is necessary regardless which construction is applied.” *Id.* at 6 (citing Ex. 1024 ¶¶ 10–11). Petitioner notes that “the claimed ‘automatic identification of real time traffic conditions’ makes no reference to using the ‘individual statistical travel time estimates.’” *Id.* (quoting Ex. 1001, 14:49–67). Thus, according to Petitioner, “the claim is necessarily broader than solely contemplating a comparison of real time traffic to statistical travel times to identify traffic jams.” *Id.*

Finally, Petitioner relies on dictionary definitions of “traffic jam” in arguing the ordinary meaning encompasses any significant slowdown, e.g., “congestion, and resultant stoppage, of traffic, e.g. at a busy junction.” Reply 7 (quoting Ex. 1031, 4). Petitioner points out that Patent Owner’s expert similarly agreed that, in ordinary contexts, “traffic jam” would encompass “historical congestion or realtime congestion that also had a historical analog.” *Id.* at 8 (citing Ex. 1028, 14:17–15:14; Ex. 1030, 19:16–20:17).

In construing the claims, our analysis begins with, and remains centered on, the language of the claims themselves. *See Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001). “[C]laims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their ‘broadest reasonable interpretation.’” *In re Marosi*, 710 F.2d 799, 802 (Fed. Cir. 1983) (quoting *In re Okuzawa*, 537 F.2d 545, 548 (CCPA 1976)). “[T]he broadest *reasonable* interpretation must be reasonable in light of the claims and specification.” *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 747, 755 (Fed. Cir. 2016). The broadest reasonable

interpretation does not mean the broadest possible interpretation, our construction “cannot be divorced from the specification and the record evidence.” *In re NTP, Inc.*, 654 F.3d 1279, 1288 (Fed. Cir. 2011).

The disagreement between the parties concerning the scope of “traffic jam” centers on whether the term should be construed in a broader lay sense as proposed by Petitioner, or whether the term should be construed in accordance with the more specific descriptions found in the Specification, as proposed by Patent Owner. We decline, however, to adopt Patent Owner’s proposed claim construction in whole because it adds unnecessary ambiguity. For example, terms such as “abnormal” do not add clarity to the definition. PO Resp. 9. If a feature is not necessary to give meaning to what the inventor means by a claim term, it would be “extraneous” and should not be read into the claim. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). Our perception of the Specification is that the term “traffic jam” is not used in a layman’s sense, but instead as a description of a situation arising from a data comparison meeting certain criteria, as discussed below.

We first examine the claim as a whole with a focus on the disputed language. Here, the claim language itself requires “computational tools for automatic identification of *real time* traffic jam conditions at various locations of the individual roads *by utilizing the sample vehicles for measuring time delays*.” Ex. 1001, 22:18–21 (emphases added). By qualifying the claimed traffic jam as being determined in real time, and by using “sample vehicles for measuring time delays,” a person of ordinary skill in the art would understand that traffic jams are more immediate, e.g., real time, than the regular, statistical, congestion described in the ’130

patent. PO Resp. 5 (citing Ex. 2003 ¶ 7) (“[C]laim 6 goes on to further recite the automatic identification of ‘traffic jams,’ by using ‘the sample vehicles for measuring time delays,’ which a person of ordinary skill in the art would understand is distinct from regular, statistical, congestion.”). The claim also requires “collecting structured GPS data” and “computing individual statistical travel time estimates (regular times) for predetermined roads.” Ex. 1001, 22:11–13. Reading the claim as a whole suggests that a “traffic jam” must be a sudden unpredictable change of traffic on a segment as compared to these regular times. *See* Ex. 2003 ¶ 7.

The Specification confirms our interpretation. For example, the Specification describes a “real time vehicle guidance system” “capable of providing [an] optimal route from the present position of a vehicle to a desired target destination when traffic jams may be present.” *Id.* at 2:54–57. The Specification also describes “a true real time system” that collects and stores three types of data, including: (1) temporary changes in road conditions known in advance, (2) regular predictable changes such as everyday slowdowns in rush hour, and (3) “[s]udden unpredictable changes such [as] traffic accidents, traffic congestion due to sudden and drastic changes in traffic arrangements.” *Id.* at 3:13–22. The Specification similarly separates “Travel Times Data” into three categories, including a third category of “[s]udden unpredictable changes such [as] traffic accidents, traffic congestion due to sudden and drastic changes in weather conditions, etc.” *Id.* at 12:9–11. The third category of data is meant to encompass traffic jam situations because the Specification further describes, “[a]s to factors in the third category, it appears that even empirical travel times may be unsuitable for describing *traffic conditions arising from sudden and*

unexpected circumstances which might drastically influence traffic conditions.” Id. at 12:43–47 (emphasis added). As explained in the Specification, “[t]his last feature provides the present invention with truly real time capabilities.” *Id. at 12:54–55.* Based on these descriptions, the term “traffic jam” is meant to convey real time traffic conditions arising from sudden and unexpected circumstances that might drastically influence traffic conditions.

Moreover, the Specification describes using GPS data from vehicles to obtain “Regular Empirical Travel Times,” which are described as times correlated to regular predictable changes for a particular segment, such as everyday slowdowns in rush hour. *Id. at 14:15–33.* Data from regular travel times may be stored in a central database and attached to sections of roads according to a number of categories, such as type of road or day of the week. *Id.* We therefore understand the regular travel time described in the Specification as corresponding to the claim limitation of “collecting structured GPS data, computing individual statistical travel time estimates (regular times) for predetermined roads, and storing the results.” *Id. at 22:12–14.* This language specifically ties the regular time value to a “predetermined road,” and additional claim limitations require storing the results of the regular times according to subdivisions based on time factors. As discussed below, regular times are used to determine whether a traffic jam situation exists.

The Specification further describes detecting a “bottleneck situation,” which we interpret as being used synonymously with “traffic jam.” *Id. at 14:52–54.* For example, the Abstract describes updating travel times based on detecting a bottleneck situation. *Id. at Abst.* We understand the

Specification as using the terms “traffic jam” and “bottleneck situation” in the same context to convey instances where sample vehicles have spent considerably more time than “a regular travel time stored in the database.” *Id.* at Abst., 14:59–60 (“considerably more time on S than the corresponding [Regular Travel Times] RTT”). In one embodiment for detecting a bottleneck, or traffic jam, a “Current Travel Time” (CTT) is used and compared to the “Regular Travel Time” (RTT) when a time interval is “short enough to consider the detected bottleneck to be current” and when each vehicle “has spent considerably more time” on a segment “than the corresponding RTT.” *Id.* at 14:54–67. Such a situation is “interpreted as a bottleneck” or traffic jam. *Id.*

At the same time, the traffic jam discussion in the Background of the Invention is not particularly probative of how that term should be construed in the context of the ’130 patent. The background explains how another patent (U.S. Patent No. 5,699,056) (“the ’056 patent”) defines a situation as a “jam.” *See* Ex. 1001, 1:41–43 (“A jam is presumed if an average speed of a block of vehicles is less than a predetermined value.”). The context makes clear that the ’130 patent distinguishes how it determines a traffic jam compared to the ’056 patent. Thus, we do not view the discussion of “a jam” in the Background of the Invention as particularly helpful in determining the scope of the claim term “traffic jam” because that description also dissuades using average speeds because it is “wildly discontinuous and measuring it on time grid of a minute may prove highly inaccurate.” *Id.* at 1:61–64.

Thus, the Specification consistently equates a traffic jam to situations where sudden and unpredictable changes in traffic conditions result in

considerably more time spent on a segment, as compared to regular times. *See id.* at Abst., 3:19–21, 5:22–24; 12:9–11; 13:35–39. Based on the Specification discussed above, and reading claim 6 as a whole, we determine that “traffic jam identification” is based on measured time delays of sample vehicles, and requires a baseline “regular time” for comparison to determine whether or not a traffic jam condition exists. Based on the final trial record, we construe “traffic jam,” broadly, but reasonably, as *a sudden unpredictable change of traffic in a segment as compared to regular times, i.e., individual statistical travel time estimates.*

D. Obviousness Based on TravTek and Angwin

Petitioner challenges the patentability of claim 6 of the ’130 patent under 35 U.S.C. § 103 as obvious based on TravTek and Angwin. Pet. 4–45. In support thereof, Petitioner identifies the disclosures in the cited references alleged to describe the subject matter in the challenged claim and provides an articulated reasoning with rational underpinning to support its conclusion of obviousness. *Id.* Patent Owner disagrees, arguing that the proposed combination of TravTek and Angwin is unavailing for the reasons discussed *infra*. PO Resp. 14–16.

We have reviewed the parties’ contentions and supporting evidence of record in this trial. For the reasons given below, we conclude that Petitioner has not met its burden and demonstrated by a preponderance of the evidence that claim 6 would have been obvious based on TravTek and Angwin. After a brief summary of these references, we address the parties’ contentions in turn.

1. TravTek (Ex. 1004)

TravTek has a date stamp indicating publication in 1995. Pet. 4. Petitioner also provides the Declaration of Lisa Rowlison de Ortiz (Ex. 1022), the Head of Catalog and Metadata Services at University of California-Berkeley Library, as evidence that TravTek was publicly available on January 2, 1997, or earlier. Pet. 4 (citing Ex. 1022 ¶¶ 4–10).

TravTek describes a system for providing motorists in Orlando, Florida with real-time traffic information and route selection. Ex. 1004, 8, 20, 31.⁶ The “Foreword” of TravTek describes “an advanced driver information and traffic management system that provided a combination of traveler information services and route navigation and guidance support to the driver.” *Id.* at 4. “One of the primary objectives of the TravTek system was to provide drivers with routes that minimized their individual travel times to their destinations.” *Id.* at 38. The process incorporates link (road section) travel times broadcast to a Traffic Management Center (TMC) to achieve this objective. *Id.* One of three sources of current link travel time information was vehicle probes. *Id.* TravTek states that “[l]ink travel time data were received automatically from the probe vehicles, freeway management system, and arterial control management system.” *Id.* at 5 (Form DOT F 1700.7). TravTek explains that “the time required for the TravTek vehicle to travel a link was determined by monitoring the time it crossed the beginning and end of the link.” *Id.* at 88.

“Using information provided by the TMC, software in the vehicle continuously determined the optimum route that minimized the travel time

⁶ For articles cited by Petitioner, we rely on Petitioner’s inserted page numbering set forth at the bottom of each page. See 37 C.F.R. § 42.63(d)(2).

to a destination.” *Id.* at 38. TravTek further discloses that “the double ended search process continued to search for a minimum travel time path . . . until a connected path was formed between the origin and the destination.” *Id.* at 79. In a similar manner, TravTek describes rerouting drivers around areas of congestion and incidents. *Id.* Vehicles in the network would receive once a minute updates of the travel times on links in the TravTek network such that “the vehicle continuously searched for routes that provided a significant time savings to the driver.” *Id.*

2. Angwin (Ex. 1005)

Angwin teaches the use of a cellular phone as a network gateway, “to enable devices on a network in a vehicle to communicate with an external network.” Ex. 1005, Abstr.

3. Discussion

To support its argument that the limitations of claim 6 are found in the proposed combination of TravTek and Angwin, Petitioner identifies the relevant passages in the cited references that purportedly meet the corresponding claim limitation, and explains the significance of each passage with respect to the corresponding claim limitation. Pet. 8–45. For example, Petitioner argues generally that TravTek teaches

a system for providing “[r]oute guidance reflect[ing] current traffic conditions” that uses a “historical data base of link travel times that was updated by dynamic link travel times.” GOOGLE1004, 20; 22; 36. TravTek’s system includes a Traffic Control System (TCS) in communication with probe vehicles that report “travel time[s] over the previous link[s] [they] had traversed” which was used by the system to compute travel times for road links. *Id.*, 29. TravTek’s system relied on “dynamic link travel time and congestion information” whenever available while using “historical travel times” identified by time of day

when sufficient real time traffic data was not available for portions of a route. *Id.*, 60-61.

Pet. 9.

Petitioner also relies on Angwin for “providing additional details on traditional functions for ‘using a cellular phone as a network gateway in an automotive network’ including using a mobile phone handset as ‘a gateway for devices’ in an automobile, including ‘vehicle navigation processors.’” *Id.* (citing Ex. 1003 ¶¶ 38–98; Ex. 1005, Abstract; 5:47–55).

As to the proposed combination of TravTek and Angwin, Petitioner provides an articulated reasoning with rational underpinning to support its proposed combination of references. Pet. 33–37, 41, 45. In particular, Petitioner argues that one of skill in the art would have been motivated “to implement the well-known practice of using a standalone cellular telephone to provide wireless network connectivity for vehicle mounted computing devices (as suggested by Angwin) in the traffic forecasting and navigation system disclosed by TravTek.” *Id.* at 33 (citing Ex. 1003 ¶¶ 79–86). Petitioner contends that incorporation of Angwin’s cellphone handset as a network gateway into TravTek’s navigation system (1) “would ‘minimize retail and manufacturing costs’” (*id.* at 33–34 (citing Ex. 1005, 2:51–61, 2:9–14, 1:27–28, 1:49–52; Ex. 1003 ¶ 81)); (2) reduce wireless subscription costs by eliminating multiple subscriptions (*id.* at 34–35 (citing Ex. 1005, 2:12–16, 2:32–50, 2:66–3:2; Ex. 1003 ¶ 82)); (3) allow dual use of the cellular phone for voice and data communications as well as providing data communications for in-vehicle computing devices (*id.* at 35 (citing Ex. 1005, 1:14–18; Ex. 1003 ¶ 83)); and (4) “allow for compatibility with a greater number of vehicles” (*id.* at 36 (citing Ex. 1003 ¶ 84)). Petitioner also

contends that Angwin’s “standalone” cellular phone would be a cost savings, enabling the modified system of TravTek which already discloses the use of a cellular telephone to be used “in a greater number of geographic areas and provide service for more users” (*id.* at 36 (citing Ex. 1005, 2:51–3:2, 32–45, 1:12–16; Ex. 1003 ¶ 85)); and the proposed modification “would be merely the application of a known technique (e.g., using a cellular phone as a network gateway between an in-vehicle device and a remote server system) to a known system (e.g., TravTek’s navigation system) ready for improvement to yield predictable results” (*id.* at 37 (citing Ex. 1003 ¶ 86; Ex. 1005, 1:6–10; 1:27–28)). Petitioner further argues that “a POSITA would have been prompted to apply Angwin’s suggestion for transmitting data (including TravTek’s vehicle probe reports) from in-vehicle computing devices to a central server (such as TravTek’s TMC) for the reasons articulated above in the analysis of element [6.10], *supra.*” Pet. 41 (citing Ex. 1003 ¶¶ 81–86). Petitioner further argues that “the resulting combination of TravTek and Angwin would likewise provide this functionality while implementing the suggested prior art practice of using cellphone/handset units as network gateways for the in-vehicle navigation systems.” *Id.* at 45 (citing Ex. 1003 ¶¶ 79–86, 95–97).

In its Response, Patent Owner does not dispute most of Petitioner’s contentions regarding how the identified disclosure in TravTek and Angwin purportedly meet the corresponding claim elements of claim 6. We previously instructed Patent Owner that “any arguments for patentability not raised in the [Patent Owner Response] will be deemed waived.” Paper 8, 7; *see also* 37 C.F.R. § 42.23(a) (“Any material fact not specifically denied may be considered admitted.”).

With the complete trial record before us, we note that we have reviewed arguments and evidence advanced by Petitioner to support its unpatentability contentions where Patent Owner chose not to address certain limitations in its Patent Owner Response. In this regard, the record now contains persuasive arguments and evidence presented by Petitioner, many of which are unrebutted, regarding the manner in which the asserted prior art teaches corresponding limitations of the claims against which that prior art is asserted. Now, in view of the entire record, we adopt as our own Petitioner's analysis of the undisputed claim limitations as recited in claim 6. *See In re Nuvasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016) (“Although the Board did not make findings as to whether any of the other claim limitations . . . are disclosed in the prior art, it did not have to: *NuVasive* did not present arguments about those limitations to the Board.”). The limitation Patent Owner expressly contests in the Patent Owner Response is addressed below.

“Traffic Jam Limitation”

Central to the parties' dispute is whether TravTek discloses “computational tools for automatic identification of real time traffic jam conditions at various locations of the individual roads by utilizing the sample vehicles for measuring time delays.” Ex. 1001, 22:18–21 (“traffic jam limitation”). Petitioner argues that this limitation is satisfied by the disclosure in TravTek regarding “dynamic link travel time and congestion information.” Pet. 29 (citing Ex. 1004, 60). Specifically,

TravTek's current travel time data base “was updated on a minute to minute basis to reflect the status of current travel times.” [Ex. 1004], 61. Furthermore “[w]hen incidents or congestion affected the selected routings, drivers were informed and given the opportunity to accept new routings . . . which reflected the **changed conditions**.” *Id.*, 22; [Ex.]1003, ¶75.

Id. at 30.

In TravTek, Petitioner contends that the vehicle used and generated current, i.e., real-time traffic information, current traffic conditions were displayed on the driver interface, and current traffic conditions were used in routing and rerouting calculations. *Id.* (citing Ex. 1004, 76, 94–96). Petitioner views the link travel time data provided by probe vehicles as identifying congestion. *Id.* (citing Ex. 1004 88–90 (“At the TMC, the probe reports were combined with other sources of link travel time to provide a current representation of the travel conditions on the TravTek Network. This information was then used by the TravTek vehicles in the route selection and route guidance processes.”), 20 (describing determining “link travel times when incidents or ***unusual traffic conditions occurred***”), 38 (“sources of current link travel time were the vehicle probes” which “monitored the time it takes to traverse a [road] link” and “sent information on the last link[s] . . . traversed to the TMC once every minute.”), 63 (indicating that “congestion level[s]” were expressed with respect to “nominal link times”), 55, 29 (“Travel time delays were calculated”), 65).

Patent Owner disagrees that TravTek’s use of sample vehicles for measuring time delays satisfies the traffic jam limitation. PO Resp. 14–16. According to Patent Owner, “TravTek takes current link times from the probe vehicles and continuously computes link time travel ratios. These ratios are computed by comparing the current link time with a ‘Free flow link time’ in a Dynamic Link Message.” *Id.* at 14–15 (citing Ex. 1004, 63). Patent Owner contends

that the estimate of current travel time on each route are broadcast to every vehicle through the Dynamic Link Message in route guidance. *Id.* at 15 (citing Ex. 1004, 63). Patent Owner argues that “TravTek does not account for typical, *e.g.*, rush hour, congestion – that is, TravTek does not differentiate between normal congestion and abnormal “traffic jams” as that term is understood in claim 6. A comparison with free flow link time, which is based on the speed limit alone, is indifferent as between statistically normal and abnormal conditions.” *Id.* (citing Ex. 2003 ¶ 14). Patent Owner notes that during cross-examination in another proceeding (IPR2016-01537) concerning the ’130 patent, Petitioner’s expert agreed that TravTek determines congestion by comparing current to free flow link times. *Id.* (citing Ex. 2004, 58:16–21 (“Q. That’s how TravTek determines traffic, correct, a comparison between current- and free-flow link times? A. Yes. TravTek determines congestion in part, but with this ratio of current-link time to free-flow link time.”))

Petitioner counters that TravTek discloses the traffic jam limitation, even under Patent Owner’s proposed construction. Reply 11–14. Petitioner first argues that TravTek’s rerouting process satisfies the traffic jam limitation because an atypical slowdown is identified “when its system reroutes a vehicle responsive to identifying that ‘congestion affected the selected routings.’” Reply 12 (citing Pet. 23–30; Ex. 1004, 22, 88–90; *see* 29; 38; 55; 65). Petitioner supports this position with the cross-examination testimony of Patent Owner’s expert, Dr. Kurzhanskiy acknowledging

that if a “current travel route in TravTek happened to be a route on which it was historical link travel times that were used ... and you then had a reroute, that reroute has to then be because the current link travel time reported by the probe vehicles is different than the data in the historical link travel times that was used to plan that route. . . .”

Id. at 12 (quoting Ex. 1028, 14:17–15:14 (affirming truthfulness of deposition transcript Ex. 1030 in which Dr. Kurzhanskiy responded to this question (at 45:17–46:5) with “I agree with you. In that case, yes”)); *see* Ex. 1030, 43:1–47:7).

Secondly, Petitioner argues that the traffic jam limitation is met by TravTek’s disclosure regarding “link travel times when incidents or unusual traffic conditions occurred.” Reply 12 (citing Ex. 1004, 20) (emphasis added). Petitioner contends that “[a] POSITA would have understood that identifying ‘unusual’ travel times involves selecting travel times that are ‘unusual’ compared to TravTek’s ‘historical data base’ of travel times.” *Id.* at 12–13 (citing Ex. 1024 ¶ 18; Ex. 1004, 20, 38, 60–61; 94–95, 120–122; Pet. 33–35). Petitioner maintains that TravTek teaches that current travel times provided by probe vehicles are used in a data fusion process that compares current probe vehicle times with historical travel times. *Id.* at 13 (citing Ex. 1004, 29, 38, 55, 65, 88–90).

Next, Petitioner argues that the traffic jam limitation is satisfied by the teaching in TravTek regarding comparing current probe vehicle times with historical travel times. Reply 13 (citing Ex. 1004, 44). Petitioner relies on the description in TravTek of how “[a]t certain times of the day, the normal speed on some road segments equals the theoretical speed for those segments, and at such times any

identification by TravTek’s system that actual/current travel times are worse than free flow travel times is a differentiation between normal and abnormal congestion.” *Id.* (citing Ex. 1024 ¶ 21; Ex. 1004, 220 (noting that some links have nominal travel times). The in-vehicle congestion display would include “at least some congestion that is ‘abnormal.’” *Id.* (citing Ex. 1004, 63; Ex. 1024 ¶ 21).

At the outset, we observe that the arguments Petitioner now presents in its Reply deviate from the arguments presented in the original Petition as to how TravTek’s output displays, in the form of congestion level displays and map color displays in the vehicle, teach the traffic jam limitation. *Compare* Pet. 30 with Reply 11–13. Patent Owner, however, did not object specifically to these arguments, and because these arguments were arguably necessitated by our interpretation of “traffic jam,” we address them in our analysis below after discussing positions raised during oral hearing. *See* Tr. 28:7–14.

We also note that Petitioner further modified its arguments during oral hearing to create an additional theory as to why TravTek would read upon the traffic jam limitation. *See* Tr. 26:4–28:17, *id.* at 27:25–28:2 (“JUDGE KINDER: Can you show me where you made this argument though in your original petition? MR. BERTA: It is not”). New arguments may not be raised during oral hearing because Patent Owner has no effective opportunity to review these arguments and respond. *See* Paper 23, 3 (“[T]he parties are reminded that, at the oral argument, they ‘may rely upon evidence that has been previously submitted in the proceeding and may only present arguments relied upon in the papers previously submitted.’” Office

Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,768 (Aug. 14, 2012). “No new evidence or arguments may be presented at the oral argument.” *Id.* Accordingly, we do not consider arguments raised for the first time during oral hearing.

Based on the final record, Petitioner has not provided sufficient arguments or credible evidence to support a finding that TravTek teaches the traffic jam limitation—and Petitioner does not rely on Angwin for this limitation. Pet. 29–31. Specifically, Petitioner has not persuasively shown how TravTek teaches the use of measured time delays of sample vehicles for computing a real time traffic jam. As explained above, we construe the term “traffic jam” to mean “a sudden unpredictable change of traffic in a segment as compared to regular times, i.e., individual statistical travel time estimates,” and thus, the claim element “measuring time delays” must also be in relation to regular times. Claim 6 also requires that traffic jam identification be determined by “utilizing the sample vehicles for measuring time delays.” Ex. 1001, 22:20–21. Petitioner has not directed us to record evidence sufficient to show that TravTek teaches these limitations.

Petitioner’s analysis of TravTek picks and chooses pieces of the reference, while ignoring its overall structure and operation. For example, with respect to the traffic jam limitation, the original Petition is void of any discussion of the data fusion process actually used to determine potential congestion in TravTek. *See, e.g.*, Pet. 29–31; Ex. 1004, 57–63. Indeed, Petitioner was aware of the data fusion process, and relied on the data fusion process as teaching a different claim

limitation, i.e., the “regular times” claim limitation, which correlates with regular predictable changes in traffic congestion. Pet. 24–29. TravTek explains that “[d]ata fusion was the process by which all incoming traffic information was received and evaluated *to derive an estimate* on a minute by minute basis of the link travel times in the system.” Ex. 1004, 57 (emphasis added). Although TravTek teaches routing around areas of congestion, such a function does not inherently teach or suggest the traffic jam limitation because the data fusion process does not make a comparison between vehicle times to determine if an unpredictable change in link time exists, as further explained below. We are also not persuaded by Petitioner’s argument that the data fusion process compares current probe vehicle times with historic travel times. See Reply 13 (“TravTek is also clear that the current travel times are provided by probe vehicles in a data fusion process that compares current probe vehicle times with historical travel times.” (citing Ex. 1004, 88-90; 29; 38; 55; 65)).

We understand TravTek as disclosing a ratio of (Current Link Time)/(Free Flow Link Time) (Ex. 1004, 63) and the data fusion process determines the current link time input to this equation, but the data fusion process itself does not compare times. *Id.* at 57–63. Petitioner does not offer sufficient argument or evidence demonstrating that TravTek’s ratio or formula of (Current Link Time)/(Free Flow Link time) relies upon *a time delay measurement derived from sample vehicles*. First, the Free Flow Link Time is based on a posted speed limit and not regular times obtained from vehicle probe data. See Ex. 1004, 58–60, 63. Second, the data obtained from

a probe vehicle is one of six data sources that might be used in estimating the current link time. *Id.* Each of the six data sources has “an associated score that determined its priority of consideration,” and the score of the data source begins to decay with time. Ex. 1004, 58. TravTek then uses its data fusion process to determine which of these six data sources should be used to estimate the current link time. *Id.* at 58, 59. TravTek describes that “[a]t any point in time, the data source with the maximum score was considered the best estimate and the data from that source was assigned to the link travel time.” *Id.* at 59. The link travel time ratio (Current Link Time)/(Free Flow Link Time) is described as “1 of 32” encoded ratios. Ex. 1004, 63–64 (Table 4). As explained in more detail below, even if vehicle probe data is used in the data fusion process, Petitioner’s arguments and evidence fail to demonstrate that the vehicle probe data is used to measure time delays to determine if unusual congestions exists as compared to regular times.

Notably, the Petition and Reply lack sufficient analysis of the data fusion process and evidence demonstrating how it would relate to the traffic jam limitation as we have construed it. *See* Pet. 30 (citing Ex. 1004, 76, 94–96 (“the travel time information from the probe vehicle was considered to be the most accurate measure of actual travel conditions by the TravTek system”). Petitioner’s conclusory analysis does not explain how the vehicle probe data would be used in the data fusion process for measuring time delays of vehicles for determining whether a traffic jam condition exists. Although Petitioner cites to TravTek’s mention of congestion level displays that

represent the status of each traffic link (Pet. 30), this argument is not persuasive for several reasons, including that these outputs are based on the ratio that may or may not use vehicle probe data. Further, even if vehicle probe data has been used, the level of congestion depicted on the display is not representative of real time delays of sample vehicles compared to regular times. Instead, the displayed congestion represents a ratio of Current Link Time, which is determined through a data fusion process that may or may not use vehicle probe data, compared to the Free Flow Link Time, or posted speed limit. Ex. 1004, 63 (“Congestion level displays . . . were determined both by the types of links represented and by the associated ratio.”). Further, we understand TravTek as teaching that the data fusion process only derives an estimate of the link travel times in the system. Ex. 1004, 57, 126 (“It selected the travel time source believed to provide the ‘best’ estimate of actual conditions on the link.”).

Even if vehicle probe data is used in the ratio above (as an input to the numerator “current link time”), it is not used as the claim requires and Petitioner has not demonstrated sufficiently how probe data from vehicles is compared to a regular time. *See* Reply 12–13; Ex. 1004, 58–63. We understand TravTek’s use of vehicle probe data as dependent on a “fuzzy logic” process involving “quality of data and aging,” and not whether any time delay between vehicles may exist. Ex. 1004, 58 (“[f]uzzy logic . . . deals with ambiguities and vagueness in data”), 59 (“A weight and decay time was assigned to each of the six data source[s]. . . . At any point in time the data source with the maximum score was considered the best estimate and the data from

that source was assigned the link travel time.”), 126. *See* Pet. 27 (“TravTek explains how the statistical data that is used in the route calculation depends on a “data fusion” process that selects a highest-scoring data source, which discloses updating the statistical criteria (e.g., the selected link travel times) with statistical criteria (e.g., data fusion process that selects the link travel time with the highest-scoring data source)” (citations omitted)) .

Based on the final trial record, Petitioner’s arguments and evidence do not establish persuasively how TravTek compares vehicle probe data to a regular time in order to determine time delays. For example, “[t]he link travel times were encoded as 1 of 32 ratios,” and Petitioner has not established how these ratios can represent time delays between vehicles in order to determine whether an unpredictable change in traffic conditions may exist, i.e., a traffic jam, as compared to regular travel times. Instead, we are more persuaded by Patent Owner’s argument and evidence that “[t]here is no disclosure in TravTek that compares current road conditions from sample vehicles with a regular travel time” in order to determine congestion. PO Resp. 14.

We are also not persuaded by Petitioner’s citation to TravTek’s use of “historical data” as a basis for teaching the traffic jam limitation. *See, e.g.*, Reply 12–13; Tr. 24:21–29:2. TravTek describes historical data as one of “six different data sources,” and “historical travel times were sometimes the only candidates for input to the data fusion process.” Ex. 1004, 58, 60. Petitioner does not persuasively show how this historical data would meet the traffic jam

limitation. Using historical data as the current link time in the ratio above $((\text{Current link time})/(\text{Free flow link time}))$ would result in a ratio based on historical time divided by the posted speed limit i.e., free flow link time. TravTek's single link travel time ratio represents one data point, and Petitioner does not explain sufficiently how this data point relates to determining a real time traffic jam based on measuring time delays of vehicles—there is no way to determine current real time delay using just historical data, and Petitioner directs us to no teaching in TravTek of a direct comparison of this historic data to current vehicle link probe times.

Based on the entire record, Petitioner does not present sufficient arguments and credible evidence to support a finding that TravTek discloses the traffic jam limitation.

4. Summary

Considering the final record before us, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that claim 6 is unpatentable under 35 U.S.C. § 103 based on the combination of TravTek and Angwin.

E. Obviousness based on Xu and Durocher

We next consider Petitioner's challenge of claim 6 under 35 U.S.C. § 103(a) based on the combination of Xu and Durocher. Pet. 45–74. Petitioner identifies the disclosures in the cited references alleged to describe the subject matter in the challenged claim and provides an articulated reasoning with rational underpinning to support its conclusion of obviousness. *Id.* Patent Owner disagrees, arguing that the proposed

combination of Xu and Durocher fails to disclose the traffic limitation for the reasons discuss *infra*. PO Resp. 16–22.

We have reviewed the parties’ contentions and supporting evidence of record in this trial. For the reasons given below, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claim 6 would have been obvious based on Xu and Durocher. We begin our analysis with a brief summary of these references, and then address the parties’ contentions in turn.

1. Xu (Ex. 1006)

Xu “relates to traffic data collection and intelligent routing systems for highway vehicles and, in particular, to a system and method for remotely collecting real-time traffic data and providing traffic forecasts and travel guidance for drivers of vehicles equipped to utilize the system.” Ex. 1006, 1:6–11. The Specification, in particular the Background of the Invention, states that “[t]here are several known methods for collecting traffic data.” *Id.* at 3:23–24. Xu goes on to describe external vehicle sensing systems used to collect traffic volume and vehicle speed, then Xu states “a method for collecting dynamic traffic data using equipment installed in vehicles is required.” *Id.* at 3:47–48.

Xu describes a traffic data collection system where “[e]ach vehicle **20** is equipped with an in-vehicle device **21** which receives global positioning information data from [GPS] satellites **42**.” *Id.* at 6:31–34. In-vehicle device relays road positions of the vehicle to a traffic service center (TSC). *Id.* at 6:40–45. As depicted in Figure 1 below, “[t]he [TSC] **60** uses the road positions of all vehicles **20** and the information obtained from the external party data sources to provide real-time road traffic conditions for the

roadway system **10** and broadcasts the traffic conditions via the communication station **50**.” *Id.* at 6:49–54.

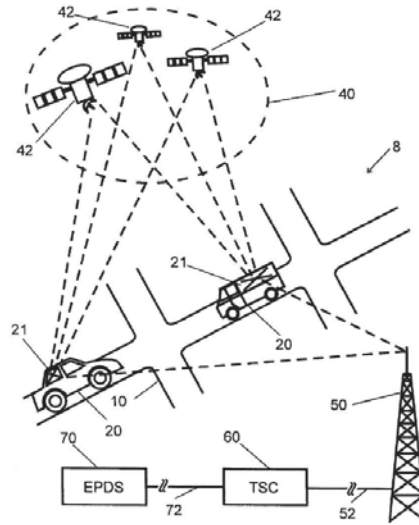


Figure 1

Figure 1 represents a block diagram of the remote traffic data acquisition and intelligent vehicle highway system.

The TSC uses positions of vehicles and information obtained from the external party data sources to provide real-time road traffic conditions to vehicles, which then use the information to provide real-time optimum route planning. *Id.* at 6:50–60. Xu notes that optimal travel routes may be recommended based on either real-time or forecast traffic conditions. *Id.*

Xu also discloses providing route planning optimization along multiple links of a route. *Id.* at 5:18–26. Xu further describes how abnormal traffic conditions may affect travel forecasts. *Id.* at 12:66–13:6. Xu states that “[i]f there is congestion on a link which is not normally congested and the congestion is completely due to traffic volume, the [TSC] receives a plurality of traffic data indicating that the link is experiencing an unusual congestion, by comparing the current traffic status with the normal traffic

condition.” *Id.* Xu then uses the traffic data related to the unusual congestion to adjust the next traffic forecast. *Id.*

2. Durocher (Ex. 1007)

Durocher is directed to a navigational system connected to a centralized server, particularly for automotive vehicles, whereby itinerary requests of mobile terminals (1, 2) are transmitted to centralized server 5, which contains the necessary data to calculate the requested itinerary and transmit the requested itinerary to the mobile terminal in order to provide real-time guidance. Ex. 1007, Abstract.

3. Discussion

Petitioner argues that each of the limitations of claim 6 is found in the proposed combination of Xu and Durocher. Pet. 47–74. To support its arguments, Petitioner identifies the relevant passages in the cited references that purportedly meet the corresponding claim limitation, and explains the significance of each passage with respect to the corresponding claim limitation. *Id.*

For example, with regards to the preamble of claim 6, Petitioner argues that

Xu discloses “a remote traffic data collection and intelligent vehicle highway system . . . that stores and processes road traffic information and provides real-time road traffic forecasts for drivers, and a route guidance sub-system.” [Ex.] 1006, 4:10-16. Xu’s system includes “vehicle[s] 20 equipped with a GPS receiver 21” and a “communication system [that] transmits the vehicle position data to the traffic service center which processes the data for use in the road traffic forecasts.” *Id.*, 9:66-67; 6:26–45; 4:15–28. Xu’s “traffic forecast is based on projections from normal traffic conditions retrieved from archived data adjusted by factors related to real-time situations.” *Id.*, Abstract.

Id. at 46.

Petitioner also argues that the disclosure in Xu regarding “in-vehicle devices 21” satisfies the “mobile guidance units” limitation, “traffic service center 60” satisfies the “central traffic unit” limitation, and “mobile radio sub-system 24 and communication station 50 satisfies the “communication system” limitation. Petitioner annotates Figure 1 of Xu, reproduced below, to illustrate this correspondence.

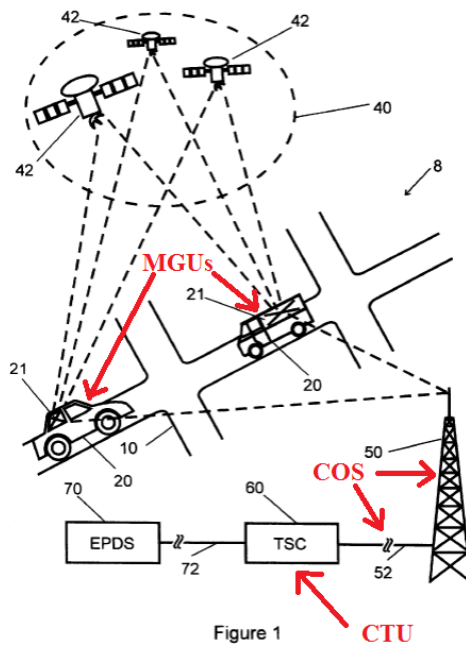


Figure 1 of Xu as annotated by Petitioner. Pet. 49.

Petitioner relies on Xu and Durocher for the claim limitation of “the CTU operatively connected to the communications system, the CTU performing a computed route search based on current and statistical section data.” Pet. 49–56. Specifically, the disclosure in Xu regarding computing optimal routes using current and statistical section data (*id.* at 50 (citing Ex. 1003 ¶¶ 110–111, 148)); and that in Durocher regarding “a navigational system to be applied to automotive vehicles’ that uses a ‘mobile telephone’ as a ‘communication module’ for the navigation system to transmit ‘a request’ for a ‘best’ or ‘fastest’ route between ‘start and destination points’

to a ‘centralized server to calculate the best itinerary’” (*id.* at 50–51 (citing Ex. 1008, 4:33–5:14; 10:1–4; 16:23–32)). Petitioner provides specific examples to support its contention that “[m]ultiple reasons would have prompted a POSITA to implement the well-known practice of performing a computed route search at a central traffic computer— as suggested by Durocher—in the traffic forecasting and navigation system disclosed by Xu.” *Id.* at 51 (citing Ex. 1008, 7:29–8:6).

Petitioner also argues that Xu discloses the determination of vehicle position data using a GPS system (Pet. 57 (citing Ex. 1006, 9:66–10:2)), and that vehicle position data being reported to the traffic service center at predetermined reporting intervals teaches collecting GPS data at predetermined time intervals from sample vehicles (*id.* (citing Ex. 1003 ¶¶ 12–124; Ex. 1006, 9:63–11:12; Ex. 1008, 27:5–11; 12:11–29, 5:16–21; Ex. 1019, 4:9–31)).

In turn, Patent Owner disputes only the traffic jam limitation. With the complete trial record before us, we note that we have reviewed arguments and evidence advanced by Petitioner to support its unpatentability contentions as to the undisputed limitations. We are also persuaded that Petitioner has articulated an adequate reason supported by rational underpinnings to combine Xu and Durocher, as well as established sufficiently that the combination of Xu and Durocher would render these limitations obvious. Pet. 51–53, 63. Indeed, Patent Owner has not challenged Petitioner’s reasons for combining the references in the manner proposed in the Petition. Now, in view of the entire record, we adopt as our own Petitioner’s analysis of the undisputed claim limitations recited in claim

6 and find that the combination of Xu and Durocher teaches these limitations.

Traffic Jam Limitation⁷

Petitioner argues that this limitation is satisfied by the disclosure in Xu of a traffic service center that uses the road position of all vehicles to provide real time road traffic conditions (Pet. 65, (citing Ex. 1006, 4:10–38, 6:50–55)) and further that received traffic data is used “to identify ‘unusual congestion’ on a road or ‘link’ that differs from ‘normal traffic condition[s]’ and is ‘completely due to traffic volume’ and that ‘[t]his unusual congestion is also used to adjust the next traffic forecast’” (*id.* (citing Ex. 1006, 12:66–13:6, 15:15–20)). To demonstrate that providing real time road traffic conditions was known in the prior art, Petitioner cites the disclosure in Durocher regarding the use of “road condition” information to identify “real-time traffic conditions” “such that ‘a traffic jam can be bypassed’ when

⁷ We note that Patent Owner disputed whether Xu taught the traffic jam limitation in another *inter partes* reviews challenging the ’130 patent, IPR2016-01536, as well as IPR2016-1535 challenging U.S. Patent No. 6,480,783, both identified above in Section I.B. While the findings and determinations set forth above are supported by the final trial record in this proceeding, the issue of whether Xu teaches the traffic jam limitation was finally decided in IPR2017-01535 and IPR2016-01536, and Patent Owner did not appeal those decisions. Patent Owner is therefore collaterally estopped from challenging our prior determination related to the traffic jam limitation – as admitted by Patent Owner’s counsel during oral hearing. *See* Tr. 47:22–49:3; *see also MaxLinear, Inc. v. CF CRESPE LLC*, 880 F.3d 1373, 1376 (Fed. Cir. 2018) (citations omitted) (“It is well established that collateral estoppel, also known as issue preclusion, applies in the administrative context.”).

calculating a route and that this ‘road condition’ information is at least in part based on ‘position’ information transmitted from the mobile terminals to the server.” *Id.* at 66 (citing Ex. 1008, 8:8–20; 8:34–9:2; 30:35–31:3).

Patent Owner argues that neither Xu nor Durocher discloses the automatic identification of real time traffic jam limitation. PO Resp. 16–22. Xu, in Patent Owner’s view, collects position data in real-time, and uses the gathered position data for *future forecasting* and not identification of traffic jam conditions *in real time*. *Id.* at 16. Patent Owner directs us to the following passage from Xu, referred to as “the Xu sentence,” asserting that this is the only citation that “can be stretched to suggest that data collected from vehicles may be used for traffic forecasting”:

[t]he traffic service center 60 uses the road positions of all vehicles 20 and the information obtained from the external party data sources to provide real-time road traffic conditions for the roadway system 10 and broadcasts the traffic conditions via the communication station 50.

Id. at 17 (citing Ex. 1006, 6:49–54).

Central to Patent Owner’s argument is its position that the Xu sentence

fails to disclose *how* it actually ‘uses’ the static positions of the vehicle for real-time traffic determination – if indeed the ‘road positions’ are intended to be part of the determination of real-time road traffic conditions, rather than merely a statement of the geographic locus to be used for each vehicle’s report.

Id. (citing Ex. 2002 ¶¶ 12–15) (emphasis added).

Patent Owner understands another passage of Xu as teaching that road positions and other sources are utilized in long-term forecasts, and external data for real-time determinations:

An external party interface 64 is provided to connect the external party data sources 70 to receive real-time information about weather or road conditions. The real-time information is processed by an external party data integrator 65 for incorporation into real-time traffic forecasts. The traffic forecasts are computed by a traffic forecaster 68 using the collected vehicle position data for *normal* road conditions.

Id. at 18 (citing Ex. 1006, 8:23–30). Taken together, Patent Owner argues that the Xu sentence and this passage teach that vehicle position is used for calculating “longer-term/normal/average conditions” and not immediate congestion conditions. *Id.* (citing Ex. 1006, 12:33–37; Ex. 2002 ¶ 16). Patent Owner contends that even if one views the Xu sentence as using data from the vehicle for identification of a traffic jam in real time, Xu does not teach how such identification is done. *Id.* (citing Ex. 2005 ¶ 17). Patent Owner asserts that other passages in Xu relating to measurements from vehicles teach using this data in calculating longer-term averages for time of day and day of week, and using this average to predict travel time for the link. *Id.* at 19 (citing Ex. 1006, 4:56–5:16).

According to Patent Owner, Xu teaches that external factors are used to determine traffic conditions in real time, and not data from vehicles. *Id.* at 20. As to the passage in Xu stating that “the traffic service center receives a plurality of traffic data indicating that the link is experiencing an unusual congestion” (Ex. 1006, 13:2–4), Patent Owner argues that this passage “does not at all tie to the positions of the vehicles determined by GPS” (*id.*), and that “[n]othing in Xu in any way indicates that the real-time data so received at the traffic center comes from the vehicles” (*id.* (citing Ex. 2005 ¶ 17)).

Petitioner, in its Reply, takes the position that Xu discloses the traffic jam limitation under both the plain meaning and Patent Owner’s more

narrow interpretation of this claim limitation. Reply 14, n.2. Petitioner supports its position with the testimony of Dr. Braasch that “Xu clearly discloses identifying real-time traffic jam conditions under both the proposed narrow constructions and the plain and ordinary meaning of the term ‘traffic jam,’” because “Xu discloses that its system identifies ‘unusual congestion, by comparing the current traffic status with the normal traffic condition.’” Ex. 1024 ¶ 32 (quoting Ex. 1006, 12:66–13:6). We agree with this position and, as such, our analysis below is not dependent on the scope of the term “traffic jam” addressed above – the limitation is taught by Xu in view of our interpretation of “traffic jam,” but also would be taught under either party’s proposed construction.

Petitioner argues that the Xu sentence establishes “that its system ‘**uses the road positions of all vehicles** 20 and the information obtained from the external party data sources **to provide real-time road traffic conditions.**”’ Reply 14 (citing Ex. 1006, 6:50-55; Dec. on Inst. 22, 26–27). Furthermore, Petitioner contends that Patent Owner’s arguments are inconsistent with the identified disclosure of Xu. *Id.* In this regard, Petitioner directs us to other passages in Xu that, when taken with the Xu sentence, support its position. Reply 14–17. For example, Petitioner notes that the abstract of Xu states “[i]n-vehicle devices . . . transmit the **time-related vehicle locations** to a traffic service center” and that “[t]he traffic service center **collects the data from all equipped vehicles** that travel the roadway system in an area within range, process the data and provide a **realtime traffic forecasts** [sic].” *Id.* at 14–15 (citing Ex. 1006, Abstract). Petitioner also points to a passage in Xu that teaches how the communication system “forwards road traffic data reported from all vehicles

20 traveling the roadway system 10 to the traffic service center” and that this information is used to provide intelligent route guidance, such as “an optimum travel route based on *real-time traffic conditions*.” *Id.* at 15 (citing Ex. 1006, 7:37-52, 8:26-36; 12:66-13:6). Petitioner argues that the Xu statement clarifies that external party data is “**incorporated** into real-time traffic forecasts,’ and is not the sole basis for real-time traffic forecasts.” *Id.* at 16 (quoting Ex. 1006, 8:23-30). Petitioner argues that like the ’130 patent, Xu uses vehicle time delay information to “calculate **both** historic and real-time travel time estimates.” *Id.* at 16-17 (citing Ex. 1001, 12:57-65; Ex. 1006, 6:50-60, 7:32-53; Abstract; Ex. 1024 ¶¶ 23, 30-31). We find Petitioner’s contentions persuasive on the final record before us for the reasons set forth below.

First, the record does not persuade us that Xu only uses information from third party, or other external, sources to identify current traffic conditions. Petitioner’s analysis considers Xu as a whole; however, Patent Owner’s argument narrowly focuses on one example described in Xu, and fails to consider Xu as a whole, from the perspective of an ordinarily skilled artisan. A prior art reference must be considered for everything it teaches by way of technology and is not limited to the particular example it is describing. *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985). Furthermore, in an obviousness analysis, we must consider the combination of references, as a whole, in light of the general knowledge of an ordinarily skilled artisan. *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

Here, one stated objective of Xu is to create “a method for collecting dynamic traffic data using equipment installed in vehicles” as opposed to

just relying on the prior art “methods for collecting traffic data” such as “sensing systems” that “are installed along highways,” using “[v]ideo cameras” or “pulsed laser range image technology.” Ex. 1006, 3:23–48. Given that a purpose of Xu was to use dynamic traffic data obtained from GPS receivers installed in vehicles, we are persuaded by Petitioner that one of ordinary skill in the art, in considering Xu as a whole, would understand Xu as providing a basis for using that same dynamic traffic data for determination of real time traffic conditions. *Id.*; *see also id.* at 2:63–67, 4:17–22; Ex. 1024 ¶¶ 22–28. For example, Xu explains how current traffic conditions may impact traffic forecasts and “the [TSC] receives a *plurality of traffic data* indicating that the link is experiencing an unusual congestion, by comparing the current traffic status with the normal traffic condition.” Ex. 1006, 12:66–13:6 (emphasis added); Ex. 1024 ¶ 26 (“the ‘plurality of traffic data’ is the traffic data previously disclosed in Xu . . . both external party data sources and time delay data collected from probe vehicles”).

Based on the final record, Petitioner presents persuasive arguments and credible evidence to support a finding that the “plurality of traffic data” would include dynamic vehicle position data and that “time delays” are determined by comparing the current traffic status as determined by vehicle position with the normal traffic condition. Ex. 1006, 13:2–5 (“comparing the current traffic status with the normal traffic condition”); Ex. 1003 ¶¶ 140–141; Ex. 1024 ¶¶ 22–29.

For example, we credit the testimony of Dr. Braasch that vehicle position data would be a source of real time traffic conditions indicative of unusual congestion. *See* Ex. 1024 ¶¶ 22–29; Ex. 1006, 12:66–13:6. We are also persuaded by Petitioner’s argument that Xu’s “communication system

‘forwards road traffic data reported from all vehicles 20 . . . to the traffic service center’ and that this data is used to provide ‘an optimum travel route based on **real-time traffic conditions.**’” Reply 15 (citing Ex. 1006, 7:37–52; 8:26–36; 12:66–13:6). Also persuasive is the cross-examination testimony of Dr. Kurzhanskiy that “one of the plurality of traffic data that could be being [sic] used to detect unusual congestion is vehicle probe position data.” *Id.* (quoting Ex. 1030, 82:19–83:7) (also agreeing “that Xu discloses that vehicle position data is a form of traffic data that the system collects”).

Based on the entire record, Petitioner present sufficient arguments and credible evidence to support a finding that Xu discloses the traffic jam limitation.

4. Summary

Considering the final record before us, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claim 6 is unpatentable under 35 U.S.C. § 103 based on the combination of Xu and Durocher.

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has established by a preponderance of the evidence that Claim 6 of the ’130 patent is unpatentable under 35 U.S.C. § 103(a) over Xu and Durocher, but has not established by a preponderance of the evidence that Claim 6 of the ’130 patent is unpatentable under 35 U.S.C. § 103(a) over TravTek and Angwin.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claim 6 of the '130 patent is held 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.

Case IPR2017-00818

Patent 6,615,130 B2

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