

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,

Petitioner,

v.

iQAR INC.,

Patent Owner

Case IPR2024-00545
U.S. Patent No. 8,972,161

**PETITIONER'S NOTICE OF APPEAL TO THE
UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

Pursuant to 35 U.S.C. §§ 141(c) and 319, and 37 C.F.R. § 90.2(a), notice is hereby given that Petitioner Tesla, Inc. hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision in Case No. IPR2024-00545 entered July 25, 2025 (Paper 21) (“Final Written Decision”) by the Patent Trial and Appeal Board (“the Board”), and from all underlying orders, decisions, rulings, and opinions related thereto and included therein. This appeal is timely under 35 U.S.C. § 142, 37 C.F.R. § 90.3, Federal Rule of Appellate Procedure 15(a)(1), and Federal Circuit Rule 15(a)(1).

For the limited purpose of providing the Director with the information required by 37 C.F.R. § 90.2(a)(3)(ii) and Federal Rule of Appellate Procedure 15(a)(2)(C), the issues on appeal may include, but are not limited to:

1. The Board’s decision that claims 1, 3, 6–10, 12, 13, and 15–18 of U.S. Patent No. 8,972,161 (the “’161 Patent”) were not shown to be unpatentable as obvious under 35 U.S.C. § 103 in view of the combination of Schramm and Clapper;
2. All of the Board’s subsidiary findings supporting its determination that claims 1, 3, 6–10, 12, 13, and 15–18 of the ’161 Patent were not shown to be unpatentable as obvious under 35 U.S.C. § 103 in view of the combination of Schramm and Clapper; the Board’s failure to consider

arguments and evidence of record properly; the Board's legal errors in undertaking the obviousness analysis; the Board's findings that conflict with the evidence of record and are not supported by substantial evidence;

3. The Board's interpretations of claim terms of the '161 Patent, including the limitation reciting "determining a plurality of efficient speeds that achieve a best summation of said energy values," and the Board's application of those interpretations to the prior art; and
4. All other issues decided adversely to Petitioner in any orders, decisions, rulings, or opinions underlying or supporting the Final Written Decision.

Petitioner further reserves the right to challenge any finding or determination supporting or relating to the issues above.

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a)(1), this notice is being filed with the Director of the U.S. Patent and Trademark Office, and a copy is also being filed with the Board. In addition, pursuant to Federal Circuit Rule 15(a)(1) and 37 C.F.R. § 90.2(a)(2), Petitioner also is electronically filing this notice with the Clerk of the U.S. Court of Appeals for the Federal Circuit, and paying the fee set forth in Federal Circuit Rule 52.

Date: September 26, 2025

/Karan Jhurani/

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on September 26, 2025, a complete and entire copy of this Petitioner's Notice of Appeal was provided via email to the Patent Owner by serving the correspondence address of record as follows:

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Pursuant to 37 C.F.R. § 90.2(a)(1), I hereby certify that in addition to being filed electronically through the Board's P-TACTS System, this Petitioner's Notice of Appeal is being provided to the Director of the USPTO on September 26, 2025, by electronically filing to the email address as follows:

Director of the United States Patent and Trademark Office
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I hereby certify that on September 26, 2025 a true and correct a copy of the foregoing Patent Owner's Notice of Appeal, along with a copy of the Final Written Decision, was filed electronically with the Clerk's Office of the United States Court of Appeals for the Federal Circuit, at the following address:

United States Court of Appeals for the Federal Circuit
717 Madison Place, N.W., Suite 401
Washington, DC 20005

Date: September 26, 2025

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

IQAR INC.,
Patent Owner.

IPR2024-00545
Patent 8,972,161 B1

Before JASON W. MELVIN, SEAN P. O'HANLON, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

O'HANLON, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Tesla, Inc. (“Petitioner”) filed a Petition for *inter partes* review of claims 1–18 (“the challenged claims”) of U.S. Patent No. 8,972,161 B1 (Ex. 1001, “the ’161 patent”). Paper 2 (“Pet.”). iQar, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6. On August 8, 2024, we instituted an *inter partes* review of the challenged claims on all grounds raised in the Petition. Paper 7 (“Institution Decision” or “Inst. Dec.”).

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 11, “PO Resp.”), Petitioner filed a Reply to the Patent Owner Response (Paper 13, “Pet. Reply”), and Patent Owner filed a Sur-reply to Petitioner’s Reply (Paper 17, “PO Sur-reply”). An oral hearing was held on May 8, 2025. A transcript of the hearing has been entered into the record. Paper 20 (“Tr.”).

For the reasons that follow, we conclude that Petitioner has proven by a preponderance of the evidence that claims 1–6, 8–15, 17, and 18 of the ’161 patent are unpatentable. It, however, has failed to meet its burden of proof regarding the unpatentability of claims 7 and 16.

B. Real Parties in Interest

Petitioner identifies itself as its sole real party in interest. Pet. 100.

Patent Owner identifies itself (stating that it is “formerly known as Invently Automotive, Inc.”) as its sole real party in interest. Paper 4, 1.

C. Related Matters

The parties indicate that the '161 patent is the subject of the following district court proceeding:

iQar Inc. v. Tesla, Inc., No. 1-23-cv-00694 (W.D. Tex. filed June 20, 2023).

Pet. 100; Paper 4, 1. It appears that this proceeding has been transferred to the Northern District of California under the caption:

iQar Inc. v. Tesla, Inc., No. 3-24-cv-01337 (N.D. Cal. filed March 6, 2024).

D. The Challenged Patent

The '161 patent discloses methods and systems for controlling power applied to a vehicle engine. Ex. 1001, 1:11–12. The '161 patent purports that, currently, fuel consumption cannot be precisely controlled by a driver, and operational assisting devices typically do not optimize power consumption of the vehicle. *Id.* at 1:16–20, 1:45–49. The '161 patent purports to improve upon optimization of power consumption of a vehicle via “power management logic that can calculate an applied power for the vehicle engine based on information provided from the external environment of the vehicle, the operational status of the vehicle, one or more command inputs from a driver, and one or more operational parameters of the vehicle.” *Id.* at 2:15–24.

The '161 patent describes “steps that may be followed to optimize the energy supplied to an engine so that the vehicle travels at a fuel-efficient speed.” Ex. 1001, 11:11–13; *see also id.* at Fig. 2 (illustrating a flowchart of steps to optimize power).

To determine an optimally efficient speed for the optimal power to be supplied to the engine), a route is determined 201 from the starting position and an actual or estimated ending position, the route is segmented 203 into one or more segments, a model optimal speed (or power) is calculated 205, statistical data from previous trips along the same segment of the route are retrieved 207, and an overall efficiency applied power is calculated from at least the model power and the statistical data 209. Finally, the overall efficient applied power is provided to the engine.

Id. at 11:13–23. “The route is determined based on the current position of the vehicle and a final destination position.” *Id.* at 11:31–32. The destination may be input by the driver before or during the trip (*id.* at 11:38–40), or the destination may be derived from information about the driver, current location, time of day, and past trips (*id.* at 13:51–14:12). “In some variations, the route may be broken up into segments that may be used by a power management device to optimize the power needed to travel this segment.” *Id.* at 13:44–47. Accuracy of the model increases as the number of segments increases. *Id.* at 14:7–9. “The route may be continuously re-segmented” as the vehicle moves. *Id.* at 13:65–66. “The power required by the vehicle to travel along a route, or a segment of the route, may be estimated or calculated, and this calculation may be used to determine a calculated speed for the vehicle so that the power usage is optimized or minimized.” *Id.* at 14:14–18. The optimal speed for each segment may be calculated by any appropriate method, and may include the use of energy calculating logic. *Id.* at 14:47–51.

E. The Challenged Claims

Petitioner challenges claims 1–18 of the '161 patent. Pet. 1. Claims 1 and 10 are independent. Claim 1 is illustrative of the challenged claims and is reproduced below.

1. A method of managing a power consumption of a vehicle, comprising the steps of:
 - (a) receiving a route at a computer of said vehicle;
 - (b) segmenting said route into a plurality of segment destinations;
 - (c) calculating a plurality of energy values consumed by said vehicle to travel said route based on a plurality of variations in a target speed of said vehicle between pairs of said segment destinations;
 - (d) determining a plurality of efficient speeds that achieve a best summation of said energy values; and
 - (e) notifying an operator of said vehicle about said efficient speeds to travel between each of said segment destinations.

Ex. 1001, 26:15–28.

F. Asserted Grounds of Unpatentability

The Petition relies on the following prior art references:

Name	Reference	Exhibit
Neiss	US 2004/0068359 A1, published April 8, 2004	1005
Clapper	US 6,161,072, issued December 12, 2000	1006
Hirasago	US 6,658,344 B2, issued December 2, 2003	1008
Schramm	US 6,005,494, issued December 21, 1999	1009

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5, 6, 8–15, 17, 18	103(a) ¹	Neiss
4	103(a)	Neiss, Hirasago
1, 3, 6–10, 12, 13, 15–18	103(a)	Schramm, Clapper

Pet. 1. Petitioner submits a declaration of Nikolaos P. Papanikolopoulos, Ph.D. (Ex. 1003, “Papanikolopoulos Declaration”) in support of its contentions. Patent Owner submits a declaration of Craig J. Hoff, Ph.D., P.E. in support of its contentions. Ex. 2003.

II. ANALYSIS

A. Principles of Law

1. *Inter Partes Review*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Petitioner bears the burden of persuasion to prove unpatentability of each challenged claim by a preponderance of the evidence. 35 U.S.C. § 316(e). This burden never

¹ The application resulting in the ’161 patent claims priority to a date prior to the date when the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011), took effect. Thus, we refer to the pre-AIA version of section 103.

shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

2. Obviousness

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the 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) when in evidence, any objective evidence of nonobviousness.² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems;

² The parties have not directed us to any such objective evidence.

(4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (quoting *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007)). “The patent’s purpose can also be informative.” *Id.*

Petitioner contends that a person having ordinary skill in the art at the time of the invention (“POSITA”) would have had “a bachelor’s degree in electrical engineering, computer engineering, mechanical engineering (including automotive engineering), civil engineering (transportation systems), physics, or a related field, and at least four years of experience (or the academic equivalent) in the field of transportation systems.” Pet. 2–3. Petitioner contends that “[a]dditional education could substitute for professional experience, and *vice versa*.” *Id.* at 3 (citing Ex. 1003 ¶¶ 1–19, 24–26; Ex. 1004).

Patent Owner “does not dispute” Petitioner’s definition of the level of ordinary skill. *See generally* PO Resp.

We find Petitioner’s definition to be consistent with the problems and solutions disclosed in the patent and prior art of record, and adopt it as our own for purposes of this Decision. *See, e.g., In re GPAC*, 57 F.3d at 1579 (approving the determination of the level of ordinary skill in the art by appeal to the references of record).

C. Claim Construction

In an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), including construing the claims in

accordance with the ordinary and customary meaning of such claims as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b). “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention” and “after reading the entire patent.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 1321 (Fed. Cir. 2005) (en banc). In addition to the specification and prosecution history, we also consider use of the terms in other claims and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Id.* at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (alteration in original) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Both parties assert that no interpretation of any claim terms is required. *See* Pet. 2 (“No claim constructions are necessary”); PO Resp. 5 (“Patent Owner does not believe that any specialized constructions are necessary”). However, both parties interpret various claim terms in their arguments. *See, e.g.*, Pet. 18 (interpreting “segment destination” to “encompass[] segmenting a route into a plurality of segments, each having an endpoint/destination”); PO Resp. 18 (interpreting “route” to mean “a road, path, or course from one place to another”). We address certain ones

of these claim interpretations below. No further claim interpretation is needed for this Decision.

D. Overview of the Asserted Prior Art

1. Neiss

Neiss discloses a “predictive cruise control system [that] utilizes information about the current vehicle position, as well as upcoming terrain[,], in order to save fuel.” Ex. 1005, code (57). Neiss’s cruise control system “minimizes vehicle operating costs, based on an analysis of vehicle operating parameters and route information regarding a route section ahead of the vehicle.” *Id.* ¶ 1. A “vehicle operating cost function” is used and is “defined[] based on a plurality of environmental parameters, vehicle parameters, vehicle operating parameters and route parameters.” *Id.* ¶ 15. “As the vehicle proceeds, an onboard computer iteratively calculates and stores in a memory vehicle control parameters that optimize the vehicle operating cost function for a predetermined distance (referred to as a ‘Prediction Horizon’) along the route ahead of the vehicle.” *Id.* “The vehicle is then controlled by reading the optimized vehicle control parameters from the memory, corresponding to the current position of the vehicle.” *Id.*

In particular, Neiss discloses a “Predictive Cruise Control (PCC)” that “is used to determine, as a function of position, a desired speed inside [a] speed band . . . in order to maximize fuel savings.” Ex. 1005 ¶ 31; *see also id.* at Fig. 1 (illustrating the speed band). The PCC can slow down the vehicle as it moves uphill until it reaches a minimum speed on top of the hill and regains speed on the downhill part to “completely convert[] the potential

energy into kinetic energy.” *Id.* ¶ 31, Fig. 2. The PCC can also slow down the vehicle when the vehicle approaches a curve to avoid high lateral acceleration. *Id.* ¶ 32, Fig. 3. The PCC operates by receiving inputs from a Global Position System (GPS) and the current velocity to generate a desired velocity, a desired throttle position, and a desired controller gain, all to control “the vehicle to follow the calculated velocity trajectory.” *Id.* ¶¶ 34–41, Fig. 4.

The overall cost function is a summation of costs associated with travel time, fuel consumption, velocity, lateral acceleration, and a penalty for traveling at velocities outside of the speed band. Ex. 1005 ¶¶ 126–127. The PCC retrieves optimal velocity, throttle positions, and controller gain from a look-up table for the prediction horizon. *Id.* ¶ 162. The values in the look-up table “are calculated online, in real time as the vehicle proceeds along the traveled route.” *Id.* ¶ 163. The PCC iteratively employs an optimization algorithm each time the vehicle has covered a specified distance, referred to as a “frame,” with multiple frames occurring over the prediction horizon. *Id.* ¶¶ 169–170, Fig. 10. The optimization algorithm starts by obtaining road grade angles and curve radii for the first several frames of the prediction horizon and computing velocity and throttle positions. *Id.* ¶¶ 178–179, Figs. 12a, 12b. The algorithm then performs several optimization iterations to obtain optimal values for all frames of the prediction horizon. *Id.* ¶¶ 180–191, Figs. 12c, 13a–13d. The optimal values are then input into the PCC. *Id.* ¶¶ 37–41.

2. *Hirasago*

Hirasago “relates to a vehicle traveling control system with a state display apparatus which system executes a constant-speed cruise control for keeping a vehicle speed at a set speed.” Ex. 1008, 1:6–9. Hirasago’s objective is to “enable[] a driver to easily compare a present vehicle speed with a set-condition speed range and a control-condition speed range.” *Id.* at 1:30–34. To accomplish this, Hirasago provides a display that “comprises a speed range display section 1-96 which is disposed along a speed scale of analog-type speedometer 2-2” in which the display section is in a shape of a belt. *Id.* at 6:31–33; *see also id.* at Fig. 3C (illustrating the display).

3. *Schramm*

Schramm discloses a “system for determining an energy-optimum route for a vehicle to take between an origin and a destination” using “a computer onboard the vehicle” that “access[es] a database containing both topographical map information and vehicle energy consumption data, and based thereon the computer determines and displays an energy-optimum route.” Ex. 1009, code (57).

Schramm provides a flow chart that exemplifies steps implemented by the computer. Ex. 1009, 3:25–27; Fig. 3. In first step 56, a routing module retrieves from topographical map electronic database 36 “a route between the origination point ‘A’ and the destination point ‘B,’” in which “each route retrieved is regarded . . . as a series of contiguous route segments.” *Id.* at 5:21–24, 5:32–34. Next, in step 58, the computer “determines, starting with the first route segment of a first route, the average elevation change . . . as indicated by the topographical map contained in the database 36.” *Id.*

at 5:41–45. Then, in step 60, the computer “accesses the energy consumption module . . . to determine the energy consumption that would be required for the vehicle 12 to traverse the route segment under test at the speed that was input” previously. *Id.* at 5:45–48. Next, in step 62, “routing module 42 sets a variable ‘consumption_{route}’ (initialized at zero) to be equal to ‘consumption_{route}’ plus the energy consumption (‘consumption_{segment}’)” determined at step 60. *Id.* at 6:11–15. Then, steps 64–70 provide “a so-called ‘DO’ loop for each segment of each possible screened route, and for each route.” *Id.* at 6:15–18. The DO loop includes step 64, determining “whether the segment under test is the last segment of the route, and if not the logic retrieves the next segment” at step 66 and loops back to step 58. *Id.* at 6:19–22. If it is determined that the last segment of the current route has been analyzed, the computer determines whether there are additional routes to analyze and, if so, the computer analyzes the segments of the next route. *Id.* at 6:22–27. After all of the routes have been analyzed, “the logic returns the route with the lowest overall energy consumption” at final step 72. *Id.* at 6:27–31.

4. Clapper

Clapper discloses “[a]n automatic cruise control [that] uses stored information about speeds which the vehicle used at given positions in the past to control the speed of the vehicle at a current position” and, if prior driving history is unavailable, “the system can consult a database of given speeds at given locations and those speeds may be used to control the vehicular speed.” Ex. 1006, code (57). The automatic cruise control includes a display that can be used to display the current actual speed, a

previously used speed, and a suggested speed from a database. *Id.* at 3:27–42, Fig. 4. The user can select one of these speeds via buttons on the display. *Id.* at 3:42–44.

E. Asserted Obviousness Based on Neiss

Petitioner argues that claims 1–3, 5, 6, 8–15, 17, and 18 would have been obvious in view of Neiss. Pet. 4–48. In support of its showing, Petitioner relies upon the Papanikolopoulos Declaration. *Id.* (citing Ex. 1003). We have reviewed the parties’ briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that these claims would have been obvious in view of Neiss.

1. Independent Claim 1

a. The Preamble

Claim 1 recites “[a] method of managing a power consumption of a vehicle.” Ex. 1001, 26:15–16. Petitioner argues that “Neiss’s predictive cruise control (PCC) system uses ‘information about the current vehicle position’ and ‘upcoming terrain . . . to save fuel’ by minimizing a vehicle operating cost function.” Pet. 10 (citing Ex. 1005 ¶¶ 1, 15, 81–82, code (57); Ex. 1003 ¶ 52).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Neiss discloses a PCC vehicle control system that seeks to minimize the cost of operating a vehicle. Ex. 1005 ¶¶ 34, 81–87.

Accordingly, for the foregoing reasons, to the extent the preamble is limiting, Neiss supports Petitioner's contentions.

b. The Receiving Recitation

Claim 1 recites "receiving a route at a computer of said vehicle." Ex. 1001, 26:17. Petitioner maps Neiss's vehicle computer to the recited computer and prediction horizon to the recited route. Pet. 12–14 (citing Ex. 1005 ¶¶ 1, 15, 34, 37–41, 44, 49, code (57), Figs. 4, 10, 15; Ex. 1003 ¶¶ 57–61). Petitioner argues that Neiss's PCC uses the vehicle's current position to query a 3D digital road map to identify and access information about the prediction horizon. *Id.* at 14–16 (citing Ex. 1005³ ¶¶ 4–5, 12, 14–15, 31, 45–49, 162–163, 167, 179, 181, 186, 190, code (57), Figs. 6, 12a–12c; Ex. 1003 ¶¶ 62–67). Petitioner argues that Neiss's prediction horizon is a route "because it constitutes a path traveled by the vehicle." *Id.* at 14 (citing Ex. 1003 ¶ 61). Petitioner also argues that "Neiss's optimization operations are performed iteratively for portions of an overall route ahead of the vehicle as the vehicle travels the overall route between a starting point and a final destination." *Id.* (emphasis omitted) (citing Ex. 1005, code (57), ¶¶ 1, 15; Ex. 1003 ¶ 61).

Alternatively, Petitioner argues that it would have been obvious "to modify Neiss so that its onboard computer receives the entire route at once, instead of receiving it iteratively." Pet. 16 (citing Ex. 1003 ¶¶ 68–72).

³ Although Petitioner sometimes cites to Exhibit 1004 (*see, e.g.*, Pet. 14, 15), we understand Petitioner's intent was to cite to Neiss, Exhibit 1005.

Patent Owner presents a number of arguments contesting Petitioner's contentions. PO Resp. 18–30. We discuss each of Patent Owner's contentions below.

i. Interpretation of “Route”

First, Patent Owner argues that “[an ordinarily skilled artisan] would have understood the ordinary meaning of the term ‘route’ to be a road, path, or course from one place to another.” PO Resp. 18 (citing Ex. 2001, 1189). “In other words, . . . [i]t is the *path* the vehicle is following to travel *from its present location to its destination*.” *Id.* (citing Ex. 2003 ¶¶ 126–128). Patent Owner argues that the ’161 patent uses the term in the same manner. *Id.* at 18–20 (citing Ex. 1001, 5:19–21, 9:10–15, 11:13–17, 11:31–32, 12:46–47, 12:58–13:2, 14:20–22, 17:6–8, Figs. 1B, 3A; Ex. 2003 ¶¶ 129–135). Patent Owner notes that, in the Institution Decision, we interpreted column 13, lines 40–44 of the ’161 patent, specifically its use of “typically,” to contemplate a route that does not include an ending position and argues that this disclosure means that a route either may have only an ending position (that is, the route has no intermediate positions) or the route may have only an intermediate position (that is, the route has no ending position). *Id.* at 21 (citing Inst. Dec. 13–14).

Petitioner replies that “the plain and ordinary meaning of ‘route’ is a path from one point/position to another point/position.” Pet. Reply 3 (citing Pet. 2, 14; PO Resp. 18; Ex. 1054, 3; Ex. 2003 ¶¶ 126–128). Petitioner argues that neither the claims nor the specification requires the recited route to include a destination. *Id.* at 3–5 (citing Ex. 1001, 6:55–56, 13:40–44, Fig. 1B; Ex. 1053, 12:12–13:5; PO Resp. 19).

We disagree with Patent Owner’s interpretation of column 13, lines 40–44 of the ’161 patent to mean that a route may not have both an ending position or an intermediate position, but will have at least one of these positions. *See* PO Resp. 21. Patent Owner interprets “typically” in “[t]he route used by the power management device typically includes a starting position . . . , an ending position, . . . , and any intermediate positions between the initial and the final positions” to apply to *either* “an ending position” *or* “any intermediate positions” (that is, an intermediate destination) but not to both. We see no grammatical reason to limit “typically” in this manner. Rather, the plain meaning of the quoted sentence suggests that, although not typical, a route may not contain an ending position, be that a final position or an intermediate position.

ii. Whether Neiss’s Prediction Horizon is a Route

Next, Patent Owner argues that Neiss’s prediction horizon is not a route. PO Resp. 22–30. Patent Owner argues that Neiss’s “Prediction Horizon bears no relation to the vehicle’s destination.” *Id.* at 22. Patent Owner notes that, if the vehicle deviates such that it will “not traverse the terrain corresponding to the Prediction Horizon,” Neiss’s system will “adapt” and “replace it with a new ‘Prediction Horizon’ for the new road ahead.” *Id.* at 23 (emphasis omitted) (citing Ex. 1005 ¶ 192); *see also* PO Sur-reply 5–7 (presenting substantially similar arguments).

Patent Owner notes that, in the Institution Decision, we preliminarily found that Neiss’s final prediction horizon would include the final destination and argues that finding is erroneous because the vehicle’s route might change and the end of final prediction horizon might not coincide with

the final destination. PO Resp. 24–26 (citing Inst. Dec. 14–15; Ex. 1005 ¶¶ 15, 165, 170, 188–192; Ex. 2003 ¶¶ 159–168).

Petitioner argues that “Neiss’s Prediction Horizon is a route at least because it is a path between two places, *i.e.*, between the vehicle’s current position (one place) to a position that is a predetermined distance ahead of the vehicle (another place).” Pet. Reply 8 (citing Ex. 1053, 12:4–6).

Petitioner argues that, to the extent claim 1 requires a destination, the “destination need not be a final destination, but instead can be just an intermediate destination,” and “Neiss’s Prediction Horizon is a path from the vehicle’s current position to an intermediate position that is a predetermined distance ahead of the vehicle, along the path to the vehicle’s final destination.” *Id.* at 9–10 (citing Ex. 1001, 14:20–22; PO Resp. 18; Ex. 1005 ¶ 15, claim 1); *see also id.* at 11 n.3 (asserting that “the end of each Prediction Horizon is an intermediate destination along the way to the vehicle’s final destination”). Petitioner argues that, because Neiss’s prediction horizons span the vehicle’s path, by the time the vehicle reaches its final destination the prediction horizons will have spanned the entire path along the vehicle’s route from start to finish. *Id.* at 10–14 (citing Ex. 1005 ¶ 15, claim 1; Ex. 1003 ¶¶ 68–72; Pet. 14–17).

Petitioner argues that it is immaterial if, in some instances, the vehicle might change its path partway through its travel because Neiss contemplates instances in which the vehicle does not deviate from its path. Pet. Reply 14–15 (citing Ex. 1005, claim 1). Continuing, Petitioner argues that, “even if the vehicle did change its path to deviate from an originally planned route, the vehicle would still have previously received Prediction Horizons prior to the deviation, and would continue to receive Prediction Horizons

after the deviation along its new path to its ultimate destination” such that it “iteratively receive[s] a ‘route.’” *Id.* at 15 (citing Ex. 1001, 5:30–31).

We disagree with Patent Owner’s contention that, because Neiss’s system will update its prediction horizon if the vehicle’s route changes, the prediction horizon must not be a route. Initially, Patent Owner provides no support for its implicit assertion that a driver may not deviate from or alter a route. Additionally, the ’161 patent discloses the same process; the ’161 patent explains that the destination can be derived based on the vehicle’s location or driving history, and there can be multiple “likely destinations” and the system can “continuously infer the vehicle’s destination” and the probable destination “may constantly change to revise the destination” while the vehicle is traveling along the route. Ex. 1001, 11:50–12:26. Moreover, Patent Owner’s arguments only pertain to instances in which the vehicle deviates from a prediction horizon but fails to consider instances in which the vehicle does not deviate from the prediction horizons.

Furthermore, by acknowledging that Neiss’s prediction horizon encompasses “the . . . road ahead” of the vehicle, Patent Owner acknowledges that Neiss’s prediction horizon *does* correspond to the route driven by the vehicle. *See* PO Resp. 23; *see also id.* at 22 (acknowledging that “[Neiss’s] system is able to recognize that the vehicle is approaching a hill” and “the system recognizes an approaching turn”). This acknowledgment also comports with Patent Owner’s interpretation of a “route” being “a road, path, or course from one place to another.” *See id.* at 18.

Notably, the ’161 patent sometimes refers to the “entire route,” indicating that use of “route” in the claims does not necessarily mean the

entire route. Indeed, the '161 patent explains that, “[i]n *some variations*, the entire route (or the entire predicted route) may be divided up into N segments” and “[i]n *some variations*, probable optimal speeds may be identified for the entire route.” Ex. 1001, 14:5–6, 18:26–27 (emphases added). This strongly suggests that, in some other variations, the entire route is *not* divided into segments and optimal speeds are *not* identified for the entire route, further indicating that the recited “route” is not the entire path the vehicle will take.

As noted by Patent Owner (*see* PO Resp. 21), in the Institution Decision, we explained that Neiss’s final prediction horizon would include the final destination. Inst. Dec. 14–15. Patent Owner’s arguments to the contrary are unavailing. Patent Owner provides no support for its implicit assertion that the final destination of the route must correspond with the end of the prediction horizon. *See* PO Resp. 25. Moreover, even if this were a requirement, Patent Owner acknowledges that this will sometimes be the case (*id.* at 26), which is all that is required for obviousness, as the Federal Circuit has explained that “combinations of prior art that sometimes meet the claim elements are sufficient to show obviousness.” *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1002 (Fed. Cir. 2016) (citing *Hewlett-Packard Co. v. Mustek Systems, Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003) (“prior art . . . that sometimes, but not always, embodies a claimed method nonetheless teaches that aspect of the invention.”)); *see also* Pet Reply 16 (“[S]ome overall routes would have a length that is a multiple of the . . . frame length, in which case the end of the last Prediction Horizon would indeed coincide with the final destination.”). Furthermore, the '161 patent ascribes a broad interpretation to “destination,” explaining that “the word ‘destination’ . . . is

not necessarily the driver's final destination. *It may be an intermediate destination along the route* that the statistical destination logic determines has a greater chance than some threshold likelihood (e.g., X %) of being the destination.” Ex. 1001, 12:7–12 (emphasis added). Thus, the endpoint of any of Neiss's prediction horizons appears to be a destination as that term is used in the '161 patent.

iii. Receiving the Entire Route

Finally, Patent Owner argues that Petitioner's contention that it would have been obvious to modify Neiss's system to receive the entire route is at odds with Neiss's disclosure. PO Resp. 27–30. Patent Owner argues that Neiss purposely does not perform calculations on an entire route. *Id.* at 26–27 (citing Ex. 1005 ¶¶ 7–8); *see also* PO Sur-reply 10 (citing same). Patent Owner argues that Petitioner's proposed modification would require “repeated, unnecessary calculation [that are] the opposite of efficiency.” PO Resp. 28–29 (citing Ex. 1005 ¶ 8). Patent Owner argues that “Neiss's system is purposefully designed to minimize the burdens on its vehicle computer” by using a ring buffer “to minimize memory requirements.” *Id.* at 29 (citing Ex. 1005 ¶¶ 163–164).

Petitioner argues that Patent Owner misinterprets the Petition's argument that it would have been obvious to modify Neiss's system to receive the entire route at once. Pet. Reply 16–18. Petitioner argues that, rather than “computing the vehicle control parameters for the entire, end-to-end route all at once, as [Patent Owner] contends,” in its “modified Neiss system, the calculations would still be performed iteratively for each successive Prediction Horizon as the vehicle traverses the entirety of the

route, consistent with Neiss's disclosure; the only change would be that the route is received all at once." *Id.* at 17 (citing Pet. 16–17).

Patent Owner replies that Petitioner's comments regarding its proposed modification that Neiss's onboard computer receives the entire route at once are improper new arguments and would not result in any difference in computation time. PO Sur-reply 10–12.

We disagree with Patent Owner's characterization of Neiss as purposefully not performing calculations for an entire route in advance. *See* PO Resp. 27 (citing Ex. 1005 ¶¶ 7–8); PO Sur-reply 10 (citing same). In the paragraphs cited by Patent Owner, Neiss explains that having to rely on a previously-recorded "record drive" to obtain driving data used to control known systems is undesirable because it requires data to be gathered for every route in the road network, the data is only as good as the driver that obtained it, and the data will be affected by unforeseeable driving situations, such as approaching a slow vehicle. *See* Ex. 1005 ¶¶ 7–8. Contrary to Patent Owner's assertions, there is no discussion of avoiding receipt of an entire route or performing calculations for an entire route in use of Neiss's system.

We also disagree with Patent Owner's contention that Petitioner's proposed modification to receive an entire route would cause Neiss's system to perform more calculations, thereby making it less efficient. *See* PO Resp. 28–29 (citing Ex. 1005 ¶ 8). Patent Owner's assertion that Petitioner's proposed modification would require re-calculation after an unforeseen event is encountered (*id.* at 29) fails to consider the corollary that there would be times when re-calculations would *not* be required while driving, making the system more efficient during those times at least.

Moreover, Petitioner explains that the modification proposed in the Petition is only that the system would receive the entire route, but vehicle operating parameters would still be calculated iteratively. *See* Pet. Reply 17. We agree that this modification would decrease the time it takes to calculate the operating parameters at least because the system would not have to calculate the location of the prediction horizon from GPS or using traveled velocities. *See* Ex. 1005 ¶¶ 4–5, 14, 35. We disagree with Patent Owner that this is an improper new argument (*see* PO Sur-reply 10–11), as the Federal Circuit has explained that “a reply argument is proper when it responds to the patent owner’s arguments or the Board’s observations without ‘point[ing] to any new embodiments’ of a prior art reference not previously identified in the petition.” *Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1009 (Fed. Cir. 2023) (alteration in original) (quoting *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1385 (Fed. Cir. 2023)).

Finally, we disagree with Patent Owner’s characterization that Neiss purposely avoids performing calculations on an entire route to minimize the burdens on its computer. PO Resp. 29–30 (citing Ex. 1005 ¶¶ 163–164, 169). Although Neiss discloses performing calculations for a prediction horizon to use less memory and to reduce the computational burden (Ex. 1005 ¶¶ 164, 169), Neiss also discloses that “the optimization calculation could be performed for every computational cycle given enough computing power” (*id.* ¶ 169). Thus, Neiss suggests the modification proposed by Petitioner.

We further note that Neiss’s PCC includes: position estimator 25 that determines the current position of the vehicle; look-up table 26 that includes velocity, throttle pedal, and controller gain values for an area (the prediction

horizon) around the current vehicle position; 3D digital road map 28 that includes gradient angles and curve radii of the upcoming road; and optimization algorithm module 27 that calculates velocity trajectory, optimal throttle pedal positions, and controller gains for the prediction horizon and stores the calculations in the look-up table. Ex. 1005 ¶¶ 45–49, Fig. 6. “The look-up table values are calculated online, in real time as the vehicle proceeds along the traveled route.” *Id.* ¶ 163. Dr. Papanikolopoulos testifies that the PCC’s use of the 3D digital road map to identify each prediction horizon constitutes receiving the prediction horizon. Ex. 1003 ¶ 67.

We are also persuaded that it would have been obvious to modify Neiss’s system to receive the entire route. *See* Pet. 16–18. As discussed above, Neiss discloses that its prediction horizon is a predetermined distance of a route along which the vehicle travels. *See, e.g.*, Ex. 1005 ¶ 15. Additionally, Dr. Papanikolopoulos testifies that modifying Neiss’s system to receive an entire route “would be computationally efficient” and “receiving an entire end-to-end route (e.g., from external map applications) was well-known in the context of vehicle control systems and enabled receipt of accurate routes that, e.g., account for real-time events, such as road and/or traffic conditions.” Ex. 1003 ¶¶ 70–71.

iv. Conclusion

Accordingly, for the foregoing reasons, Neiss supports Petitioner’s contentions.

c. The Segmenting Recitation

Claim 1 recites “segmenting said route into a plurality of segment destinations.” Ex. 1001, 26:18–19. Petitioner argues that, although the

'161 patent “does not use the phrase ‘segment destination,’” this recitation “encompasses segmenting a route into a plurality of segments, each having an endpoint/destination.” Pet. 18 (citing Ex. 1001, 13:44–50; Ex. 1003 ¶¶ 73–74). Petitioner maps Neiss’s frames having endpoints to the recited plurality of segment destinations. *Id.* (citing Ex. 1005 ¶ 170, Fig. 10; Ex. 1003 ¶ 75). Petitioner argues that Neiss’s prediction horizon is separated into frames having a specified distance and an endpoint. *Id.* at 19–21 (citing Ex. 1005 ¶¶ 162, 169–171, 192, Fig. 10; Ex. 1003 ¶¶ 78–80).

Patent Owner presents a number of arguments contesting Petitioner’s contentions. PO Resp. 12–18, 30. We discuss each of Patent Owner’s contentions below.

i. Order of the Recited Steps

First, Patent Owner argues that claim 1 requires an ordered performance of the recited method steps such that, first, a route is received and then the route is segmented into segment destinations. PO Resp. 12–15. Patent Owner argues that Neiss does not do this, asserting that Neiss “begins by filling its integration steps with road and vehicle data” and “then collects these steps into a Prediction Horizon.” *Id.* at 15 (citing Ex. 2002, 15:9–19:20). According to Patent Owner, “no ‘route’ exists that can be ‘received’ by Neiss’s vehicle computer until *after* Neiss populates a Prediction Horizon worth of integration steps / buffer cells with road-specific angle, radius, and other data.” *Id.* at 17 (citing Ex. 2003 ¶¶ 120–122); *see also* PO Sur-reply 2–5 (presenting substantially similar arguments). Patent Owner argues that Neiss’s “‘Prediction Horizon’ is nothing more than a ‘parameter’ that specifies size—in storage cells—of [a]

ring buffer.” PO Resp. 16 (citing Ex. 1005 ¶¶ 27–29, 162, 170, 176–179, 191–192).

Petitioner replies that claim 1 does not require the step of receiving the route to occur before the step of segmenting the route because the claim “only recite[s] that the ‘receiving’ happens ‘at a computer of said vehicle,’” but “do[es] not state that the same computer must also perform the claimed segmenting.” Pet. Reply 6. Thus, according to Petitioner, “the claims would be satisfied even if a route was segmented first and then the ‘computer of said vehicle’ received the already-segmented route.” *Id.* at 5.

Continuing, Petitioner traverses Patent Owner’s interpretation that Neiss’s prediction horizon is a ring buffer. Pet. Reply 19–21. Petitioner argues that Neiss’s “Prediction Horizon is a path from one place to another—*i.e.*, a route” and “[t]he ring buffer . . . is . . . simply memory used to store data about this path.” *Id.* at 20 (citing Ex. 1005 ¶ 15; Ex. 1053, 22:21–23:8). Petitioner argues that this “[d]ata about the path, such as gradient and curvature, are ‘parameters’ of the route, not the route itself.” *Id.* (citing Ex. 1005 ¶ 15).

Finally, Petitioner argues that, to the extent the route must be received by the vehicle computer before it is segmented, “Neiss makes clear that the vehicle’s route is known prior to the ring buffer being populated: road data for the upcoming road are ‘read from the road map’ and used to ‘fill[] these ring buffer cells,’” and “[i]t follows that, to retrieve road data for a particular section of road—*i.e.*, the Prediction Horizon—from the road map, that section of road would have to already be known to the system.” Pet. Reply 21 (citing Ex. 1005 ¶¶ 1, 179, claim 1; Pet. 15–16).

Patent Owner's arguments are unavailing. Patent Owner's arguments are predicated upon the mistaken interpretation that Neiss's prediction horizon is a ring buffer. *See* PO Resp. 16 (characterizing Neiss as "analogizing the 'Prediction Horizon' interchangeably with 'ring buffer'"); PO Sur-reply 3–5 (presenting similar arguments). Not so. Neiss explains that its prediction horizon is "a predetermined distance . . . along the route ahead of the vehicle." Ex. 1005 ¶ 15. Notably, Patent Owner acknowledges as much. *See* PO Resp. 15–16 ("this 'Prediction Horizon' . . . is just the road 'ahead'"); PO Sur-reply 5 ("The Prediction Horizon is simply a portion of the road immediately ahead of the vehicle."), 8 ("The Prediction Horizon is just a portion of road.").

Neiss explains that "the optimal velocity, throttle pedal positions, and controller gain series" for the prediction horizon "are stored in a look-up table[,] which is contained in a ring buffer memory." Ex. 1005 ¶ 162. Thus, it is Neiss's look-up table data, *not* the prediction horizon, that is stored in the ring buffer memory. Patent Owner's witness, Dr. Hoff, acknowledges that Neiss's ring buffer stores data regarding the prediction horizon: "the data for the prediction horizon is stored in a section of memory, which is the ring buffer." Ex. 1053, 34:4–6.

We need not, and therefore do not, consider Patent Owner's argument that the recited step of "receiving the route at a computer of said vehicle" must occur prior to the recited step of "segmenting said route into a plurality of segment destinations" (*see* PO Resp. 12–18) because it is undisputed that Neiss's system receives the prediction horizon before it is separated into frames.

ii. Whether Neiss's Prediction Horizon is a Route

Next, Patent Owner argues that, “[b]ecause Neiss’s Prediction Horizon is not a ‘route,’ its frames are not ‘segments’ and have no ‘segment destinations.’” PO Resp. 30.

Patent Owner’s arguments are unavailing for the reasons set forth above regarding the Receiving Recitation.

Neiss discloses that each prediction horizon is separated into frames, with each frame having an endpoint. Ex. 1005 ¶ 170, Fig. 10. Neiss’s PCC calculates the optimal velocity, throttle position, and controller gain, and these optimizations are updated iteratively multiple times for each frame. *Id.* ¶¶ 162–163, 169–170.

iii. conclusion

Accordingly, for the foregoing reasons, Neiss supports Petitioner’s contentions.

d. The Calculating Recitation

Claim 1 recites “calculating a plurality of energy values consumed by said vehicle to travel said route based on a plurality of variations in a target speed of said vehicle between pairs of said segment destinations.” Ex. 1001, 26:20–23. Petitioner maps the resulting velocity values of Neiss’s iterative updating steps to the recited variations in target speed. Pet. 21–23 (citing Ex. 1005 ¶¶ 180, 190–191, Figs. 12c, 13b–13d; Ex. 1003 ¶¶ 81–87).

Petitioner argues that Neiss’s calculation of fuel consumption cost J_{fuel} in each iteration constitutes calculating a plurality of energy values consumed by the vehicle to travel the prediction horizon. *Id.* at 26–28 (citing Ex. 1005 ¶¶ 80–87, 93–98, 126–132; Ex. 1003 ¶¶ 88–94).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Neiss's PCC calculates the optimal velocity, throttle position, and controller gain, and these optimizations are updated iteratively multiple times for each frame of the prediction horizon. Ex. 1005 ¶¶ 162–163, 169–170. These optimizations minimize the cost function, which includes fuel cost as a factor and outputs vehicle velocity. *Id.* ¶¶ 37–38, 81–82, 93–94.

Accordingly, for the foregoing reasons, Neiss supports Petitioner's contentions.

e. The Determining Recitation

Claim 1 recites “determining a plurality of efficient speeds that achieve a best summation of said energy values.” Ex. 1001, 26:24–25. Petitioner argues that Neiss's “cost function, J ,” is a summation of energy values because it “is a summation, over the N locations along the Prediction Horizon, of the [fuel consumption cost] values.” Pet. 31 (citing Ex. 1005 ¶ 132; Ex. 1003 ¶¶ 101–102). Petitioner argues that “Neiss's iterative optimization calculates ‘optimal velocity, throttle pedal positions, and controller gain series’ for each location along the Prediction Horizon,” and, “[a]fter one or more iterations, the calculated values ‘approach closer to the optimal values,’ *e.g.*, minimize the overall cost function J .” *Id.* at 34 (quoting Ex. 1005 ¶¶ 162, 191) (citing Ex. 1005 ¶¶ 162–163, 171, 185–186, 190; Ex. 1003 ¶ 105).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Neiss’s PCC calculates the optimal velocity, throttle position, and controller gain, and these optimizations are updated iteratively multiple times for each frame of the prediction horizon. Ex. 1005 ¶¶ 162–163, 169–170. These optimizations minimize the cost function, which includes fuel cost as a factor. *Id.* ¶¶ 81–82, 93–94. The optimization iterations continue “until the algorithm has converged and thus the values are optimal.” *Id.* ¶ 180.

Accordingly, for the foregoing reasons, Neiss supports Petitioner’s contentions.

f. The Notifying Recitation

Claim 1 recites “notifying an operator of said vehicle about said efficient speeds to travel between each of said segment destinations.” Ex. 1001, 26:26–28. Petitioner argues that Neiss’s “vehicle is controlled to drive the identified optimized speed . . . for each current location of the vehicle.” Pet. 36 (citing Ex. 1005 ¶ 15; Ex. 1003 ¶¶ 109–110). Petitioner argues that it would have been obvious to include a speedometer to display the vehicle’s current speed. *Id.* (citing Ex. 1003 ¶¶ 111–113). Alternatively, Petitioner argues that it would have been obvious “to display the determined efficient speed for an upcoming location as the vehicle travels along the Prediction Horizon.” *Id.* at 37–38 (citing Ex. 1003 ¶ 118).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Neiss discloses that, after determining the “optimal vehicle control parameters for the Prediction Horizon,” “[t]he vehicle is then controlled by reading the optimized vehicle control parameters from the memory,

corresponding to the current position of the vehicle.” Ex. 1005 ¶ 15. We are persuaded that it would have been obvious to include a speedometer with Neiss’s vehicle to display the vehicle’s speed. *See* Pet. 36–37 (citing *KSR*, 550 U.S. at 415–21; Ex. 1003 ¶¶ 113–116) (arguing that including a speedometer with Neiss’s vehicle “is merely the application of known techniques . . . to a known system . . . to yield predictable results” and would “provide[] the driver with valuable information about vehicle operation”).

Accordingly, for the foregoing reasons, Neiss supports Petitioner’s contentions. We determine that Petitioner sets forth reasoning with rational underpinning as to why a person having ordinary skill in the art would have included a speedometer with Neiss’s vehicle. *See, e.g.*, Pet. 36–37.

g. Conclusion

For the foregoing reasons, on this record, we are persuaded that Petitioner has shown, by a preponderance of the evidence, that claim 1 would have been obvious in view of Neiss.

2. Independent Claim 10

Independent claim 10 recites a method of managing a power consumption of a vehicle that contains the same first four steps as independent claim 1. *Compare* Ex. 1001, 26:15–25, *with id.* at 26:57–67. Petitioner relies on its showing made for claim 1 regarding the similar recitations (*see* Pet. 46), and Patent Owner does not challenge Petitioner’s showing for these recitations apart from its arguments made for claim 1 (*see* PO Resp. 11–30). Our above analysis regarding these similar elements applies to claim 10, and we focus our analysis below on the distinct recitation of claim 10.

a. The Applying Recitation

Claim 10 recites “applying power corresponding to said efficient speeds to an engine of said vehicle to travel between each of said segment destinations.” Ex. 1001, 27:1–3. Petitioner argues that “Neiss’s system controls the vehicle to travel at the optimized speed corresponding to the vehicle’s current position . . . as the vehicle traverses the Prediction Horizon.” Pet. 47 (citing Ex. 1005 ¶¶ 14–15, 42, Figs. 4, 15; Ex. 1003 ¶¶ 153–154).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Neiss discloses that, after determining the “optimal vehicle control parameters for the Prediction Horizon,” “[t]he vehicle is then controlled by reading the optimized vehicle control parameters from the memory, corresponding to the current position of the vehicle.” Ex. 1005 ¶ 15. This control includes converting “the desired vehicle speed . . . to a desired engine speed” and sending a “command signal . . . to the engine so that it attempts to achieve the desired [engine] speed.” *Id.* ¶ 42.

Accordingly, for the foregoing reasons, Neiss supports Petitioner’s contentions.

b. Conclusion

For the foregoing reasons, on this record, we are persuaded that Petitioner has shown, by a preponderance of the evidence, that claim 10 would have been obvious in view of Neiss.

3. Dependent Claims 2, 3, 5, 6, 8, 9, 11–15, 17, and 18

Claims 2, 3, 5, 6, 8, and 9 depend directly from claim 1, and claims 11–15, 17, and 18 depend directly from claim 11. Petitioner contends that Neiss teaches or suggests the recitations of these claims and supports these contentions with declaration testimony. Pet. 38–46, 47–48 (citing Ex. 1003).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

We determine that Petitioner’s contentions regarding these dependent claims are fully supported by the record. Accordingly, we are persuaded that Petitioner has shown, by a preponderance of the evidence, that claims 2, 3, 5, 6, 8, 9, 11–15, 17, and 18 would have been obvious in view of Neiss. *See In re NuVasive*, 841 F.3d 966, 974 (Fed. Cir. 2016) (“The Board, having found the only disputed limitations together in one reference, was not required to address undisputed matters.”); Paper 8, 9 (emphasizing that “arguments not raised in the response may be deemed waived”).

F. Asserted Obviousness Based on Neiss and Hirasago

Claim 4 depends directly from claim 1. Petitioner contends that the combination of Neiss and Hirasago teaches or suggests the recitations of this claim and supports these contentions with declaration testimony. Pet. 49–52 (citing Ex. 1003).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

We determine that Petitioner’s contentions regarding this dependent claim are fully supported by the record. Accordingly, we are persuaded that

Petitioner has shown, by a preponderance of the evidence, that claim 4 would have been obvious in view of the combination of Neiss and Hirasago. *See In re NuVasive*, 841 F.3d at 974; Paper 8, 9.

G. Asserted Obviousness Based on Schramm and Clapper

Petitioner argues that claims 1, 3, 6–10, 12, 13, and 15–18 would have been obvious in view of Schramm and Clapper. Pet. 52–95. In support of its showing, Petitioner relies upon the Papanikolopoulos Declaration. *Id.* (citing Ex. 1003). We have reviewed the parties’ briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has failed to show, by a preponderance of the evidence, that these claims would have been obvious in view of the combination of Schramm and Clapper.

Petitioner relies on Schramm to disclose a method of managing a power consumption of a vehicle substantially as recited in claim 1, and relies on Clapper to teach operating the vehicle at varying speeds and notifying the operator of efficient speeds. Pet. 52–86.

Claim 1 recites, in relevant part, “determining a plurality of efficient speeds that achieve a best summation of said energy values.” Ex. 1001, 26:24–25. Petitioner argues that Schramm’s route with the lowest overall energy consumption, comprising a plurality of efficient speeds for each route segment, is the best summation of energy values. Pet. 77–81 (citing Ex. 1006, 1:50–67, 2:12–14, 2:37–44, 2:52–57, 3:13–23, 6:29–31; Ex. 1009, 2:19–21, 2:35–37, 2:60–63, 4:25–28, 5:14–20, 5:41–49, 5:66–6:2, 6:11–15, 6:17–31, code (57), Figs. 3, 6; Ex. 1003 ¶¶ 261–270). Petitioner argues that Clapper teaches choosing an efficient speed for each segment. *Id.* at 79 (citing Ex. 1006, 1:53–55, 1:61–64, 2:12–14, 2:37–38, 3:13–20). Petitioner

argues that, in combination, “[f]or each route segment being evaluated during the optimization process, stored speed data are used along with the segment’s elevation change to identify the appropriate energy value, *e.g.*, from Schramm’s [Figure] 6 table.” *Id.* at 60 (citing Ex. 1003 ¶ 202). Petitioner argues that, by identifying “the segments that constitute that energy-optimum route,” Schramm determines the efficient speeds. *Id.* at 81 (citing Ex. 1009, 5:33–35; Ex. 2003 ¶ 271); *see also id.* at 82–84 (presenting additional arguments as to why the efficient speeds are determined).

Patent Owner argues that “Schramm’s system simply uses speed as an input” and “Clapper’s speeds have nothing to do with efficiency and are not designed to achieve a best summation of energy values.” PO Resp. 31–32 (emphasis omitted). Patent Owner argues that Clapper’s speeds are “either ‘speeds used at given locations in the past’ or ‘a speed limit,’” both of which may be inefficient. *Id.* Patent Owner argues that, “[i]n combination, Schramm will simply use whatever speeds are output by Clapper—including inefficient stored driver speeds and speed limits—as an input to its route calculation,” but “[t]he combined system will not calculate or determine any efficient speeds.” *Id.* at 33; *see also* PO Sur-reply 13 (“[T]he combined system will simply take Clapper’s inefficient speeds as inputs when performing Schramm’s route determination process.”).

Petitioner replies by acknowledging that “Schramm does take speed as an input” and arguing that “the Petition does not rely on Clapper’s stored speeds in a vacuum, but instead leverages Clapper’s teachings of varying per-segment speeds in combination with the route optimization process as described by Schramm.” Pet. Reply 23–24 (citing Ex. 1006, 5:14–20; Pet. 59–62). Petitioner argues that “[t]he relevant aspect of Clapper’s

disclosure is simply its storage of per-segment speeds.” *Id.* at 24 (citing Pet. 59–62).

We agree that the Petition relies on Clapper to teach using different speed inputs for each segment. *See, e.g.*, Pet. 59 (relying on Clapper to teach “account[ing] for different per-segment speeds”), 79 (relying on Clapper to teach “a database [of] each segment’s speed.”). As for the speeds used for each segment, Petitioner asserts that “the set speeds for the energy-optimum route’s segments correspond to a plurality of efficient speeds.” *Id.* at 78 (emphasis omitted) (citing Ex. 1003 ¶¶ 263–270). The Petition maps the speeds disclosed in Clapper to these efficient speeds: “Per Clapper, each route segment has a corresponding speed, *e.g.*, ‘the speed that the-driver used previously’ on that segment or the ‘speed limit’ of that segment; *indeed, these are the speeds that were used to retrieve the energy values for the-segments of the route . . .*” *Id.* at 80–81 (emphasis added); *see also id.* at 83 (asserting a previously-driven speed or the speed limit to be efficient speeds), 84 (same); Tr. 22:14–26 (same).

We agree with Patent Owner that Petitioner has not explained adequately how a driver’s previously driven speed or the speed limit is an efficient speed. Rather than explaining how the Schramm-Clapper system would sum efficient speeds, Petitioner merely asserts that “the set speeds for the energy-optimum route’s segments correspond to a plurality of efficient speeds.” Pet. 78 (emphasis omitted). Petitioner’s witness, Dr. Papanikolopoulos, makes substantially the same assertion. *See* Ex. 1003 ¶ 263. But neither Petitioner nor its witness explains adequately how a previously driven speed or the speed limit is an efficient speed. Patent Owner presents persuasive arguments as to why these speeds are not

efficient. *See* PO Resp. 32–33 (citing Ex. 2003 ¶¶ 198–204, 208–214). Patent Owner’s contentions are supported by Dr. Hoff’s testimony. *See, e.g.,* Ex. 2003 ¶¶ 211–218. Stated differently, although Petitioner explains how the Schramm-Clapper system would select the best summation of calculated energy values required to travel at selected speeds from among Schramm’s routes, Petitioner has not explained sufficiently how the selected speeds are efficient speeds.

For the foregoing reasons, on this record, Petitioner has not shown, by a preponderance of the evidence, that claim 1 or its dependent claims 3 and 6–9 would have been obvious in view of the combination of Schramm and Clapper. Petitioner relies on the same contentions regarding the identical language recited in independent claim 10 (*see* Pet. 93), and so, for the same reasons, has failed to show, by a preponderance of the evidence, that claim 10 or its dependent claims 12, 13, and 15–18 would have been obvious in view of the combination of Schramm and Clapper.

III. CONCLUSION⁴

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner

⁴ 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).

has shown, by a preponderance of the evidence, that claims 1–6, 8–15, 17, and 18 of the '161 patent are unpatentable, but has failed to show that claims 7 and 16 are unpatentable. In summary,

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 5, 6, 8–15, 17, 18	103(a)	Neiss	1–3, 5, 6, 8–15, 17, 18	
4	103(a)	Neiss, Hirasago	4	
1, 3, 6–10, 12, 13, 15–18	103(a)	Schramm, Clapper		1, 3, 6–10, 12, 13, 15–18
Overall Outcome			1–6, 8–15, 17, 18	7, 16

IV. ORDER

Accordingly, it is:

ORDERED that claims 1–6, 8–15, 17, and 18 of the '161 patent have been shown to be unpatentable;

FURTHER ORDERED that claims 7 and 16 of the '161 patent have not 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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