

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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VOLKSWAGEN GROUP OF AMERICA, INC.

Petitioner

v.

CARUCEL INVESTMENTS, L.P.

Patent Owner

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Case No. IPR2019-01102

U.S. Patent No. 7,848,701

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**PATENT OWNER'S NOTICE OF APPEAL**

Director of the United States Patent and Trademark Office  
c/o Office of the General Counsel  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

Pursuant to 35 U.S.C. §§ 141(c), 142 and 319, and 37 C.F.R. §§ 90.2–3, Patent Owner, Carucel Investments L.P., hereby provides notice that it appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision (Paper 28) in Case No. IPR2019-01102 entered November 20, 2020 by the Patent Trial and Appeal Board and from the Patent Trial and Appeal Board’s denial of Patent Owner’s Request for Rehearing (Paper 30) entered on January 6, 2021, as well as from all underlying orders, decisions, rulings, and opinions related thereto and included therein. A copy of the Final Written Decision is attached as Exhibit 1. This appeal is timely under 37 C.F.R. § 90.3(b)(1), 35 U.S.C. § 142, and Rule 15(a)(1) of the Federal Rules of Appellate Procedure.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Patent Owner submits that the expected issues on appeal include, but are not limited to: (i) the Board’s determination of unpatentability of claims 10, 15–18, 31, and 33–35, of U.S. Patent No. 7,848,701 (Ex. 1001); (ii) the Board’s consideration and analysis of the expert testimony, prior art, and other evidence in the record; (iii) all findings and determinations supporting or related to these issues, including claim constructions; (iv) the Board’s lack of authority as improperly appointed principal officers under the Appointments Clause (*United States v. Arthrex, Inc.*, No. 19-1434, -1452, -1458 (U.S.)); and (v) all other issues decided adversely to Patent Owner in any order, decision, ruling, or opinion.

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), this Notice of Appeal is being filed with the Director of the United States Patent and Trademark Office. Simultaneous with this submission, Patent Owner is electronically filing a copy of this Notice of Appeal with the Patent Trial and Appeal Board. In addition, this Notice of Appeal, along with the required docketing fees, is being filed electronically with the Clerk of the United States Court of Appeals for the Federal Circuit in accordance with Fed. Cir. R. 15(a)(1).

Date: March 10, 2021

Respectfully submitted,

/s/ R. Scott Rhoades

R. Scott Rhoades

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**Lead Counsel for Patent Owner**

## **CERTIFICATION OF FILING**

Pursuant to 37 C.F.R. §§ 90.2(a)(1) and 104.2(a), the undersigned hereby certifies that in addition to being filed electronically through the Board's Patent Trial and Appeal Board's end to end system (PTAB E2E), a true and correct copy of the above-captioned PATENT OWNER'S NOTICE OF APPEAL is being filed by Priority Mail Express under 37 U.S.C. § 1.10 with the Director of the United States Patent and Trademark Office on March 10, 2021, at the following address:

Director of the United States Patent and Trademark Office  
c/o Office of the General Counsel  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

Pursuant to 37 C.F.R. §§ 90.2(a)(2), the undersigned also hereby certifies that a true and correct copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL is being filed electronically through CM/ECF with the United States Court of Appeals for the Federal Circuit on March 10, 2021.

Date: March 10, 2021

Respectfully submitted,

/s/ R. Scott Rhoades

R. Scott Rhoades

Reg. No. 44,300

## **CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. §§ 42.6(e), the undersigned certifies that an electronic copy of the foregoing PATENT OWNER'S REQUEST FOR REHEARING was served on the Petitioners by electronic mail on March 10, 2021:

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Date: March 10, 2021

Respectfully submitted,

/s/ R. Scott Rhoades

R. Scott Rhoades

Reg. No. 44,300

# **EXHIBIT 1**

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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VOLKSWAGEN GROUP OF AMERICA, INC.,  
Petitioner,

v.

CARUCEL INVESTMENTS, L.P.,  
Patent Owner.

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IPR2019-01102  
Patent 7,848,701 B2

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Before THOMAS L. GIANNETTI, DANIEL J. GALLIGAN, and  
PAUL J. KORNICZKY, *Administrative Patent Judges*.

KORNICZKY, *Administrative Patent Judge*.

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

## I. INTRODUCTION

Volkswagen Group of America, Inc. (“Petitioner”) filed a Petition for an *inter partes* review of claims 10, 15–18, 31, and 33–35 of U.S. Patent No. 7,848,701 B2 (Ex. 1001, “the ’701 patent”). Paper 2 (“Pet.”). Carucel Investments, L.P. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Pursuant to 35 U.S.C. § 314, we instituted this *inter partes* review as to all of the challenged claims and all grounds raised in the Petition. Paper 7 (“Institution Dec.”).

Following institution, Patent Owner filed a Response. Paper 12 (“PO Resp.”). Subsequently, Petitioner filed a Reply to Patent Owner’s Response (Paper 19, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 23, “PO Sur-reply”).

On September 2, 2020, we held a consolidated oral hearing with several related cases involving Petitioner and Patent Owner: IPR2019-01079 (Patent 7,979,023 B2), IPR2019-01103 (Patent 7,979,023 B2), IPR2019-01101 (Patent 7,221,904 B1), and IPR2019-01105 (Patent 8,718,543 B2). A transcript of the hearing is included in the record. Paper 27 (“Hearing Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a).

Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e) (2016); 37 C.F.R. § 42.1(d). For the reasons below, we determine that Petitioner has

demonstrated by a preponderance of the evidence that claims 10, 15–18, 31, and 33–35 of the '701 patent are unpatentable.

## II. BACKGROUND

### A. *Related Proceedings*

According to Petitioner and Patent Owner, the '701 patent (as well as other patents) is involved in these district court litigations:

(1) *Carucel Investments LP v. Fiat Chrysler Automobiles US LLC et al.*, Case No. 3-18-cv-03331 (N.D. Tex., filed Dec. 18, 2018),

(2) *Carucel Investments LP v. General Motors Company*, Case No. 3-18-cv-03332 (N.D. Tex., filed Dec. 18, 2018 ),

(3) *Carucel Investments LP v. Volkswagen Group of America Inc.*, Case No. 3-18-cv-03333 (N.D. Tex., filed Dec. 18, 2018 ), and

(4) *Carucel Investments LP v. Mercedes-Benz USA LLC et al.*, Case No. 3-18-cv-03334 (N.D. Tex., filed Dec. 18, 2018). Pet. 3; Prelim. Resp. 3.

The parties also state that the '701 patent is related to certain patents involved in *inter partes* reviews:

(1) U.S. Patent No. 7,221,904: IPR2019-01298, -01101, -01573, 01635;

(2) U.S. Patent No. 7,979,023: IPR2019-01079, -01103, -01404;

(3) U.S. Patent No. 8,463,177: IPR2019-01104, -01440; and

(4) U.S. Patent No. 8,718,543: IPR2019-01105, -01106, -01441. *See* Pet. 3; Paper 4, 1.

### B. *Real Parties-in-Interest*

Petitioner identifies itself as the real party in interest. Pet. 3. Patent Owner identifies itself as the real party in interest. Paper 4, 1.

*C. The '701 Patent (Ex. 1001)*

The title of the '701 patent is “Mobile Communication System with Moving Base Station.” Ex. 1001, code (54). The '701 patent relates to mobile telephone systems and states that a “problem with existing mobile telephone systems is the considerable time required in handoffs,” which is the process by which a mobile unit is transferred from one cell site to another as it moves through a network. *Id.* at 1:35–43, 1:54–55. According to the '701 patent, in urban areas, the number of cells is increased and cell size is decreased to accommodate more users. *Id.* at 1:55–65. The '701 patent states that a drawback of reducing cell size is that mobile units cross cell boundaries more often, requiring more handoffs. *Id.* at 1:65–2:2.

To address this purported problem, the '701 patent proposes a mobile communication system that employs moving base stations which move in the direction of traffic along a roadway. *Id.* at 2:65–3:5. The moving base stations are interposed between mobile units and fixed base stations. *Id.* The '701 patent states that, “because of movement of the base station in the same direction as the traveling mobile unit, the number of handoffs is greatly reduced.” *Id.* at 5:14–16.

*D. Illustrative Claim*

As mentioned above, the challenged claims are claims 10, 15–18, 31, and 33–35. Claims 10 and 31 are the independent claims among the challenged claims and are reproduced below:

10. A movable base station configured to move relative to Earth, the movable base station comprising:
  - a plurality of spatially separated antennas;
  - a receiver configured to receive fixed port signals from a fixed port through the plurality of spatially separated antennas;

a controller configured to align and combine the received fixed port signals; and

a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals.

Ex. 1001, 11:54–64.

31. A movable base station configured to move relative to Earth, the movable base station comprising:

a plurality of spatially separated antennas;

a receiver configured to receive fixed port signals from a fixed port through the plurality of spatially separated antennas; and

a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals, the radio frequency signals transmitted within time slots of time-division multiplex channels.

Ex. 1001, 13:13–22.

#### *E. References and Other Evidence*

Petitioner relies on the following references:

Reference	Description	Date	Exhibit
Ito	US 5,276,686	Issued Jan. 4, 1994	Ex. 1005
Gardner	US 5,504,786	Issued April 2, 1996	Ex. 1006
Gilhousen390	US 5,109,390	Issued April 28, 1992	Ex. 1007
Gilhousen865	US 5,559,865	Issued Sept. 24, 1996	Ex. 1009

Petitioner also relies on testimony from Scott A. Denning (Ex. 1003, “Denning Decl.”) and a Reply Declaration of Mr. Denning (Ex. 1034, “Denning Reply Decl.”).

Patent Owner has submitted a Declaration of Mark R. Lanning (Ex. 2100, “Lanning Decl.”).

Both parties have submitted deposition transcripts for these declarants.<sup>1</sup>

#### *F. Grounds Asserted*

Petitioner challenges the patentability of the ’701 patent claims on the following grounds:

<b>Claims Challenged</b>	<b>35 U.S.C. §</b>	<b>References/Basis</b>
10, 15–18, 31, 33–35	103(a)	Ito, Gardner
10, 15–18, 31, 33–35	103(a)	Gilhousen865, Gilhousen390

Pet. 6.

### III. ANALYSIS

#### *A. Level of Ordinary Skill in the Art*

Petitioner asserts that a person of ordinary skill in the art would have had “a B.S. degree in Computer Science, Electrical Engineering, or an equivalent field, as well as at least 2–3 years of academic or industry experience in mobile wireless communications, or comparable industry experience.” Pet. 16 (citing Denning Decl. ¶¶ 29–30).

Patent Owner contends a person of ordinary skill in the art “at or near the filing date of the earliest priority application of the ’701 Patent would have had (i) a Bachelor of Science degree in electrical engineering or computer engineering or related field of study; (ii) at least two years of experience with wireless communications systems; and (iii) would also be familiar with cellular communication technology.” PO Resp. 8 (citing

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<sup>1</sup> Exs. 1039 (“Lanning I Dep.”), 1040 (“Lanning II Dep.”), 1041 (“Lanning III Dep.”), 1042 (“Lanning IV Dep.”), 2108 (“Denning Dep.”).

Lanning Decl. ¶ 46). Further, Patent Owner contends that “[a] lack of experience can be compensated with additional education and a lack of education can be compensated with additional work experience.” *Id.*

The parties’ formulations differ slightly. Patent Owner’s formulation specifically calls for familiarity with cellular communication technology whereas Petitioner’s formulation more generally requires a comparable level of experience with mobile wireless communications. We regard these formulations as essentially the same because familiarity with mobile wireless communications would normally include knowledge of cellular communication technology. Both definitions also are consistent with the prior art before us and the level of skill reflected in the ’701 patent. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (prior art itself may reflect an appropriate level of skill). As the definitions are equivalent, we adopt Patent Owner’s more specific description, with the exception of the open-ended language “at least.” However, we would reach the same result on the ultimate question of obviousness of the ’701 patent under either formulation.

### *B. Claim Construction*

In an *inter partes* review based on a petition filed on or after November 13, 2018, the Board applies the same claim construction standard as that applied in federal courts. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (now codified at 37 C.F.R. § 42.100(b) (2019)). In this context, we “constru[e] the claim in accordance with the ordinary and customary meaning of such claim 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) (2019); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally operative meaning of claim language.’” *Phillips*, 415 F.3d at 1317. Any special definitions for claim terms must be set forth in the specification with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Before institution, neither party proposed any claim constructions for our consideration. Petitioner initially contended that “all claim terms should receive their plain and ordinary meaning, in the context of the ’701 patent specification, under the *Phillips* standard.” Pet. 17–18. In the Preliminary Response, Patent Owner stated that the Board “need not construe any claim term in a particular manner in order to arrive at the conclusion that the Petition is procedurally and substantively deficient.” Prelim. Resp. 3. In our Institution Decision, we did not see the need to construe any terms. Institution Dec. 6–7.

Post-institution, both parties now propose constructions for certain terms appearing in the challenged claims. Patent Owner now seeks construction of the following terms: (1) “fixed port,” (2) “configured to,” (3) “transmit radio frequency signals to a mobile device corresponding to the

received fixed port signals,” (4) “mobile device,” and (5) “automotive vehicle.” PO Resp. 10–17. Several of these terms were construed by the district court in the *Novatel* litigation. See Ex. 2105 (*Carucel Investments L.P. v. Novatel Wireless, Inc. et al.*, Case No. 3:16-cv-0118-H-KSC (S.D. Cal.), Dkt. 131 (Claim Construction Order), 20 (Sept. 19, 2016)). Petitioner responds that “none of these terms require construction.” Pet. Reply 3.

1. “fixed port”

The district court construed “fixed port” as “a stationary device at which signals can enter and exit a communication network.” Ex. 2105, 12. Patent Owner urges us to adopt the district court’s construction. PO Resp. 10. Petitioner contends there is no need to provide a construction for this term to resolve a controversy. Pet. Reply 3–4 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We agree with Petitioner that no construction of this term is necessary.

2. “configured to”

In the *Novatel* litigation, the district court construed “configured to” as “constructed to move with the traffic at a rate of speed which is comparable to the speed of the traffic.” Ex. 2105, 16. Patent Owner contends that the preamble is limiting and urges us to adopt this construction. PO Resp. 10–12. Petitioner states that this construction “is consistent with the district court’s order” and does not dispute this construction. Pet. Reply 4. However, Petitioner disagrees with what it terms an “even narrower construction” of this term, implied by Patent Owner’s arguments. *Id.* This dispute centers around the meaning of “traffic,” a term that does not appear in the claim but does appear in the district court’s construction of “configured to.” Patent Owner relies on this

proposed further limitation to the district court's construction in discussing the prior art Gilhousen<sup>865</sup> patent, where Patent Owner states: "An airplane does not move with traffic as it is not bound to predetermined roads." PO Resp. 48; *see also* PO Sur-reply 24–25.

Based on the parties' agreement with the district court's construction, we apply that construction in our analysis below. Furthermore, we discuss the "narrower implied construction" of the term "traffic" advanced by Patent Owner in the analysis below of Gilhousen<sup>865</sup>.

3. *"transmit radio frequency signals to a mobile device corresponding to the received fixed port signals"*

Patent Owner asserts that this phrase means "transmit radio frequency signals to a mobile device, where the radio frequency signals correspond to the received fixed port signals." PO Resp. 13. Petitioner responds that an express construction of this term is not necessary to resolve a controversy. Pet. Reply 3–4. We agree with Petitioner that no construction of this term is necessary.

4. *"mobile device"*

Before our Institution Decision, neither party advanced a construction for "mobile device," which now lies at the center of this controversy. Post-institution, Patent Owner argues: "A mobile device is more than just a cordless phone handset." PO Resp. 13. Thus, Patent Owner would have us construe "mobile device" narrowly, as "a device that must register with and be able to directly communicate with the cellular network." *Id.* Patent Owner asserts that this includes the "capability to be switched back-and-forth between either a direct connection with the fixed base station or a connection with a moving base station." *Id.* at 13–14.

To support this construction, Patent Owner relies on the '701 patent Specification: “The '701 Patent specification teaches that a mobile device must be capable of directly communicating with either a fixed cellular base station or a moving base station.” *Id.* at 13 (citing Ex. 1001, 4:46–49). According to Patent Owner, “the mobile unit’s capability to be switched back-and-forth between either a direct connection with the fixed base station or a connection with a moving base station is discussed repeatedly and throughout the specification.” *Id.* at 13–14 (citing Ex. 1001, 10:52–57, 11:3–11). Patent Owner also cites the discussion of the mobile device in the '701 patent (called a “mobile unit”) which describes registration:

When a mobile unit set is first powered up or first enters a service area, the mobile unit must register in the manner described earlier, by transmitting its unique address in the new service area. The address will be received by the closest moving base station 30 and transmitted via a fixed radio port and the gateway switch 60 to the telephone network.

Ex. 1001, 9:49–56 (partially quoted at PO Resp. 14–15). Patent Owner also relies on testimony from its expert, Mr. Lanning. *See* PO Resp. 13–14 (citing Lanning Decl. ¶¶ 44, 52–59, 62–66).

Petitioner responds that no special construction of “mobile device” is necessary and opposes Patent Owner’s construction on a number of grounds. Pet. Reply 4–9. In summary, Petitioner asserts that Patent Owner’s argument for a special construction is inconsistent with Patent Owner’s position in the *Novatel* litigation. *Id.* at 5; Ex. 2105, 20 (“In its opening claim construction brief, [Patent Owner] states that it no longer requests construction of the term ‘mobile unit.’”). Further, Petitioner points out that the challenged claims are directed to a “mobile base station,” not to a

“mobile device” which is “merely ancillary” to the claimed mobile based station and is not a “positively recited element.” Pet. Reply 6.

Petitioner also contends that Patent Owner’s construction is inconsistent with the intrinsic record. *Id.* at 7–9. Petitioner shows that the claims themselves do not require that the mobile device perform registration or communicate directly with a cellular network. *Id.* at 7–8. Also, Petitioner shows that the ’701 patent discloses that “the mobile unit does not receive communications from the fixed port but only from the movable base station,” and describes “eliminating any direct communication from the mobile unit to the fixed radio port.” *Id.* at 7 (quoting Ex. 1001, 3:28–35) (citing Ex. 1001, 4:46–52). Finally, Petitioner points to Patent Owner’s statements describing the “mobile unit” during prosecution of a closely related patent (U.S. Patent No. 7,221,904) that contradict Patent Owner’s narrow construction here. *Id.* at 8 (citing Ex. 1023, 181<sup>2</sup> (“The present invention is directed to methods and devices for providing communication services to moving mobile units such as telephones, radio modems, or other types of radios.”))).

Having reviewed and considered the record presented, including Petitioner’s and Patent Owner’s submissions, we are not persuaded to adopt Patent Owner’s construction of “mobile device.” We first look to the words of the claims. *Phillips*, 415 F.2d at 1312. We find that the language of the challenged claims does not support Patent Owner’s construction. As Petitioner points out, the challenged claims themselves are not directed to the mobile device. Pet. Reply 6–7. Also, the claims themselves do not

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<sup>2</sup> Although Petitioner cites page 108 of Exhibit 1023, the material Petitioner quotes appears on page 181 of the exhibit.

specify a device “that must register with and be able to directly communicate with the cellular network.” The challenged claims and the Specification of the ’701 patent focus on the mobile base station, not the mobile device. Denning Reply Decl. ¶ 21; Lanning I Dep. 164:6–7 (“None of the claims are in regard to the mobile device.”). Patent Owner’s expert, Mr. Lanning, describes the moving base station (not the mobile device) as “a new invention.” Lanning I Dep. 62:6–8. The Summary of the Invention in the ’701 patent begins: “These and other problems of the prior art are overcome in accordance with this invention by means of a moving base station.” Ex. 1001, 2:65–67. This emphasis on the moving base station as the invention is consistent with counsel for Patent Owner’s presentation at oral argument: “The Carucel patents were the culmination of Mr. Gavrilovich’s life’s work when he invented a moveable base station that significantly improved wireless communications by acting as an intermediary between cell towers and mobile devices.” Hearing Tr. 67:15–19.

We find that Patent Owner’s contention that the mobile unit must be able to communicate directly with the cellular network is not supported by the intrinsic record. In the challenged claims, it is the mobile base station that communicates directly with the fixed ports, not the mobile device. Pet. Reply 7–8. As Petitioner shows, we find that the challenged claims describe only communications passing between the moving base station and the fixed port and between the moving base station and the mobile device. *Id.*; Denning Reply Decl. ¶ 23. Thus, claim 10 recites that the *movable base station* has: “a receiver configured to receive fixed port signals *from a fixed port* through the plurality of spatially separated antennas;” and “a transmitter

configured to transmit radio frequency signals *to a mobile device.*” Ex. 1001, 11:54–64 (emphasis added). The challenged claims, therefore, do not require the mobile device to communicate directly with a cellular network. *Id.*

Furthermore, the claims do not associate the signals transmitted by the mobile device to the moving base station with a cellular network, or identify the recited mobile unit with a cellular network. Denning Reply Decl. ¶ 23. As Mr. Denning testifies: “The only functionality attributed to the ‘mobile device’ by the independent claims of the ’701 patent are the abilities to transmit and receive radio signals from/to the claimed ‘mobile bas station.’” *Id.* ¶ 21 (emphases omitted).

Moreover, we find that the ’701 patent Specification does not support Patent Owner’s narrowing construction of “mobile device” as a phone capable of communications directly with a cellular network. *Cf.* PO Resp. 7–8. As stated in *Phillips*, “the specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Phillips*, 415 F.2d at 1315 (internal quotes and citation omitted).

First, the Specification of the ’701 patent does not provide a clear indication supporting Patent Owner’s contention that conventional cordless non-cellular phones should be excluded. *Cf.* PO Resp. 13 (“A mobile device is more than just a cordless handset.”). In the Background section, the ’701 patent describes the goal of the patent as encompassing “all applications” including cordless phones: “What is desirable is an infra structure which allows the use of such terminals *in all applications*, whether in the home of office as a *cordless phone . . .*” Ex. 1001, 2:45–47 (emphases added).

While the '701 patent does refer to the base stations as “cell site[s]” (*id.* at 4:61–62), it also describes the radio interfaces between the mobile devices and the base stations in more general terms. *Id.* at 6:37–67. Thus, the '701 patent describes the radio interfaces between the mobile units and both the moving and fixed base stations as “a standard radio interface, well known in the art.” *Id.* at 6:37–38. This is consistent with the stated goal of providing “an infra structure which allows the use of . . . a cordless phone.” *Id.* at 2:45–47.

Moreover, further support for our conclusion that Patent Owner’s construction is too limiting is found in the '701 patent’s description of an embodiment where the mobile device is prevented from communicating directly with the fixed ports. Pet. Reply 7–8 (citing Ex. 1001, 3:28–35). In this embodiment, the power levels for the signals between the moving base station and the mobile device are chosen to *avoid* direct communication between the mobile device and the fixed radio ports. Ex. 1001, 3:28–35.

We also consider the prosecution history of the '701 patent and its related applications in construing the claims. *Phillips*, 415 F.2d at 1317. Here, the prosecution history of related U.S. Patent 7,221,904 (the subject of co-pending IPR2019-01101) is relevant. Pet. Reply 8.

The '701 patent is a continuation of the '904 patent, and shares a common specification and similar claims with the '904 patent. During prosecution of the '904 patent, in an appeal brief to the Board of Patent Appeals and Interferences, Patent Owner did not limit the invention to cellular devices, but told the Board that radios and telephones were included: “The present invention is directed to methods and devices for providing communication services to moving mobile units *such as telephones, radio*

*modems, or other types of radios.*” Ex. 1023, 181 (emphasis added). We find that this prosecution history of the ’904 patent describing the mobile devices as “telephones” and “radios” does not support Patent Owner’s construction limiting such devices to “a device that must register with and be able to directly communicate with the cellular network.”

Patent Owner asserts that its proposed construction reflects “the plain and ordinary meaning” of the term “mobile device” under *Phillips*. PO Resp. 13; PO Sur-reply 1–2. Patent Owner argues that Petitioner is “construing the meaning of ‘mobile device’ in the abstract.” PO Sur-reply 1. Patent Owner contends Petitioner’s analysis “is premised on incorrect legal standards.” *Id.* at 2. Patent Owner argues that “the ’701 Patent specification also describes the invention as a whole and should be limited as such.” *Id.* Patent Owner continues: “Specifically, the ’701 Patent relates to and describes as a whole improving the wireless connections of **mobile devices within cellular telephone systems** via a moving base station . . . .” *Id.* at 2–3.

Patent Owner’s arguments are not persuasive because they are contrary to the claim language and the intrinsic evidence discussed above. The challenged claims are directed to the “moveable base station,” and Patent Owner has asserted that the invention of the ’701 patent is the moving base station, not the mobile devices, which according to the prosecution history can be conventional radios and telephones. *See* Hearing Tr. 67:15–19; *see also* PO Resp. 2 (“The asserted claims of the ’701 Patent cover a movable base station configured to provide important benefits to mobile devices, such as smartphone, tablet and laptop users.”), 3 (discussing “Mr. Gavrilovich’s inventive movable base station”), 5 (Mr. Gavrilovich’s “vision

led to the patented invention of a movable base station or apparatus interposed between mobile devices and a cellular network.”). While the ’701 patent may discuss cellular networks, we find that, for the reasons above, the disclosure is not limited to cellular phones.

Patent Owner does not explicitly argue that there has been a disavowal or disclaimer of claim scope, and there is no support for such an argument. Patent Owner fails to demonstrate a disavowal of mobile units that do not communicate directly with a cellular system either in the Specification or prosecution history. As discussed above, the ’701 patent claims are directed to the mobile base station communicating with the cellular network and the Specification describes an embodiment which prevents the mobile unit from communicating with the fixed ports. “To disavow claim scope, the specification must contain ‘expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.’” *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1306 (Fed. Cir. 2011); *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001) (“Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question.”). The references to cellular communications in the ’701 patent cited by Patent Owner (PO Sur-reply 5–6) are merely exemplary, and do not rise to the level of a clear and unmistakable disavowal.

Rather than asserting there has been a disavowal or disclaimer of claim scope, Patent Owner argues “recent Federal Circuit precedent . . .

cautions against . . . effectively requiring statements in the intrinsic record to rise to the level of a disclaimer in order to inform the meaning of the disputed claim term.” PO Sur-reply 4. We are not persuaded that Patent Owner’s cited authorities support that argument here. *Id.* at 4–6.

In *Pacing Technologies, LLC v. Garmin International, Inc.*, 778 F.3d 1021 (Fed. Cir. 2015), cited by Patent Owner (PO Sur-reply 2), the Federal Circuit found evidence of “a clear and unmistakable statement of disavowal or disclaimer” in the stated objects of the invention, including a statement that the objects would be accomplished by the particular feature (a “repetitive motion pacing system”) to which the Court limited the claims. 778 F.3d at 1025. Here, in contrast, for the reasons discussed above, there is no corresponding “clear and unmistakable statement” limiting the scope of the mobile devices to “a device that must register with and be able to directly communicate with the cellular network.”

We do not find Patent Owner’s other authorities to be any more persuasive. For example, in *Personalized Media Communications, LLC v. Apple Inc.*, 952 F.3d 1336 (Fed. Cir. 2020), cited by Patent Owner (PO Sur-reply 4), the Federal Circuit relied on facts not present here, namely, that “[d]uring prosecution, the applicant repeatedly and consistently voiced its position that encryption and decryption require a digital process in the context of the ’091 patent.” 952 F.3d at 1345. Moreover, the Court observed: “The applicant never abandoned that position. Indeed, the applicant amended the claims—giving rise to the claim term at issue on appeal—only to clarify its position that “encryption requires a digital signal.” *Id.* at 1345–46. As discussed above, the relevant prosecution history here does not include any such repeated or consistent statements by

Patent Owner excluding non-cellular devices; in fact, the prosecution of a related patent includes a statement that radios and telephones are within the scope of the invention. Ex. 1023, 181. Nor has Patent Owner identified an amendment to the claims during prosecution that would “clarify its position” that such devices are excluded.

Patent Owner cites *Bell Atlantic Network Services, Inc. v. Covad Communications Group, Inc.*, 262 F.3d 1258 (Fed. Cir. 2001), for the proposition that the written description “can provide guidance as to the meaning of the claims.” PO Sur-reply 4. This point is not in dispute. We discuss the written description in our analysis above, and find that it does not support Patent Owner’s construction for the reasons given there. *Bell Atlantic* does not help Patent Owner’s argument.

The same is true of Patent Owner’s discussion of *On Demand Machine Corp. v. Ingram Industries, Inc.*, 442 F.3d 1331 (Fed. Cir. 2006). See PO Sur-reply 4–5. As Patent Owner’s quotation from *On Demand* makes clear, it is not necessary to find an explicit disavowal “when the scope of the invention is clearly stated in the specification, and is described as an advantage and distinction of the invention.” 442 F.3d at 1340 (quoted at PO Sur-reply 4–5). However, in our analysis above, we find that the scope of the invention and its advantages as described in the ’701 patent specification center on the mobile base station, not the mobile device. The ’701 patent Specification, therefore, does not favor Patent Owner’s narrow construction of “mobile device.” Thus, *On Demand*’s exception to the normal requirement for an explicit disavowal is not applicable here.

We are not persuaded by Patent Owner’s listing of “examples” from the ’701 patent that discuss communications with the fixed base stations

when traveling at lower speeds of less than thirty miles per hour. PO Sur-reply 3–4. Those citations do not describe the communications as cellular communications or fixed base stations 70 as cell sites, stating only that their operation is “essentially the same as that of a standard cellular fixed base station.” Ex. 1001, 10:50–52. Nor are Patent Owner’s citations to the various occurrences of the term “cellular” in the ’701 patent persuasive. *Cf.* PO Sur-reply 5–6. There is no dispute that improving cellular technology is one of the goals described in the ’701 patent. However, Patent Owner fails to support its argument that the ’701 patent “explicitly *and exclusively* relates to improving the wireless connections of mobile devices within ‘cellular telephone systems.’” *Id.* at 5 (original emphasis omitted; emphasis added). We find, based on the analysis above, that the claims, the Specification, and the prosecution history of the ’701 patent reveal a broader goal of also improving wireless connections involving non-cellular devices, such as radios and telephones.

In addition, we are not persuaded by Patent Owner’s suggestion that the Specification requires the mobile device to “register . . . with the cellular network.” PO Sur-reply 1 n.1. Such a registration requirement is not in the claims or prosecution history. Registration with a base station is mentioned in the ’701 patent Specification (*see* PO Sur-reply 3), but the registration process described there occurs only “[w]hen a mobile unit set is first powered up or first enters a service area,” and involves the mobile device transmitting its address to the moving base station, not the fixed base stations. Ex. 1001, 9:52–54 (“The address will be received by the closest moving base station 30 and transmitted . . . to the telephone network”).

As discussed above, such transmissions between the mobile unit and the moving base station use a “standard radio interface.”

Thus, we find that Patent Owner’s analysis of the ’701 patent Specification does not support its theory that the mobile device communicates *directly* with a cellular system when it registers during power up or when first entering a service area. Further, we find that, to the extent the ’701 patent discloses registration by the mobile device, it describes registering with the moving base station and not with the fixed base station. Ex. 1001, 9:49–56. The actual registration with the fixed base station is handled by the mobile base station. *Id.*

In summary, we find that Patent Owner’s proposed construction for “mobile device” is not supported by the claim language of the ’701 patent or the intrinsic evidence, and, therefore, we do not adopt a construction that would limit “mobile devices” to cellular phones or other devices “that must register with and be able to directly communicate with the cellular network,” and which excludes conventional cordless phones.

We agree with Petitioner that no construction of “mobile device” is necessary. Pet. Reply 3, 5–6.

5. “*automotive vehicle*”

Patent Owner construes the term “automotive vehicle,” which appears in dependent claim 18, as an automobile. PO Resp. 16 (citing Lanning Decl. ¶ 44). Patent Owner relies on the description in the Specification of an automotive vehicle as an alternative means of moving base stations 30. *Id.* (citing Ex. 1001, 4:5–9).

Petitioner contends that no construction of this term is needed, but if a construction is necessary, Petitioner construes “automotive vehicle” as “a

vehicle moving by means of its own power.” Pet. Reply 9 (citing Denning Decl. ¶ 182).

As will be apparent from our analysis below, our decision does not depend on the construction of “automotive vehicle.” Therefore, we do not see the need to construe this term to resolve a controversy.

### *C. Legal Standard*

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the subject matter sought to be patented 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 based on underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in the record, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Neither the Petition nor the Patent Owner Response presents evidence on the fourth *Graham* factor. We, therefore, do not consider that factor in this decision.

Even if prior art references disclose all of the limitations in a claim when combined, there must be evidence to explain why a person of ordinary skill in the art would have combined the references to arrive at the claimed invention. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1366–67 (Fed. Cir. 2012) (citing *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008) (holding that post-*KSR* “some kind of motivation must be shown from some source, so that the [trier of fact] can

understand why a person of ordinary skill would have thought of either combining two or more references or modifying one to achieve the patented [invention]”)). A precise teaching directed to the specific subject matter of a challenged claim is not necessary to establish obviousness. *KSR*, 550 U.S. at 418. Rather, “any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 420. Accordingly, Petitioner must show that “a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (internal quotations and citations omitted).

*D. Obviousness over Ito and Gardner*

Petitioner asserts that claims 10, 15–18, 31, and 33–35 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Ito and Gardner. Pet. 26–51. We first describe the prior art that Petitioner seeks to combine to show that these challenged claims would have been obvious and then turn to the merits of the combination.

*1. Overview of Ito (Ex. 1005)*

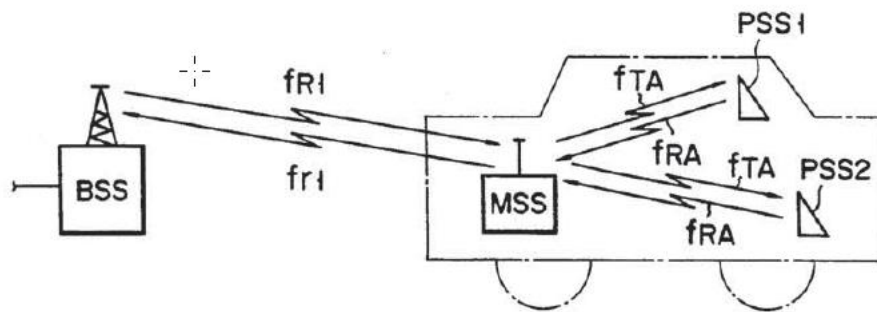
Ito is a patent titled “Mobile Radio Communication System Having Mobile Base and Portable Devices as a Mobile Station,” and issued on January 4, 1994. Ex. 1005, codes (54), (45). Petitioner contends Ito is prior art under 35 U.S.C. § 102(b). Pet. 5.

According to Ito, cellular mobile radio telephone systems have mobile stations that are connected by a radio channel to a base station for the radio communication zone where the mobile stations are currently located. Ex.

1005, 1:22–24. The mobile stations are further connected to a wire telephone network by way of the base station and a control station. *Id.* at 1:24–26. In an automobile, the automobile telephone main unit and a handset assembly are connected by a signal cord, and the cradle and the handset are connected by a curled cord. *Id.* at 1:51–54. Ito explains that “[w]ith such an arrangement, the curled cord can constitute[] an annoying obstacle when the driver drives and speaks into the telephone transmitter simultaneously. Moreover, the handset cannot be moved away beyond a limit posed by the curled wire . . . .” *Id.* at 1:55–59.

To address these issues, Ito describes a mobile radio communication system that wirelessly connects a mobile station, or a mobile base device, and a portable device by a radio channel, in order to eliminate the necessity of wiring the mobile base device and portable telephone device together and increasing the maneuverability of the telephone handset. *Id.* at 2:5–12.

This is illustrated by Figure 6 of Ito, reproduced below.



**FIG. 6**

Figure 6 of Ito depicts a mobile radio communication system. In Figure 6 of Ito, mobile base device MSS is wirelessly connected simultaneously with two portable devices PSS1 and PSS2. Ex. 1005, 12:52–

56. Base station BSS and mobile base device MSS communicate with each other by way of radio frequencies  $f_{T1}$  and  $f_{R1}$ .<sup>3</sup> *Id.* at 12:57–63. Mobile base device MSS and portable devices PSS1 and PSS2 communicate with each other by way of radio frequencies  $f_{TA}$  and  $f_{RA}$ . *Id.*

As described by Ito, Figure 3 (not shown) illustrates mobile base device MSS, which has two transmitter-receiver units. Ex. 1005, 7:9–12. The first transmitter-receiver unit is used for radio communication with base station BSS by way of a first radio channel. *Id.* at 7:12–17. The second transmitter-receiver unit is used for radio communication with its portable devices PSS by way of a second radio channel. *Id.*

## 2. Overview of Gardner (Ex. 1006)

Gardner is a patent titled “Open Loop Phase Estimation Methods and Apparatus for Coherent Combining of Signals Using Spatially Diverse Antennas in Mobile Channels.” Ex. 1006, code (54). Petitioner asserts that, because Gardner was filed on October 5, 1993, which is before the earliest effective filing date of the ’701 patent, it is prior art under 35 U.S.C. § 102(e). Pet. 6.

Gardner describes a receiver for use in cellular communications. Ex. 1006, 2:17–19. The receiver is configured to receive spatially diverse signals and to properly align and combine the received signals. *Id.* at 1:65–2:4. The receiver includes two spatially diverse antennas. *Id.* at 2:23–24. After demodulation and conversion, the received signals are processed by the receiver for alignment and combining. *Id.* at 2:64–3:10. Specifically, after the signals are converted to digital form, phase difference detection is

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<sup>3</sup> As Petitioner points out (Pet. 20 n.5), Figure 6 of Ito mislabels  $f_{T1}$  as  $f_{r1}$ . See Ex. 1005, 12:57–63.

performed in order to detect “a good estimate of the actual phase difference between the two signals.” *Id.* at 2:64–67. Then, the phase difference is used to phase align the two digitized signal vectors by shifting the phase of the vector. *Id.* at 3:1–7. Once aligned, the signals can be combined. *Id.* at 3:7–10.

3. *Analysis of Asserted Obviousness of Claims 10, 15–18, 31, and 33–35*

In support of Petitioner’s contention that claims 10, 15–18, 31, and 33–35 would have been obvious over the combined teachings of Ito and Gardner, Petitioner provides an element-by-element analysis showing where each element of the challenged claims is in Ito or Gardner. Pet. 26–51. Petitioner supports its analysis with testimony from Mr. Denning. *See* Denning Decl. ¶¶ 105–154; Denning Reply Decl. ¶¶ 32–47. Patent Owner, relying on the testimony of Mr. Lanning, argues that Petitioner does not show that the challenged claims are unpatentable. *See, e.g.*, PO Resp. 30–47; PO Sur-reply 11–24. For the reasons set forth below, we determine that Petitioner has proven by a preponderance of the evidence that claims 10, 15–18, 31, and 33–35 are obvious over the combined teachings of Ito and Gardner.

a) *Independent Claim 10*

(i) *A “movable base station configured to move relative to Earth”*

Petitioner asserts that, to the extent the preamble is limiting, Ito’s mobile base device MSS is the “movable base station” recited in the preamble of claim 10). Pet. 29 (citing Ex. 1005, 12:52–53; Denning Decl. ¶ 113).

Patent Owner does not challenge Petitioner's showing that Ito teaches this subject matter. We find that the preamble of claim 10 (whether or not limiting) is met by Ito.<sup>4</sup>

(ii) *“a plurality of spatially separated antennas”*

Petitioner asserts that “a plurality of spatially separated antennas” is taught by Gardner's disclosure that “[o]ne of the most useful techniques for improving receiver performance in the mobile (Rayleigh) channel is to use spatial diversity” and that this “spatial diversity is achieved by ‘us[ing] two (or more) antennas spaced far enough apart’ so as to reduce the effects of fading on the received signal.” Pet. 30 (quoting Ex. 1006, 1:15–20).

Petitioner further asserts that “Gardner explains that, during operation, multiple ‘RF signals [are] received on the two antennas’ in order to improve receiver performance and combat fading issues.” *Id.* (quoting Ex. 1006, 2:24–30) (citing Ex. 1006, 1:15–24). Patent Owner does not challenge Petitioner's showing that Gardner teaches this limitation. We find that Gardner discloses this limitation.

(iii) *“a receiver configured to receive fixed port signals from a fixed port through the plurality of spatially separated antennas” and “a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals”*

Petitioner identifies Ito's transmitter-receivers 50 and 80 as the “receiver” and “transmitter” recited in claim 10. Pet. 31–34, 36–37; Denning Decl. ¶¶ 117–120, 124–125. As discussed above, Petitioner shows that Gardner discloses a plurality of spatially separated antennas. Pet. 33 (citing Ex. 1006, 1:10–20).

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<sup>4</sup> We do not decide whether the preamble of claim 10 is limiting.

Petitioner's analysis refers to annotated Figure 1 of Ito, reproduced below:

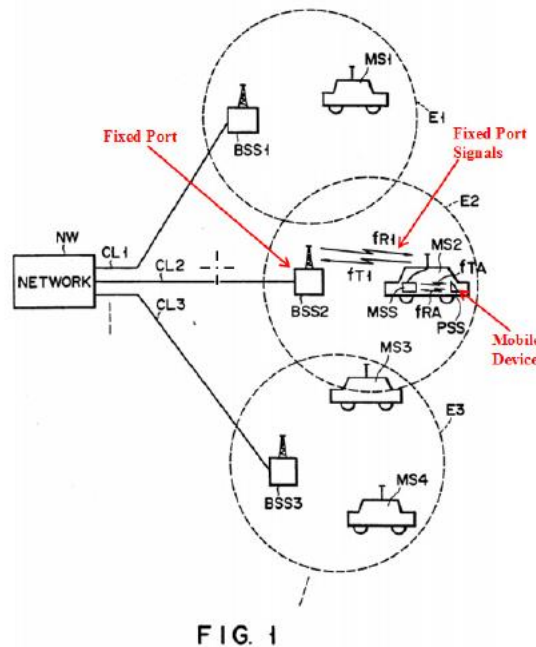


Figure 1 of Ito (annotated) shows an automobile telephone system. Pet. 31–32. Petitioner shows that Figure 1 of Ito and the accompanying written description disclose that Ito's mobile base device MSS "facilitates communication between a stationary base station BSS2 (*fixed port*) and a portable device PSS located within the vehicle" and "receive[s] a signal from the base station BSS2' (*receive [a] fixed port signal[] from a fixed port*) via the first transmitter-receiver 50 and 'forward[s] it to the portable device PSS2' via the second transmitter-receiver 80." *Id.* (citing Ex. 1005, 5:62–65) (quoting Ex. 1005, 13:15–18).

Petitioner also shows that Ito discloses "mobile base device MSS [i.e. movable base station] 'receive[s] a signal from the base station BSS2 [i.e., fixed port] and **forward[s] it to the portable device PSS2** [i.e., mobile device],'" and that a person of ordinary skill in the art would have

understood that “the signal transmitted to the portable device PSS corresponds to those received from the base station BSS2.” Pet. 36–37 (quoting Ex. 1005, 13:15–18) (citing Denning Decl. ¶ 124). According to Petitioner, “Ito further explains that this forwarding process is performed for multiple signals” and “that the portable device PSS receives multiple signals and that the BSS transmits multiple signals.” *Id.* at 37 (citing Denning Decl. ¶ 124; Ex. 1005, 6:41–46, 8:62–64). Petitioner contends that because Ito discloses forwarding a signal received from a base station to the portable device, it would have been obvious to a person of ordinary skill in the art that the multiple received signals are forwarded in the same manner. *Id.* (citing Denning Decl. ¶ 124).

In response to Petitioner’s contentions, Patent Owner refers to its proposed claim construction and argues that Ito does not disclose a “mobile device” as recited in claim 10. PO Resp. 41–43. Patent Owner states that “Ito does not disclose any ability of its portable devices to register or directly communicate with a cellular network.” *Id.* at 42 (citing Lanning Decl. ¶¶ 130–132). Patent Owner asserts Ito’s “portable device is similar to a cordless phone system,” and, therefore, is excluded under Patent Owner’s construction of “mobile device.” *Id.* at 43. Patent Owner’s argument relies on its proposed construction of “mobile device” as “a device that must register with and be able to directly communicate with the cellular network.” *Id.* Because we have not adopted Patent Owner’s claim construction for “mobile device” (*see* Section III.B.4), Patent Owner’s argument is not persuasive.

For the reasons given by Petitioner and summarized above, we find that Ito’s portable device PSS meets the requirement of a mobile device as

recited in claim 10. *See* Denning Decl. ¶ 124–125; Denning Reply Decl. ¶ 32 (citing Ito’s Fig 6; Ex. 1005, 11:65–12:1). We also find that Ito discloses a “receiver” and “transmitter” as recited in claim 10.

(iv) “*a controller configured to align and combine the received fixed port signals*”

For the claimed aligning the received fixed port signals, Petitioner asserts Gardner discloses “detecting a phase difference of the signals received from the two spatially diverse antennas,” and using this phase difference “to phase **align**, as shown in block 8, the two digitized signal vectors . . . by shifting the phase’ of the antenna 0 signal to be inphase with the antenna 1 signal.” Pet. 35 (citing Ex. 1006, 2:64–67) (quoting Ex. 1006, 3:1–7).

For the claimed combining the received fixed port signals, Petitioner asserts Gardner discloses, once the signals have been properly aligned, “**combining** of the samples as shown in block 10, in the preferred embodiment by adding’ the two aligned signals.” *Id.* (quoting Ex. 1006, 3:7–10). Finally, Petitioner asserts Gardner discloses that “a processor (*controller*) performs the *aligning* and *combining* functions,” thereby teaching the claimed “controller.” *Id.* at 36 (citing Ex. 1006, 2:53–63).

Patent Owner does not challenge Petitioner’s showing that Gardner meets this limitation. We find that this limitation is met by Gardner.

(v) *Rationale for Combining Ito and Gardner*

Petitioner provides a rationale for combining Ito and Gardner. *See, e.g.,* Pet. 26–28. In response to Petitioner’s rationale for combining Ito and Gardner, Patent Owner makes several arguments alleging Petitioner has not provided sufficient reasoning to support the combination of Ito and Gardner.

PO Resp. 30–38. We have considered Patent Owner’s arguments and find them unpersuasive. Below, we first address Petitioner’s rationale and then Patent Owner’s responsive arguments.

Petitioner asserts that Ito’s first receiver-transmitter 50 (base station side) and second receiver-transmitter 80 (portable device side) each include only a single antenna, and, thus, are not configured to receive spatially diverse signals. *Id.* at 26. According to Petitioner, Ito also discloses that signals transmitted to a moving device often have higher error rates due to “high speed fading phenomena” but does not specifically describe how such errors can be reduced. *Id.* (citing Ex. 1005, 16:49–61; Denning Decl. ¶ 106). Petitioner explains that a person of ordinary skill in the art “would have looked to the prior art, such as Gardner, for determining how to combat the deleterious effects of fading on signals transmitted to a moving device.” *Id.* (citing Denning Decl. ¶ 106). Petitioner also explains that “Gardner emphasizes the importance of employing spatially diverse antennas in the receiver to reduce the effects of fading on received signals” and contends that based on the teachings of Gardner, a person of ordinary skill in the art “would have been motivated to modify Ito so as to incorporate spatially diverse antennas.” *Id.* at 26–27 (citing Ex. 1006, 1:15–24; Denning Decl. ¶ 108).

Petitioner further asserts that a person of ordinary skill in the art would have recognized Gardner’s spatially diverse receiver to be modular and that modifying Ito with Gardner would have required minimal modifications. Pet. 27 (citing Denning Decl. ¶ 108). According to Petitioner, a person of ordinary skill in the art “could have combined the system of Ito with the teachings of Gardner by known methods, and the

results of the combination would have been predictable (e.g., by replacing Ito’s antenna with Gardner’s spatially separated antennas),” and “the proposed combination of Ito and Gardner would involve nothing more than incorporating a well-known concept (i.e., Gardner’s signal diversity) into a well-known system (i.e., Ito’s radio communication system).” *Id.* at 28 (citing Denning Decl. ¶ 110).

In response to Petitioner’s contentions, Patent Owner presents several arguments that a person of ordinary skill in the art would not have been motivated to combine the teachings of Ito and Gardner. PO Resp. 36–38. First, Patent Owner argues that “such a combination would not result in an automobile telephone unit that can receive signals from a fixed port.” *Id.* at 37. Patent Owner contends that such a combination would yield “an inoperable device”:

If a [person of ordinary skill] were to simply replace the single antenna of the automobile telephone unit of *Ito* with the spatially separated antennas of *Gardner*, as Petitioner proposes, this would result in an inoperable device, because it would be unable to correctly receive or process any signals from the spatially separated antennas.

*Id.* We disagree with Patent Owner’s assertion that a motivation to combine Ito and Gardner is lacking. We find that Petitioner’s rationale, as summarized above, is persuasive. Pet. 26–28; Denning Decl. ¶¶ 105–110.

Patent Owner cites *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), as requiring the Board to consider the motivation to combine in determining obviousness. PO Resp. 36. But, as the Federal Circuit has emphasized in analyzing obviousness, the person of ordinary skill “is not an automaton”:

*KSR* does not require that a combination only unite old elements without changing their respective functions. Instead, *KSR* teaches that “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” And it explains that the ordinary artisan recognizes “that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.”

*ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1219 (Fed. Cir. 2016) (citations omitted). The Federal Circuit further cautioned that “the rationale of *KSR* does not support [the] theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B.” *Id.*

Given the high level of skill in the pertinent art before us (*see* above § III.A)), we find that such a person of ordinary skill would have easily recognized that combining Ito and Gardner would have the advantages identified by Petitioner. Denning Decl. ¶¶ 105–110. Moreover, such a highly skilled person would have been able to combine the teaching of those references with a reasonable expectation of success. *Id.* As Petitioner summarizes: “Further, as evident from the above discussion, a [person of ordinary skill in the art] could have combined the system of Ito with the teachings of Gardner by known methods, and the results of the combination would have been predictable to a [person of ordinary skill].” Pet. 28 (citing Denning Decl. ¶ 110).

Second, Patent Owner argues that combining Ito and Gardner “would have required much new circuitry — not disclosed in either Ito or Gardner.” PO Resp. 37 (citing Lanning Decl. ¶ 114). Patent Owner’s argument is not persuasive.

“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art.” *MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1294 (Fed. Cir. 2015) (quoting *In re Keller*, 642 F.2d 413, 425 (CCPA 1981)); see also *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) (“[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review.”) and *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973) (“Combining the *teachings* of references does not involve an ability to combine their specific structures.”). We are satisfied with Mr. Denning’s description of how a person of ordinary skill would have approached making the combination of these known techniques. See Denning Decl. ¶¶ 105–110. We are not persuaded by Mr. Lanning’s testimony on this issue. Cf. Lanning Decl. ¶¶ 86–87, 114–115. His testimony mirrors arguments in Patent Owner’s response about the combination of Ito and Gardner resulting in an “inoperable device” and requiring “new circuitry.” See *id.* As discussed above, we find these arguments are unpersuasive and contrary to *KSR*, and Mr. Lanning’s testimony is similarly unpersuasive.

Third, Patent Owner argues that the supporting testimony from Mr. Denning is “unsupported and conclusory” and “entitled to little or no weight because Mr. Denning’s Declaration is a near-verbatim copy of the conclusory statements set forth in the Petition.” PO Resp. 22–29. We disagree with Patent Owner’s criticism of Mr. Denning’s testimony, which

we find helpful on this issue, particularly his example of how Ito and Gardner could be combined. *See, e.g.*, Denning Decl. ¶¶ 105–110. For the reasons stated above, we find Petitioner’s analysis of this challenge and the supporting testimony from Mr. Denning, including his explanation of the rationale for combining the teachings of the references, to be credible and supported by the cited evidentiary record.

Fourth, Patent Owner argues that the Petition does not supply “sufficient detail” on “how to combine” Ito and Gardner (and the other references). PO Resp. 31–35; PO Sur-reply 11–12. Petitioner and Mr. Denning, however, provide a detailed analysis explaining what teachings of Gardner would have been combined with the system of Ito. *See generally* Pet. 26–28; Denning Decl. ¶¶ 92–154. Mr. Denning’s testimony also demonstrates that all of the technology for practicing the alleged invention of the ’701 patent was well-known. Denning Decl. ¶¶ 39–85. According to the ’701 patent, the invention uses “well-known” equipment and functions. *See, e.g.*, Ex. 1001, 4:26, 5:3–4, 5:20, 5:47, 5:64, 6:10, 6:21, 6:36, 6:39, 6:48, 6:60, 9:5, 9:18, 9:47. Mr. Denning provides an example of how Ito and Gardner could have been combined. Denning Decl. ¶¶ 105–106.

We find Mr. Lanning’s testimony raising various technical problems in combining the references to be inconsistent with the Federal Circuit’s admonition that “the rationale of *KSR* does not support [the] theory that a person of ordinary skill can only perform combinations of a puzzle element A with a perfectly fitting puzzle element B.” *ClassCo*, 838 F.3d at 1219. We are not persuaded that more detailed explanations of how to combine such “well-known” equipment are required by *KSR*.

Fifth, Patent Owner argues that, because Petitioner’s proposed combination of Ito and Gardner “would result in an inoperable device,” these references “teach away from the combination.” PO Sur-reply 12 (citing *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1354 (Fed. Cir. 2001)). In *McGinley*, the Court of Appeals for the Federal Circuit stated that, “[i]f references taken in combination would produce a ‘seemingly inoperative device,’ we have held that such references teach away from the combination and thus cannot serve as predicates for a prima facie case of obviousness.” 262 F.3d at 1354. But as discussed above, we are persuaded by Petitioner’s contentions and evidence as to how Ito and Gardner would have and could have been combined, and, therefore, we do not agree with Patent Owner’s suggestion that the resulting combination yields an inoperative device. Moreover, *McGinley* was more recently distinguished in *In re Urbanski*, 809 F.3d 1237 (Fed. Cir. 2016). In *Urbanski*, as here, the motivation to combine the references (Wong and Gross) comes from the references themselves. *Urbanski*, 809 F.3d at 1243–44 (“Here, the cited references do not teach away from the claimed method. . . . Wong thus provides the motivation to modify the Gross process and suggests the desirability of such modification.”) We are, therefore, persuaded by Petitioner’s evidence that a person of ordinary skill would have combined the teachings of Ito and Gardner, and we are not persuaded by Patent Owner’s argument based on *McGinley*.

For the reasons above, we determine that Petitioner has shown by a preponderance of the evidence that a person of ordinary skill in the art would have been motivated to combine the teachings of Ito and Gardner with a reasonable expectation of success. As Petitioner points out, Ito itself refers

to errors caused by the “high speed fading phenomena” in the path between the base station and the mobile device. Pet. 26; Ex. 1005, 16:49–61; *see also* Denning Decl. ¶ 106. Moreover, Gardner discloses that spatial diversity is “[o]ne of the most useful techniques for improving receiver performance.” Ex. 1006, 1:14–16. Furthermore, Gardner discloses that to reduce the effects of fading “use two (or more) antennas spaced far enough apart.” *Id.* at 1:16–17.

b) *Claims 15–18, 31, and 33–35*

Petitioner also provides a detailed analysis explaining where the combination of Ito and Gardner teaches or suggests the limitations in claims 15–18, which depend from independent claim 10, and claims 31 and 33–35. Pet. 38–51; Denning Decl. ¶¶ 126–154. Patent Owner’s response refers back to its contentions directed to claim 10. PO Resp. 30–38, 41–44. For the reasons discussed above in connection with claim 10, Patent Owner’s arguments are not persuasive.

Claim 15

In addition to its arguments directed to claim 10, which are discussed above, Patent Owner also provides additional arguments regarding claim 15. PO Resp. 44–47.

Claim 15, which depends from claim 10, requires a further element of “a controller configured to compare the received fixed port signals received through the spatially separated antennas and to select a *best signal*.” Ex. 1001, 12:14–17 (emphasis added). Petitioner shows that Gardner meets this “best signal” limitation: “Gardner discloses that, while there are many well-known ways to make use of the signals received from the multiple antennas, ‘the simplest of these is to just choose [sic] the antenna that provides the

strongest signal.” Pet. 38 (quoting Ex. 1006, 1:25–27). Petitioner relies on Gardner also to show the “compare” and “select” steps in this claim. *Id.* at 38–39.

Patent Owner argues that Petitioner “incorrectly equates” Gardner’s selection of the “strongest signal” with the claimed “best signal.” PO Resp. 44; *see id.* at 44–47. Patent Owner contends the ’701 patent “provides that ‘a best signal’ is more than just the strongest signal,” and “[a]t a minimum, ‘best signal’ includes an analysis of the error rate in addition to the signal strength when viewed in the entire context of the ’701 Patent.” *Id.* at 46 (citing Ex. 1001, 10:57–62; Lanning Decl. ¶¶ 136–137).

Petitioner responds that the portion of the ’701 patent cited by Patent Owner does not support Patent Owner’s position because it “does not relate to the claimed limitation, but rather to functions carried out by a mobile device determining whether to handoff.” Pet. Reply 16 (emphasis omitted); Denning Reply Decl. ¶¶ 41–43. We agree with Petitioner. The passage relied on by Patent Owner describes the mobile unit’s operation in monitoring the signal from the base stations: “Each mobile unit monitors pilot signals from fixed and moving base stations and synchronizes to the base station providing the best signal.” Ex. 1001, 10:65–67. The claim, however, is directed to functionality of a controller in the moveable base station. Nor does the claim specify particular metrics (such as error rate) that must be evaluated by the claimed apparatus to select a “best signal.”

In addition, Mr. Denning testifies that Gardner discloses “well known schemes” for analyzing signals from two antennas, including one in which received signals are “weighted with gains proportional to their signal voltage to noise power ratios.” Denning Reply Decl. ¶¶ 45–46 (citing Ex. 1006,

1:32–34) (emphasis omitted). Mr. Denning testifies that a person of ordinary skill “would have understood there is a 1-to-1 mapping between signal-to-noise ratio and error rate for a given modulation and coding.” *Id.* ¶ 45. Mr. Denning’s testimony is supported by his citations to several background references, including Exhibits 1042, 1047, and 1044. *Id.* ¶¶ 40–47. In addition, Mr. Denning testifies that Gardner discloses “analyzing signals using coherent demodulation schemes, which analyze symbol errors of the signal.” *Id.* ¶ 46 (citing Ex. 1006, 1:28–41).

We are not persuaded by Patent Owner’s argument that Mr. Denning’s testimony is “unsupported.” PO Sur-reply 24. We find, for the reasons summarized above, that Mr. Denning’s testimony is credible and supported by the record.

We are not persuaded by Mr. Lanning’s testimony that “the strongest signal may not be the best signal received by the mobile phone, . . . because the strongest received signal may not be coming from the correct cellular network operator or the strongest signal may have some type of distortion that would cause errors in the data being received.” Lanning Decl. ¶ 137. We agree with Mr. Denning that claim 15 “requires selecting a best signal among signals received from a single fixed port. Thus, all signals analyzed are from the same fixed port, including the best received signal that is selected.” Denning Reply Decl. ¶ 47. We also agree that Gardner discloses analysis of the received signals for distortion. *Id.* (citing Ex. 1006, 2:31–38).

For the reasons above, we determine that Petitioner has proven by a preponderance of the evidence that the “best signal” limitation in claim 15 is disclosed by Ito and Gardner (*see* Pet. 36–37; Pet. Reply 14–16; Denning

Decl. ¶ 121; Denning Reply Decl. ¶¶ 40–47), and that claim 15 would have been obvious over Ito and Gardner.

c) *Summary of Claims 10, 15–18, 31, and 33–35*

For the reasons presented in the Petition and those discussed above, we determine that Petitioner has proven by a preponderance of the evidence, supported by expert testimony and by the references themselves, that the combination of Ito and Gardner teaches or suggests each element of claims 10, 15–18, 31, and 33–35 and that a person of ordinary skill in the art would have had reason to combine the teachings of Ito and Gardner in the manner asserted with a reasonable expectation of success. Thus, these claims are unpatentable as being obvious over Ito and Gardner.

E. *Obviousness over Gilhousen865 and Gilhousen390*

Petitioner asserts that claims 10, 15–18, 31, and 33–35 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Gilhousen865 and Gilhousen390. Pet. 51–70. We first describe the prior art that Petitioner seeks to combine to show that these claims would have been obvious and then turn to the merits of the combination.

1. *Overview of Gilhousen865 (Ex. 1009)*

Gilhousen865 is a patent titled “Airborne Radiotelephone Communication System.” Ex. 1009, code (54). Petitioner asserts that, because Gilhousen865 was filed on July 8, 1994, which is before the earliest effective filing date of the ’701 patent, it is prior art under 35 U.S.C. § 102(e). Pet. 6.

Gilhousen865 is directed to an airborne communication system that allows radiotelephones on a plane to communicate with a ground-based

cellular system. Ex. 1009, code (57). Figure 1 of Gilhousen865 is reproduced below.

FIG. 1

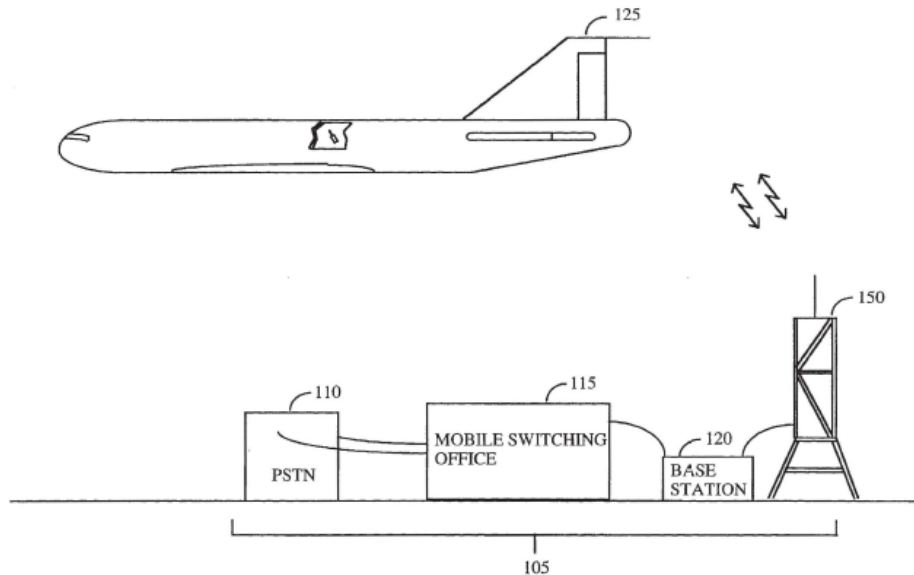


Figure 1 of Gilhousen865, reproduced above, depicts an airborne communication system having ground-based subsystem 105 and airborne-based subsystem 125. *Id.* at 2:9–12. As shown in Figure 1, ground-based subsystem 105 has base station 120 coupled to antenna 150 and to mobile switching center 115, which in turn is coupled to public switched telephone network (PSTN) 110. *Id.* at 2:21–33.

Figure 2 of Gilhousen865 is reproduced below.

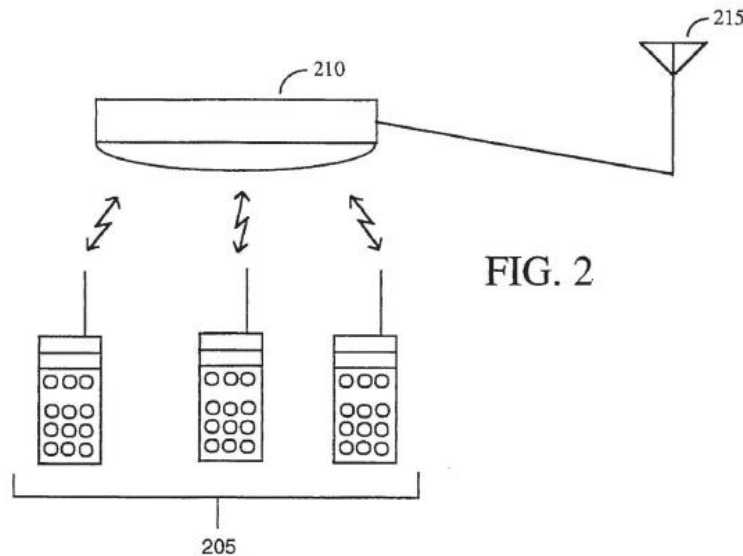


Figure 2 of Gilhousen865, reproduced above, depicts an airborne-based subsystem having radiotelephones 205, signal repeater 210, and antenna 215 mounted on the outside of the aircraft. Ex. 1009, 2:45–52. Repeater 210 receives signals from radiotelephones 205 within the aircraft and relays them to antenna 215, which relays the signals to the base station on the ground. *Id.* at 2:53–57. Gilhousen865 discloses that signal repeater 210 may be replaced by an airborne base station that “has the same functionality of its ground-based counterpart but on a much smaller scale since it does not have to handle the thousands of radiotelephones of the ground-based station.” *Id.* at 3:3–10.

## 2. Overview of Gilhousen390 (Ex. 1007)

Gilhousen390 is a patent titled “Diversity Receiver in a CDMA Cellular Telephone System.” Ex. 1007, code (54). Petitioner asserts that, because Gilhousen390 issued on April 28, 1992, more than three years before the earliest effective filing date of the ’701 patent, it is prior art under 35 U.S.C. § 102(b). Pet. 6.

Gilhousen390 discloses techniques for receiving the strongest signals from multiple sites in a cellular system. Ex. 1007, 4:27–34. One technique disclosed in Gilhousen390 involves using two receivers to demodulate signals on the two strongest paths and using information from both signals in a “diversity combining operation,” which results in improved resistance to multipath fading. Ex. 1007, 8:11–21. Gilhousen390 also discloses a mobile unit having multiple digital data receivers to enable diversity reception. Ex. 1007, 12:35–40, Fig. 2.

*3. Analysis of Obviousness of Claims 10, 15–18, 31, and 33–35*

In support of Petitioner’s contention that claims 10, 15–18, 31, and 33–35 are unpatentable as obvious over the combined teachings of Gilhousen865 and Gilhousen390, Petitioner provides an element-by-element analysis showing where each element of the challenged claims is in Gilhousen865 and Gilhousen390. Pet. 51–70. Petitioner supports its analysis with testimony from Mr. Denning. *See* Denning Decl. ¶¶ 155–200; Denning Reply Decl. ¶¶ 48–67. Patent Owner, relying on the testimony of Mr. Lanning, argues that Petitioner does not show that the challenged claims are unpatentable. *See, e.g.*, PO Resp. 30–36, 38–41, 47–52; PO Sur-reply 11–15, 24–27. For the reasons set forth below, we determine that Petitioner has shown that claims 10, 15–18, 31, and 33–35 are obvious over the combined teachings of Gilhousen865 and Gilhousen390.

*a) Independent Claim 10*

*(i) “movable base station configured to move relative to Earth”*

Petitioner identifies Gilhousen865’s repeater 210 as the “movable base station” recited in the preamble of claim 10. Pet. 55. Petitioner shows that the repeater “functions both to provide outgoing calls from the

radiotelephone to the ground base station, and incoming calls originating from the ground subsystem to the airborne radiotelephone.” *Id.* (citing Ex. 1009, 2:56–63). Also, “[b]ecause the repeater is installed in an airplane, it would have been obvious to a [person of ordinary skill in the art] that the repeater is ‘configured to move relative to Earth.’” *Id.* (emphasis omitted).

Relying on the construction of “configured to” as “constructed to move with the traffic at a rate of speed which is comparable to the speed of the traffic,” Patent Owner contends this preamble limitation is not met: “An airplane does not move with traffic as it is not bound to predetermined roads.” PO Resp. 48 (citing Lanning Decl. ¶ 141). Petitioner responds that the term “traffic” should not be confined to “predetermined roads.” Pet. Reply 17.

As discussed in Section III.B.2 above, we apply the proposed construction of “configured to” in the preamble as “constructed to move with the traffic at a rate of speed which is comparable to the speed of the traffic.” However, as noted, Patent Owner would require the “traffic” in the district court’s construction to be “bound to predetermined roads.” PO Resp. 48. We see no proper basis in the language of the claims, the Specification of the ’701 patent, or its prosecution history to limit the claims to require “predetermined roads.” The ’701 patent’s references to “pedestrian traffic” (Ex. 1001, 2:40–43, 3:15–19, 4:46–49) further persuade us that Patent Owner’s proposed narrowing of the term “traffic” as requiring “predetermined roads” is contrary to the intrinsic record. We, therefore, find that the preamble (whether or not limiting) is met by Gilhousen865’s disclosure of a repeater in an airplane, which moves at speed comparable to

air traffic. *See* Denning Reply Decl. ¶ 52 (citing Ex. 1036, 611, a dictionary definition of “traffic” that includes air traffic).

*(ii) “a plurality of spatially separated antennas”*

Petitioner asserts that the recited “plurality of spatially separated antennas” is taught by Gilhousen390’s two separate antennas for space diversity reception. Pet. 56 (citing Ex. 1007, 14:37–39; Denning Decl. ¶ 167). Patent Owner does not dispute this limitation. We find that this element is met by Gilhousen390.

*(iii) “a receiver configured to receive fixed port signals from a fixed port through the plurality of spatially separated antennas” and “a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals”*

Petitioner identifies Gilhousen865’s repeater 210 as the “receiver” and “transmitter” recited in claim 10. Pet. 57–58, 60. This relationship is illustrated by Figure 1 of Gilhousen865, reproduced below as annotated by Petitioner:

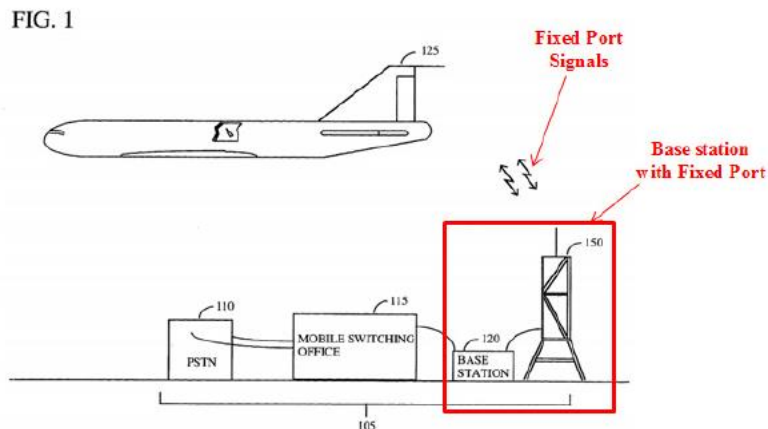


Figure 1 of Gilhousen865 (annotated) shows an airborne radio telephone system.

Pet. 58. Petitioner shows that repeater 210 in the aircraft includes a receiver that facilitates communication between a radiotelephone in the aircraft and a ground-based base station (fixed port), in part by receiving signals (fixed port signals) from the ground-based base station. *Id.* at 57–59. Petitioner also shows that the repeater includes a transmitter that sends signals from the ground-based stations received by the external antenna of the airborne system to the radiotelephones. *Id.* at 60 (quoting Ex. 1009, 3:55–57; citing Denning Decl. ¶ 172).

Referring back to its proposed claim construction, Patent Owner contends, “[w]hile *Gilhousen865* does disclose radiotelephones, *Gilhousen865* does not disclose a transmitter configured to transmit radio frequency signals to a radiotelephone that registers with or is capable of directly communicating with the cellular network as required by the limitation of a ‘mobile device.’” PO Resp. 49; *see also* discussion at Section III.B.4 above. Because we have not adopted Patent Owner’s claim construction for “mobile device,” Patent Owner’s arguments are not persuasive.

We also find that, contrary to Patent Owner’s arguments (PO Resp. 49–50), there is no the additional requirement that the mobile device must be “capable of being switched back-and-forth between either a direct connection with the fixed base station or a connection with a moving base station.” *Id.* at 50. We see no support for this additional requirement in the language of the claims, the Specification, or the prosecution history of the ’701 patent. Consequently, we do not credit Patent Owner’s argument that *Gilhousen865* does not have this capability. *Id.*

Petitioner argues that even under Patent Owner’s construction of “mobile device,” Gilhousen865 meets this limitation. Pet. Reply 18–20; Denning Reply Decl. ¶¶ 55–60. We agree with Petitioner and find that this limitation would be met even if we had adopted Patent Owner’s construction for “mobile device.” Gilhousen865 explicitly teaches that the radiotelephones register with a base station in a cellular network. Ex. 1009, 3:57–59 (“This enables the radiotelephones to search for the strongest pilot signal of the next cell and register with that base station.”), *cited in* Pet. Reply 19. Moreover, Gilhousen865 describes that the radiotelephones operate using the industry standard for cellular networks. Ex. 1009, 2:65–3:2; Denning Reply Decl. ¶ 60. We find that such phones would be capable of direct communication with the cellular network. *Id.*

For the reasons given by Petitioner and summarized above, we find that Gilhousen865’s radiotelephone teaches a “mobile device” as claimed and that repeater 210 meets the “receiver” and “transmitter” requirements of claim 10. *See, e.g.*, Denning Decl. ¶¶ 168–169, 172–173; Denning Reply Decl. ¶¶ 55–60.

(iv) *“a controller configured to align and combine the received fixed port signals”*

Petitioner identifies Gilhousen390’s diversity combiner 104, which “adjusts the timing of the two streams of received signals into alignment,” as the recited “controller.” *Id.* at 59 (citing Ex. 1007, 13:22–25) (emphasis removed). Patent Owner does not dispute this limitation. We find that this element is met by Gilhousen390.

*(v) Rationale for Combining Gilhousen865 and Gilhousen390*

Petitioner, relying on Mr. Denning’s testimony, provides a rationale for combining Gilhousen865 and Gilhousen390. *See, e.g.*, Pet. 51–55. In response to Petitioner’s rationale for combining Gilhousen865 and Gilhousen390, Patent Owner makes several arguments alleging Petitioner has not provided sufficient reasoning to support the combination of Gilhousen865 and Gilhousen390. PO Resp. 30–35, 38–41. We have considered Patent Owner’s arguments and find them unpersuasive. Below, we first address Petitioner’s rationale and then Patent Owner’s responsive arguments.

Petitioner provides evidence of a rationale to combine the references: “Deleterious effects on wirelessly-transmitted signals, such as fading, interference, and other degradations to signal quality were well-known at the time of the ’701 patent.” Pet. 52 (citing Denning Decl. ¶ 158). Thus, a person of ordinary skill “would have been motivated to look to the prior art, such as Gilhousen390, for methods of reducing the negative effects on signals during wireless transmission.” *Id.* at 53. Petitioner continues: “In order to counter the negative effects of fading, Gilhousen390 describes employing various configurations to achieve signal diversity at the receiver.” *Id.* Petitioner further asserts: “Based on the teachings of Gilhousen390, a [person of ordinary skill in the art] would have been motivated to modify Gilhousen865’s system with any one or more of the signal diversity configurations of Gilhousen390 at least for the purpose of reducing the errors caused by well-known deleterious effects on wirelessly-transmitted signals.” *Id.* at 54 (citing Denning Decl. ¶ 161). Relying on testimony from Mr. Denning, Petitioner further asserts “[m]odifying Gilhousen865 in this

manner would have required minimal modifications.” *Id.* at 54 (citing Denning Decl. ¶ 161).

Patent Owner makes several arguments challenging Petitioner’s motivation to combine *Gilhousen865* and *Gilhousen390* and reasonable expectation of success. PO Resp. 30–35, 38–41. First, Patent Owner contends that “*Gilhousen390*’s CDMA signal diversity configurations will not work if employed on *Gilhousen865*’s high speed airborne repeater.” *Id.* at 38–39. According to Patent Owner, “*Gilhousen390*’s CDMA signal diversity configuration cannot increase the power of *Gilhousen865*’s airborne repeater fast enough to compensate for the transmitted signal fading that is occurring on the connection with the base station due to the high speed of *Gilhousen865*’s airborne repeater.” *Id.* at 39; *see also id.* at 41 (discussing speed of a commercial jet). As a result, “with this combination, any calls in progress will be dropped because handovers cannot occur.” *Id.*

Petitioner responds that “*Gilhousen865*’s communication system *is* a CDMA communication system,” and, consequently, the system “would have considered the power control and other features of CDMA systems to operate in its preferred embodiment—on a plane.” Pet. Reply 23–24. Petitioner also responds that Patent Owner’s presumed rate of speed for an aircraft is “exaggerated,” using the Cessna 152 airplane as an example. *Id.* at 24.

We do not need to reach the question of whether the proposed combination would work on the Cessna 152 (which Patent Owner contends went out of production in 1985). PO Sur-reply 14. The flaw in Patent Owner’s argument is the same as that discussed above with respect to the Ito/Gardner combination; namely, Patent Owner assumes that the person of

ordinary skill (a highly trained and experienced engineer) would not be able to resolve the technical issues hypothesized by Patent Owner's expert, Mr. Lanning. As stated previously, we find Mr. Lanning's testimony on this issue is out of step with the Supreme Court's admonition in *KSR* that the person of ordinary skill is a person of "ordinary creativity," not "an automaton." *KSR*, 550 U.S. at 421; *ClassCo*, 838 F.3d at 1219 (stating "the ordinary artisan recognizes 'that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.'"). For this reason, we credit Mr. Denning's testimony that a person of ordinary skill would have been motivated to combine the teachings of Gilhousen865 and Gilhousen890 with a reasonable expectation of success. *See* Denning Decl. ¶¶ 155–162; Denning Reply Decl. ¶¶ 64–67.

Second, Patent Owner argues that Petitioner's rationale for combining Gilhousen865 and Gilhousen390 and the supporting testimony from Mr. Denning are "conclusory." PO Resp. 32 (asserting the Petition merely contains "conclusory assurances that a person of ordinary skill could combine Petitioner's prior art references, but the Petition never actually articulates how the POSITA could do so."). We disagree with Patent Owner's criticism of Mr. Denning and credit Mr. Denning's testimony. *See* Denning Decl. ¶¶ 155–162; Denning Reply Decl. ¶¶ 64–67. As previously discussed, we find that Petitioner's explanation of the rationale for combining the teachings of the cited references and Mr. Denning's testimony are supported by the record and are not conclusory.

Third, Patent Owner argues that the Petition does not supply "sufficient detail how to combine" Gilhousen390 and Gilhousen865, or

sufficiently demonstrate “a reasonable expectation of success.” PO Resp. 31–35. We find that Petitioner provides a sufficiently detailed explanation of how the references could have been combined. As discussed with respect to Patent Owner’s arguments regarding the Ito/Gardner combination, the ’701 patent states that the invention uses “well-known” equipment and functions. *See* Denning Decl. ¶ 162 (“[T]he proposed combination of Gilhousen865 and Gilhousen390 would involve nothing more than incorporating well-known concepts (i.e., Gilhousen390’s diversity techniques) into a well-known system (i.e., Gilhousen865 radio communication system).”). As the Federal Circuit stated in *Rothman v. Target Corp.*, 556 F.3d 1310, 1319 (Fed. Cir. 2009): “[T]his invention falls into a very predictable field. In the predictable arts, a trial record may more readily show a motivation to combine known elements to yield a predictable result, thus rendering a claimed invention obvious.”

We find that Petitioner has demonstrated by a preponderance of the evidence that a person of ordinary skill would have combined Gilhousen390 and Gilhousen865 with a reasonable expectation of success. We conclude that, for the reasons discussed, Petitioner has demonstrated that claim 10 would have been obvious over those references.

b) *Claims 15–18, 31, and 33–35*

Petitioner also provides a detailed analysis explaining where the combination of Gilhousen865 and Gilhousen390 teaches or suggests the limitations in claims 15–18, which depend from independent claim 10, and claims 31 and 33–35. Pet. 60–70; Denning Decl. ¶¶ 174–200. Patent Owner does not address claims 15–17, 31, 33, and 34 separately from claim 10. PO Resp. 30–35, 38–41, 47–50. We find, for the reasons given by Petitioner

and those discussed above for claim 10, that Gilhousen865 and Gilhousen390 disclose each of the limitations in these claims.

Claims 18 and 35

Claim 18 depends directly from claim 17 and indirectly from claim 10, and claims 17 and 18 recite how the “moveable base station” is “conveyed.” In particular, claim 17 recites that “the movable base station is conveyed by a vehicle,” and claim 18 recites that “the vehicle is an automotive vehicle.” Ex. 1001, 12:22–25. Claim 35 depends from claims 31 and 34 and recites subject matter similar to claim 18. Ex. 1001, 13:33–34. Petitioner asserts that Gilhousen865’s repeater, the claimed “mobile base station,” is mounted on an airplane, which is an “automotive vehicle.” Pet. 63 (citing Ex. 1009, 2:45–49; Ex. 1003 ¶ 182); *see also* Pet. Reply 20–22. In addition to its arguments directed to claim 10, which are discussed above, Patent Owner also argues that Petitioner has not shown that Gilhousen865’s airplane is an “automotive vehicle.” PO Resp. 51–52.

Patent Owner’s arguments are not persuasive. While we agree with Petitioner and find that an airplane is a “vehicle” as recited in claim 17, whether an airplane is an “automotive vehicle” is another issue. However, we need not resolve that issue because we agree with Petitioner that Gilhousen865 suggests that the teachings of that reference would be applicable to an automobile-based system. Pet. Reply 18 (citing Ex. 1009, 2:37–42). Petitioner supports this with testimony from Mr. Denning. Denning Reply Decl. ¶ 54 (“[A person of ordinary skill] would have found it obvious to apply Gilhousen’s teachings to an automobile-based system for use on ‘predetermined roads.’”). We find Mr. Denning’s testimony credible, especially in light of the high level of ordinary skill in the relevant art, which

encompasses all wireless communications systems, without regard to where they are located, and the discussion in Gilhousen865 of the similarity between the disclosed airborne system and ground-based radiotelephone systems. Ex. 1009, 3:11–13. We conclude that, for the reasons given, Petitioner has demonstrated by a preponderance of the evidence that claims 18 and 35 would have been obvious over Gilhousen865 and Gilhousen390.

*c) Summary of Claims 10, 15–18, 31, and 33–35*

For the reasons presented in the Petition and those discussed above, we determine that Petitioner has proven by a preponderance of the evidence, supported by expert testimony and by the references themselves, that the combination of Gilhousen865 and Gilhousen390 teaches or suggests each element of claim 10, 15–18, 31, and 33–35 and that a person of ordinary skill in the art would have had reason to combine the teachings of Gilhousen865 and Gilhousen390 in the manner asserted. Thus, these claims are unpatentable as being obvious over Gilhousen865 and Gilhousen390.

*F. Constitutional Challenge*

Patent Owner contends that “adjudication of the ’701 patent violates the U.S. Constitution” because “the current structure of the Board violates the Appointments Clause of Article II.” PO Resp. 52–53.

In *Arthrex v. Smith & Nephew*, 941 F.3d 1320, 1338 (Fed. Cir. 2019), the Federal Circuit determined that the current structure of the Board does not violate Article II as of the date of that precedential decision. *See also Arthrex, Inc. v. Smith & Nephew, Inc.*, 953 F.3d 760, 764 (Fed. Cir. 2020) (Moore, J., concurring in denial of rehearing) (“Because the APJs were constitutionally appointed as of the implementation of the severance, *inter partes* review decisions going forward were no longer rendered by

unconstitutional panels.”). Furthermore, in *Arthrex* the Federal Circuit found “no constitutional infirmity in the institution decision as the statute clearly bestows such authority on the Director pursuant to 35 U.S.C. § 314.” 941 F.3d at 1340.

Therefore, we disagree with Patent Owner that this Final Written Decision and our Institution Decision are “invalid.” PO Resp. 53.

#### IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 10, 15–18, 31, and 33–35 of the ’701 patent are unpatentable.

A summary of our conclusions is set forth in the table below.

<b>Claims</b>	<b>35 U.S.C. §</b>	<b>References/ Basis</b>	<b>Claims Shown Unpatentable</b>	<b>Claims Not shown Unpatentable</b>
10, 15–18, 31, 33–35	103(a)	Ito, Gardner	10, 15–18, 31, 33–35	
10, 15–18, 31, 33–35	103(a)	Gilhousen865, Gilhousen390	10, 15–18, 31, 33–35	
<b>Overall Outcome</b>			10, 15–18, 31, 33–35	

#### V. ORDER

It is, therefore,

ORDERED that *inter partes* review of claims 10, 15–18, 31, and 33–35 of the ’701 patent are not patentable;

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

IPR2019-01102  
Patent 7,848,701 B2

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