

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC.,
Petitioner,

v.

CARUCEL INVESTMENTS, L.P.,
Patent Owner.

IPR2019-01102
Patent 7,848,701 B2

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

KORNICZKY, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

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.”).

Under 37 C.F.R. § 42.4(a), we have authority to determine whether to institute an *inter partes* review. Upon considering the Petition, the Preliminary Response, and the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in showing the unpatentability of at least one of the challenged claims. For the reasons described below, we institute an *inter partes* review of claims 10, 15–18, 31, and 33–35 of the ’701 patent with respect to all grounds in the Petition.

II. BACKGROUND

A. *Related Proceedings*

According to Petitioner and Patent Owner, the ’701 patent (as well as other patents) is involved in 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.

Petitioner also states 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.

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.

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 cellular 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

Petitioner relies on the following references:

1. U.S. Patent No. 5,276,686, issued January 4, 1994 (Ex. 1005, “Ito”).
2. U.S. Patent No. 5,504,786, issued April 2, 1996 (Ex. 1006, “Gardner”).
3. U.S. Patent No. 5,109,390, issued April 28, 1992 (Ex. 1007, “Gilhousen ’390”).
4. U.S. Patent No. 5,559,865, issued July 13, 1999 (Ex. 1009, “Gilhousen ’865”).

Petitioner also relies on testimony from Scott A. Denning (Ex. 1003, “Denning Decl.”).

F. Grounds Asserted

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

Claims Challenged	35 U.S.C. §	References
10, 15–18, 31, 33–35	103	Ito, Gardner
10, 15–18, 31, 33–35	103	Gilhousen ’865, Gilhousen ’390

Pet. 1.

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).

At this stage, Patent Owner does not dispute Petitioner’s formulation of the person of ordinary skill in the art. Prelim. Resp. 2.

We regard Petitioner’s definition as consistent with the prior art before us. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (prior art itself may reflect an appropriate level of skill). Thus, for the purpose of our decision, we adopt Petitioner’s proposal.

B. Claim Construction

In an *inter partes* review based on a petition filed on or after November 13, 2018,¹ the claims are construed

using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing 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) (Nov. 2018); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005). 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).

Neither party asserts that any construction of claim terms is required to resolve issues in dispute in the proceeding. Pet. 17–18; Prelim. Resp. 3. We determine that no claim term requires express construction for purposes

¹ *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).

of this Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”); *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

C. Patent Owner’s Arguments Under 35 U.S.C. § 314(a)

Patent Owner contends the Petition should be denied under 35 U.S.C. § 314(a) because Petitioner “presents multiple redundant grounds and makes no meaningful distinction between them.” Prelim. Resp. 4–5. Specifically, Patent Owner asserts that the ground based on Gilhousen ’865 and Gilhousen ’390 is “horizontally redundant” of the ground based on Ito and Gardner. *Id.* at 6. Patent Owner contends that the Board should exercise its “discretion to deny the Petition as procedurally deficient.” *Id.* at 7.

Patent Owner’s reliance on *Liberty Mutual Insurance Co. v. Progressive Casualty Insurance Co.*, CBM2012-00003, Paper 7 (PTAB Oct. 25, 2012) is misplaced. *Id.* at 5–6. In *Liberty Mutual*, “Petitioner assert[ed] four hundred and twenty two (422) grounds of unpatentability over prior art on an unit claim basis [] averaging more than 21 grounds per claim.” *Liberty Mutual*, Paper 7 at 2. The Board found that 422 “redundant grounds would place a significant burden on the Patent Owner and the Board, and would cause unnecessary delays.” *Id.*

In contrast, in the present proceeding, Petitioner asserts two grounds of unpatentability for claims 10, 15–18, 31, and 33–35. Pet. 6. Contrary to Patent Owner’s arguments, Petitioner here is not required to explain why its two grounds for the same claims are not cumulative of one another. We find

that Petitioner’s two grounds do not place a significant burden on the Board and would not cause unnecessary delays.

We determine that the record does not weigh in favor of exercising our discretion to deny institution under 35 U.S.C. § 314(a), and we, thus, do not do so.

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 as obvious over the combined teachings of Ito and Gardner. Pet. 26–50. We first describe the prior art that Petitioner seeks to combine to show that independent claim 10 is 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, code (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 it is 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. The automobile telephone main unit and the 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.

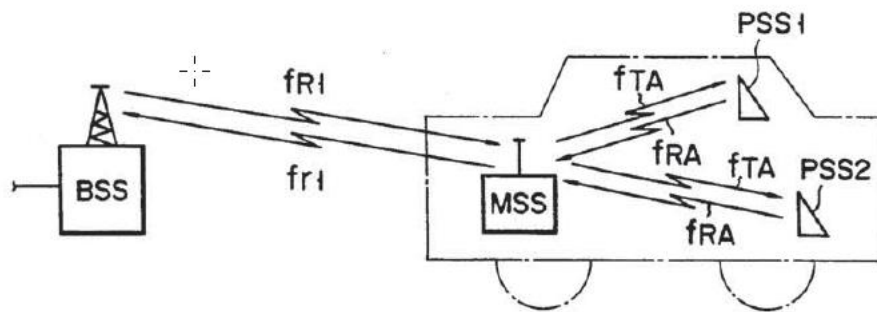


FIG. 6

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} .² *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.*

² As Petitioner points out (Pet. 20 n. 5), Figure 6 of Ito mislabels f_{T1} as f_{r1} . See Ex. 1005, 12:57–63.

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 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

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*, 383 U.S. at 17–18. In that regard, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418.

a) Petitioner’s Arguments

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. We have reviewed the information provided by Petitioner, including the relevant portions of the supporting Denning Declaration (Ex. 1004). Based on the current record, for reasons set forth

below, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing on this obviousness challenge.

(i) Independent Claim 10

As mentioned above, the preamble of claim 10 recites a “movable base station configured to move relative to Earth.” Petitioner asserts that, to the extent the preamble is limiting, this preamble is taught by Ito’s disclosure of an automobile equipped with a mobile base device MSS (i.e., mobile base station). Pet. 29 (citing Ex. 1005, 12:52–53; Denning Decl. ¶ 113).

Claim 10 recites that the movable base station comprises “a plurality of spatially separated antennas.” Petitioner asserts that this limitation 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 (citing 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.* (citing Ex. 1006, 2:24–30; 1:15–24).

Claim 10 recites that the base station comprises “a receiver configured to receive fixed port signals from a fixed port through the plurality of spatially separated antennas.” Petitioner asserts that this limitation is taught by (1) Gardner’s disclosure of a plurality of spatially separated antennas (Pet. 33 (citing Ex. 1006, 1:10–20)), and (2) Ito’s disclosure 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.* at 31–32 (citing Ex. 1005, 5:62–65, 13:15–18)).

Claim 10 recites that the base station comprises “a controller configured to align and combine the received fixed port signals.” For the claimed “align[ing] . . . 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, 3:1–7). For the claimed “combin[ing] 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.* (citing 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).

Finally, claim 10 recites that the base station comprises “a transmitter configured to transmit radio frequency signals to a mobile device corresponding to the received fixed port signals.” Petitioner asserts 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 (citing Denning Decl. ¶ 124; Ex. 1005, 13:15–18). 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).

Even if Petitioner’s two prior art references (Ito and Gardner) disclose all of the limitations in claim 10 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).

Here, Petitioner provides a rationale for combining Ito and Gardner. *See, e.g.*, Pet. 26–28. 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).

b) *Patent Owner’s Arguments*

Patent Owner does not provide a rebuttal to Petitioner’s element-by-element analysis of claims 10, 15–18, 31, and 33–35 in light of the teachings of Ito and Gardner. Instead, Patent Owner makes several arguments alleging Petitioner has not provided sufficient reasoning to support the combination of Ito and Gardner. Prelim. Resp. 10–21.

First, Patent Owner repeatedly argues that Petitioner has failed to present “a *prima facie* showing” or “*prima facie* case of obviousness.” *See, e.g.*, Prelim. Resp. 7, 8, 9. We are not persuaded by Patent Owner’s argument because this is not the correct standard for institution of *inter partes* review. The correct standard, stated in the governing statute and our rules, requires the Petitioner to show “that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); *see also* 37 C.F.R. § 42.108(c).

Second, Patent Owner argues that Petitioner “relies on impermissible hindsight” because “it proposes a solution to a problem that never existed in *Ito*” and that “*Ito* expresses no concern or even a need to improve its invention, let alone its receiver performance.” Prelim. Resp. 10. Patent Owner also argues that “the mere fact that [Ito and Gardner] are similar is insufficient to show that a [person of ordinary skill in the art] would have been motivated to combine *Ito* and *Gardner*. *Id.* at 12. Patent Owner further argues that the testimony by Petitioner’s expert “fails to cure the deficiencies of the Petition.” *Id.* at 10–11, 16–17.

We are not persuaded by Patent Owner’s arguments. Petitioner provides sufficient reasoning, supported by declarant testimony and the references themselves, as support for the motivation to combine Ito and Gardner. 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” and that “us[ing] two (or more) antennas spaced far enough apart” reduces the effects of fading. Ex. 1006, 1:14–17. At this stage, we credit Mr. Denning’s testimony supporting Petitioner’s motivation to combine the teachings of Ito and Gardner and find it sufficient.

Third, Patent Owner argues that Petitioner’s statement that a person of ordinary skill in the art “could have combined” the references is insufficient. Prelim. Resp. 13–15 (citing Pet. 28). We are not persuaded by this argument. The referenced passage from the Petition states the following:

Further, as is 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 in the art] (e.g., by replacing Ito's antenna with Gardner's spatially separated antennas).

Pet. 28 (citing Denning Decl. ¶ 110). This passage asserts that a person of ordinary skill in the art would have been capable of making the combination, i.e., the combination would have been within the skill of a person of ordinary skill in the art. The passage also states that the results would have been “predictable.” Pet. 28. Petitioner provides other arguments as to what would have motivated a person of ordinary skill in the art to make the combination, as discussed above, such as to “combat the deleterious effects of fading on signals transmitted to a moving device” and to provide “considerable performance improvement.” *Id.* at 26–27 (citing Denning Decl. ¶ 106; Ex. 1006, 1:19–23).

Fourth, Patent Owner argues that the Petition is “substantively deficient because it does not explain in sufficient detail how to combine *Ito* and *Gardner*.” Prelim. Resp. 17–18 (citing, in part, *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327–28 (Fed. Cir. 2012)). We do not find support for this argument in *ActiveVideo*. In *ActiveVideo*, the U.S. Court of Appeals for the Federal Circuit criticized an expert witness who “failed to explain how specific references could be combined, which combination(s) of elements in specific references would yield a predictable result, or how any specific combination would operate or read on the asserted claims.” *ActiveVideo*, 694 F.3d at 1327. In the present proceeding, by contrast, Petitioner and its declarant, Mr. Denning, provide detailed analysis explaining what teachings of Gardner would have been combined

with the system of Ito. *See generally* Pet. 26–27; 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.

Fifth, Patent Owner argues Petitioner fails to address the reasonable expectation of success. Prelim. Resp. 19; *see also id.* at 13. We disagree. On this record, we are persuaded Petitioner’s assertion that a person of ordinary skill in the art would have been capable of making the combination addresses sufficiently the reasonable expectation of success in combining Ito and Gardner. *See KSR*, 550 U.S. at 417 (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”). On this record, we are persuaded Petitioner’s evidence and argument are sufficient to meet the threshold for institution.

Sixth, Patent Owner also argues Petitioner’s expert declaration in support of its motivation to combine Ito and Gardner is entitled to “little or no weight” because “[p]aragraphs 106 [and] 108–110 of Petitioner’s Expert Declaration are near-verbatim copies of conclusory statements set forth in the Petition.” Prelim. Resp. 20 (citing Pet. 26–28). We disagree that Petitioner’s citation to Mr. Denning’s Declaration is improper. The four-identified paragraphs are cited in over three pages of discussion in the

Petition. This is not a case in which Petitioner has made a conclusory allegation and incorporated by reference voluminous evidence in support with no explanation.

c) *Threshold Determination for the Challenged Claims*

Based on the present record, we find that Petitioner has shown a reasonable likelihood of prevailing with respect to its challenge of claim 10 as unpatentable as being obvious over Ito and Gardner, and thus, Petitioner's evidence is sufficient for the purpose of instituting *inter partes* review.

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. Based on our review of Petitioner's arguments and evidence concerning claims 15–18, 31, and 33–35, we have determined that the Petitioner has shown a reasonable likelihood of proving that the challenged claims are unpatentable. *See* Pet. 38–51 (providing detailed explanation and supporting citations to the prior art and testimony of Mr. Denning).

Having determined that Petitioner meets the threshold for review based on this ground of obviousness, we institute a review as to all of challenged claims and grounds contained in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018) (holding that a decision to institute under 35 U.S.C. § 314 may not institute on fewer than all claims challenged in the petition); Trial Practice Guide Update 31 (July 2019) (“The Board will not institute on fewer than all claims or all challenges in a petition.”), *available at*

<https://www.uspto.gov/sites/default/files/documents/trial-practice-guide-update3.pdf>.

We provide further analysis below in the interest of completeness and to provide guidance to the parties.

E. Obviousness over Gilhousen '865 and Gilhousen '390

As mentioned above, Petitioner also challenges the patentability of claims 10, 15–18, 31, and 33–35 over the combination of Gilhousen '865 and Gilhousen '390. Pet. 51–70. We first describe the prior art that Petitioner seeks to combine to show that these claims are obvious and then turn to the merits of the combination.

1. Overview of Gilhousen '865 (Ex. 1009)

Gilhousen '865 is a patent titled “Airborne Radiotelephone Communication System.” Ex. 1009, code (54). Petitioner asserts that, because Gilhousen '865 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.

Gilhousen '865 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 Gilhousen '865 is reproduced below.

FIG. 1

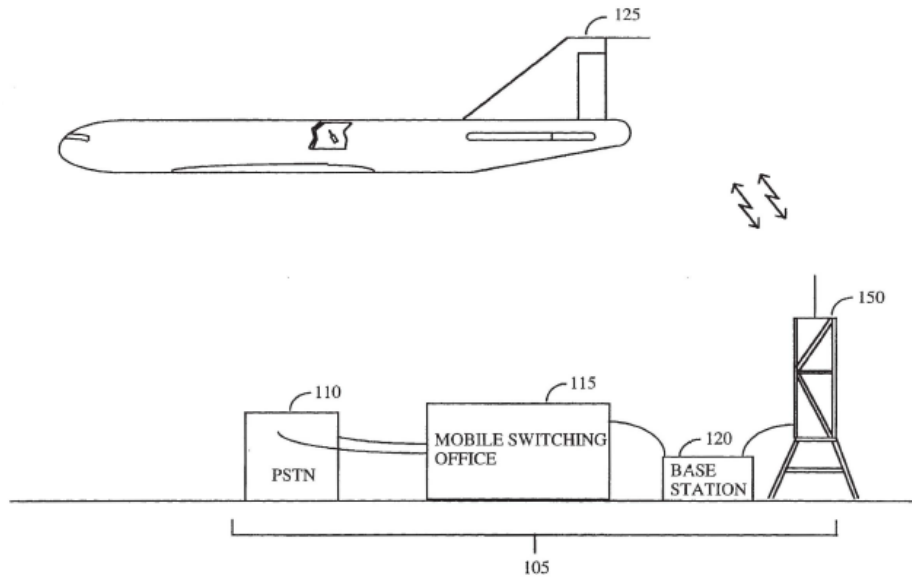


Figure 1 of Gilhousen '865, reproduced above, depicts an airborne communication system having ground-based subsystem 105 and airborne-based subsystem 125. Ex. 1009, 2:9–12. As shown in Figure 1, ground-based subsystem 105 has base station 120 coupled to antenna 150 and to mobile switching center 115, which in turn is coupled to public switched telephone network (PSTN) 110. Ex. 1009, 2:21–33.

Figure 2 of Gilhousen '865 is reproduced below.

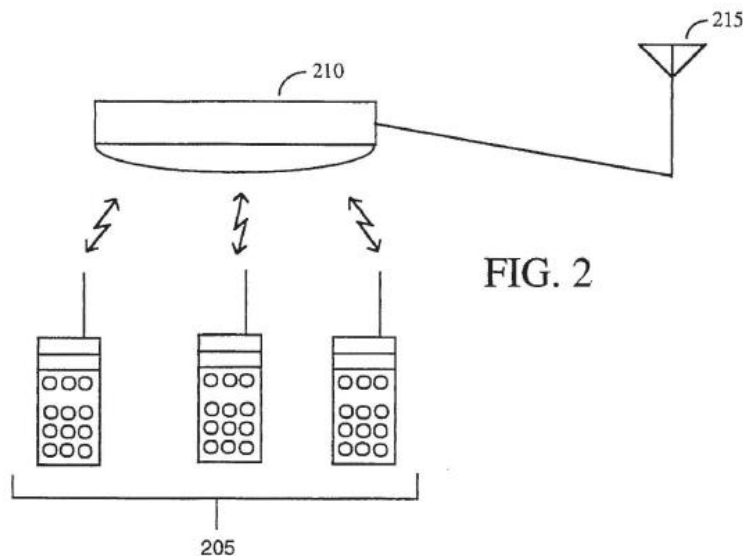


FIG. 2

Figure 2 of Gilhousen '865, 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. Ex. 1009, 2:53–57. Gilhousen '865 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.” Ex. 1009, 3:3–10.

2. Overview of Gilhousen '390 (Ex. 1007)

Gilhousen '390 is a patent titled “Diversity Receiver in a CDMA Cellular Telephone System.” Ex. 1007, code (54). Petitioner asserts that, because Gilhousen '390 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.

Gilhousen '390 discloses techniques for receiving the strongest signals from multiple sites in a cellular system. Ex. 1007, 4:27–34. One technique disclosed in Gilhousen '390 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. Gilhousen '390 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

As noted above, Petitioner also contends that claims 10, 15–18, 31, and 33–35 are unpatentable as obvious over the combined teachings of Gilhousen '865 and Gilhousen '390. Pet. 51–70.

a) Petitioner's Arguments

In its contentions, Petitioner provides an element-by-element analysis showing where each element of the challenged claims is in Gilhousen '865 and Gilhousen '390. Pet. 51–70. Petitioner supports its analysis with testimony from Mr. Denning. *See* Denning Decl. ¶¶ 155–200. We have reviewed the information provided by Petitioner, including the relevant portions of the supporting Denning Declaration (Ex. 1003). Based on the current record, for reasons set forth below, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing on this obviousness challenge.

Petitioner, for example, demonstrates that each element of independent claim 10 is disclosed or suggested by Gilhousen '865 and Gilhousen '390. For example, Petitioner asserts that the “movable base station” recited in the preamble of claim 10 is taught by Gilhousen '865's repeater 210. Pet. 55. Petitioner asserts that the recited “plurality of spatially separated antennas” is taught by Gilhousen '390's two separate antennas for space diversity reception. *Id.* at 56 (citing Ex. 1007, 14:37–39; Denning Decl. ¶ 167). Petitioner asserts that the “receiver” and “transmitter” recited in claim 10 are also taught by Gilhousen '865's repeater 210. *Id.* at 57–58, 60. Petitioner asserts that the recited “controller” is taught by Gilhousen '390's diversity combiner 104, which “adjusts the

timing of the two streams of received signals into alignment.” *Id.* at 59 (citing Ex. 1007, 13:22–25) (emphasis removed).

Petitioner also provides a persuasive rationale for combining Gilhousen ’865 and Gilhousen ’390. *See, e.g.*, Pet. 51–55. Petitioner asserts, in part: “In order to counter the negative effects of fading, Gilhousen390 describes employing various configurations to achieve signal diversity at the receiver.” *Id.* at 53. Petitioner further asserts: “Based on the teachings of Gilhousen390, a [person of ordinary skill] 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).

b) *Patent Owner’s Arguments*

Patent Owner’s response to Petitioner’s challenges mirrors its response to the challenges based on Ito and Gardner discussed above. Patent Owner does not provide a rebuttal to Petitioner’s element-by-element analysis of the claims in relation to the teachings of Gilhousen ’865 and Gilhousen ’390. Instead, Patent Owner focuses on the motivation to combine the references and reasonable expectation of success. Prelim. Resp. 21–31.

Patent Owner makes several arguments alleging Petitioner has not provided reasoning to support the combination of Gilhousen ’865 and

Gilhousen '390. Patent Owner, for example, argues it is improper for Petitioner to rely on Gilhousen '390's recognition of the problem of fading in cellular systems in support of the rationale to combine because, according to Patent Owner, "[a]n inventor's recitation of a problem to be solved is not an admission that this problem was known and, therefore, the recitation of the problem cannot serve as the motivation to combine *Gilhousen*865 and *Gilhousen*390." Prelim. Resp. 23. Petitioner, however, does not rely on the '701 patent inventor's recognition of a problem; rather, Petitioner relies on the prior art's recognition of a problem, as disclosed in Gilhousen '390. *See* Pet. 53 (citing Ex. 1007, 3:17–22); *see also* Ex. 1007, 3:17–24 (disclosing that "the motion of the mobile unit through the environment can result in a quite rapid fading process," which "can be extremely disruptive to signals in the terrestrial channel resulting in poor communication quality"). Thus, Patent Owner's argument is legally unavailing.

Patent Owner's remaining arguments are nearly identical to the arguments previously discussed in relation to Ito and Gardner that we found unpersuasive. For example, Patent Owner argues that Petitioner's argument "that [Gilhousen '865 and Gilhousen '390] are similar is insufficient to show that a [person skilled in the art] would have been motivated to combine *Gilhousen*865 and *Gilhousen*390." Prelim. Resp. 24. Patent Owner repeats its prior arguments that Petitioner's rationale for combining Gilhousen '865 and Gilhousen '390 fails to: (1) provide "sufficient detail how to combine" the two references (*id.* at 29); (2) explain whether the combination "would have been predictable" (*id.* at 25); and "would have [had] a reasonable expectation of success" (*id.* at 30). Patent Owner also argues that the

rationale to combine the two references and the supporting testimony from Mr. Denning are “conclusory” (*id.* at 30–31).

We are not persuaded by Patent Owner’s arguments. As discussed above, we find that Petitioner’s explanations of the rationale for combining the teachings of Gilhousen ’865 and Gilhousen ’390 and Mr. Denning’s supporting testimony are not conclusory and are sufficient at this stage. As discussed above, according to the ’701 patent, the invention uses “well-known” equipment and functions. We are not persuaded that at this stage, a more detailed explanation of how the references could be combined is required. *See, e.g.*, 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.”

Petitioner relies on the same combination of Gilhousen ’865 and Gilhousen ’390 in its challenge to claims 15–18, 31, and 33–35. Pet. 60–70. Patent Owner does not address these claims separately from claim 10. Prelim. Resp. 21–31. We conclude that Petitioner has demonstrated a reasonable likelihood of prevailing on these challenges.

c) *Threshold Determination as to the Challenged Claims*

Based on our review of Petitioner's and Patent Owner's arguments and evidence concerning claims 10, 15–18, 31, and 33–35, we have determined that the Petitioner has shown a reasonable likelihood of proving that the challenged claims are unpatentable on those grounds.

IV. CONCLUSION

For the reasons expressed above, we determine that Petitioner has established the requisite reasonable likelihood of prevailing as to at least one challenged claim of the '701 patent. Because Petitioner has satisfied the threshold for institution as to one claim, we institute *inter partes* review on all claims and all grounds raised in the Petition. *See SAS*, 138 S. Ct. at 1359–60.

Our factual findings and determinations at this stage of the proceeding are preliminary and based on the evidentiary record developed thus far. This is not a final decision as to the patentability of claims for which *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial.

V. ORDER

It is, therefore,

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 10, 15–18, 31, and 33–35 of the '701 patent with respect to all grounds in the Petition is hereby instituted; and

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FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this Decision.

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