

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FORD MOTOR COMPANY, AMERICAN HONDA MOTOR CO., INC.,
GENERAL MOTORS LLC, NISSAN NORTH AMERICA, INC., and
TESLA, INC.,
Petitioner,

v.

NEO WIRELESS LLC,
Patent Owner.

IPR2022-01537
Patent 10,075,941 B2

Before KRISTEN L. DROESCH, HYUN J. JUNG, and
MATTHEW S. MEYERS, *Administrative Patent Judges*.

MEYERS, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Volkswagen Group of America, Inc. (“VWGoA”) filed a Petition to institute *inter partes* review of claims 1–14 (the “challenged claims”) of U.S. Patent 10,075,941 B2 (Ex. 1001, the “’941 patent”). Paper 1 (“Pet.”). Neo Wireless LLC (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). On May 5, 2023, we instituted an *inter partes* review of the challenged claims on all grounds raised in the Petition. Paper 8 (“Institution Decision” or “Inst. Dec.”). Ford Motor Company, American Honda Motor Co., Inc., General Motors LLC, Nissan North America, Inc., and Tesla, Inc. (collectively, “Petitioner” or “Petitioners”) joined this proceeding after institution (Papers 22, 24, 26), and are the remaining Petitioners after VWGoA was terminated from this proceeding (Paper 45).¹

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”), VWGoA filed a Reply to the Patent Owner Response (Paper 27, “Pet. Reply”), and Patent Owner filed a Sur-reply to the Reply (Paper 54, “PO Sur-reply”). An oral hearing was held on March 29, 2024. A transcript of the hearing is included in the record. Paper 60 (“Tr.”).

¹ Ford Motor Company filed a motion for joinder and a petition in IPR2023-00766, American Honda Motor Co., Inc., filed a motion for joinder and petition in IPR2023-00791, and General Motors LLC, Nissan North America, Inc., and Tesla, Inc., filed a motion for joinder and petition in IPR2023-00964. All three motions were granted, and, therefore, Ford Motor Company, American Honda Motor Co., Inc., General Motors LLC, Nissan North America, Inc., and Tesla, Inc., have been joined as petitioners in this proceeding. Volkswagen Group of America, Inc., has been terminated from this proceeding. Paper 45.

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–14 are unpatentable.

B. Real Parties-in-Interest

Ford Motor Company identifies itself as a real party-in-interest. IPR2023-00766, Paper 1, 4. American Honda Motor Co., Inc. and Honda Development & Manufacturing of America, LLC (collectively, “Honda”) identify as real parties-in-interest. IPR2023-00791, Paper 3, 3. General Motors LLC, Nissan North America, Inc., and Tesla, Inc. “along with General Motors Company and LG Electronics, Inc. (as to General Motors LLC), Nissan Motor Acceptance Corporation a/k/a Nissan Motor Acceptance Company LLC, and Quectel Wireless Solutions Co. Ltd.” also identify as real parties-in-interest. IPR2023-00964, Paper 3, 3.

Patent Owner identifies itself, Neo Wireless LLC, as the real party-in-interest. Paper 6, 1.

C. Related Proceedings

The parties identify, as matters involving or related to the ’941 patent, *In re: Neo Wireless, LLC Patent Litigation*, 2-22-md-03034 (E.D. Mich.) (“the NEO Wireless litigation”) and *Neo Wireless LLC v. Volkswagen Group of America, Inc. et al.*, 2-22-cv-11404 (E.D. Mich.). Pet. 3–4; Paper 6, 1–2. The parties also identify other district court proceedings involving the ’941 patent, both current and former. See IPR2023-00766, Paper 1, 4–5; IPR2023-00791, Paper 3, 3–4; IPR2023-00964, Paper 3, 3–5.

The parties also identify that the '941 patent was the subject of IPR2021-01468 ("the -01468 proceeding"), a petition filed by Dell Inc. that was denied *inter partes* review, as a related matter. Pet. 4. In addition, Patent Owner identifies IPR2022-01567 (U.S. Patent No. 10,447,450) as a related matter. Paper 6, 4.

D. The '941 Patent

The '941 patent is titled "Methods and Apparatus for Multi-Carrier Communication Systems with Adaptive Transmission and Feedback." Ex. 1001, code (54). The '941 patent describes various methods to improve the performance of a wireless system, such as adaptive modulation and coding ("AMC"), channel estimation, transmission power control ("TPC"), and the adjustment of a subchannel configuration in accordance with the state of a communication channel. *Id.* at 1:34–48. The '941 patent, however, states that "[t]he subchannel configuration is normally defined and fixed in an operation, and it is usually not considered an adjustable function of the system to be adapted to the user profile and/or operational environment." *Id.* at 2:4–7.

The '941 patent describes a method for adaptive transmission of wireless communication signals in which modulation and coding scheme ("MCS"), coding rates, training pilot patterns, TPC levels, and subchannel configurations "are jointly adjusted to adapt to the channel conditions." Ex. 1001, 2:33–38. Figure 4 of the '941 patent is reproduced below.

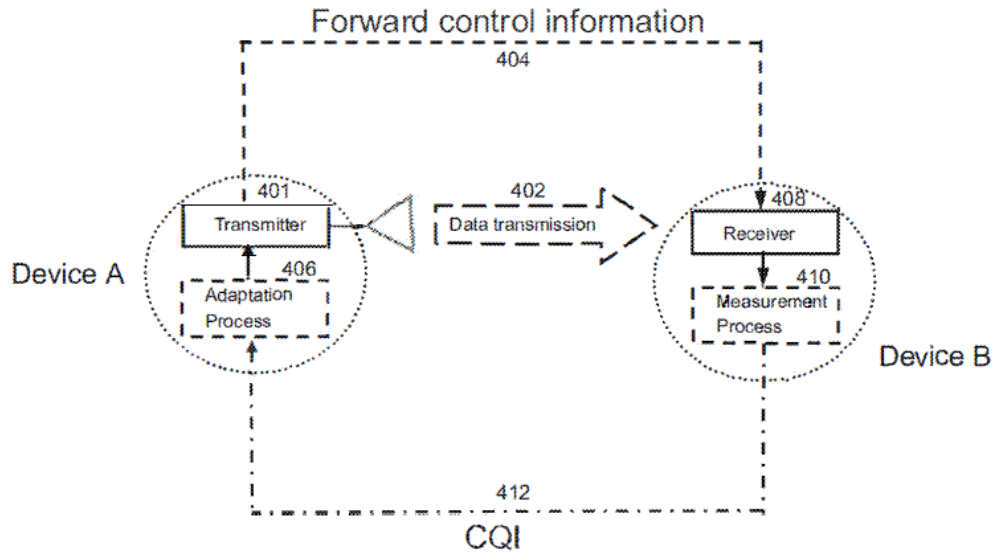


FIG. 4

Figure 4 shows an example of a control process between Device A and Device B. Ex. 1001, 2:17–18. Device A and Device B may be a base station and a mobile station that use adaptive transmission. *Id.* at 4:14–17. Specifically, based on output from adaptation process 406, Device A’s transmitter 401 transmits data 402 and control information 404 to Device B. *Id.* at 4:17–19. Device B’s receiver 408 receives data 402 and control information 404, whereas measurement process 410 measures channel conditions and feeds channel quality information (“CQI”) 412 back to Device A. *Id.* at 4:20–24.

According to the ’941 patent, “[t]he underlying principles of adaptive transmission and feedback are both to increase the degree of freedom of a transmission process and to supply information for the adaptation process of a communication system.” Ex. 1001, 3:63–66. The ’941 patent explains that when adaptive modulation, coding, training, and power control (“AMCTP”) is used, a transmitter relies on CQI to select an appropriate AMCTP scheme for transmitting the next packet or retransmitting a

previously failed packet. *Id.* at 4:46–49. The ’941 patent states that “[t]he adaptation process adjusts the allocated modulation schemes, coding rates, pilot patterns, power levels, spatial processing schemes, subchannel configurations, etc. in accordance with the transmission channel state and condition, for improving system performance and/or capacity.” *Id.* at 3:66–4:4.

E. The Challenged Claims

Petitioner challenges claims 1–14 of the ’941 patent. Pet. 1. Claims 1, 6, 8, and 13 are the independent challenged claims. Claim 1, reproduced below with Petitioner’s bracketing and labels, is representative.

1. [1A] A link adaptation method by a base station serving a plurality of mobile stations in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the method comprising:

[1B] transmitting a control message to a mobile station over a control channel, wherein:

[1C] the control message contains transmission parameters allocated to the mobile station for a subsequent transmission of data by the base station over a frequency subchannel to the mobile station in a time slot; and

[1D] the mobile station-specific transmission parameters indicate an antenna transmission scheme and

[1E] a corresponding subchannel configuration,

[1F] the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme and

[1G] the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain; and

[1H] transmitting a data packet to the mobile station over the frequency subchannel in accordance with the mobile station-specific transmission parameters.

Ex. 1001, 9:5–31; Pet. 117–118.

F. Prior Art and Instituted Grounds

We instituted trial based on all asserted claims and grounds of unpatentability as follows:

Claims Challenged	35 U.S.C. §	References
1–14	103(a) ²	802.16a-2001, ³ 802.16a-2003, ⁴ Heath ⁵
1, 3–8, 10–14	103(a)	Walton040, ⁶ Li017 ⁷
2, 9	103(a)	Walton040, Li017, Tufvesson ⁸

Pet. 7; Inst. Dec. 64. Petitioner also relies on declarations of Sarah Kate Wilson, PhD. (Ex. 1003, “the First Wilson Declaration”; Ex. 1046, “the

² The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102 and 103 that became effective on March 16, 2013. Because the ’941 patent claims priority as a continuation to an application filed before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability. *See* Ex. 1001, code (63).

³ IEEE Std 802.16-2001, “802.16-2001 - IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Fixed Broadband Wireless Access Systems” (Ex. 1005, “802.16a-2001”).

⁴ IEEE Std 802.16-2003, “802.16a-2003 - Standard for Amendment to IEEE Standard for Local and Metropolitan Area Networks - Part 16: Air Interface for Fixed Broadband Wireless Access Systems - Medium Access Control Modifications and Additional Physical Layer Specifications for 2-11 GHz” (Ex. 1006, “802.16a-2003”).

⁵ US 6,937,592 B1, issued Aug. 30, 2005 (Ex. 1007, “Heath”).

⁶ US 2003/0125040 A1, published July 3, 2003 (Ex. 1008, “Walton040”).

⁷ US 2002/0147017 A1, published Oct. 10, 2002 (Ex. 1009, “Li017”).

⁸ F. Tufvesson et al., “Pilot Assisted Channel Estimation for OFDM in Mobile Cellular Systems,” 1997 IEEE 47th Vehicular Technology Conf. Tech. in Motion, May 4–7, 1997 (Ex. 1010, “Tufvesson”).

Second Wilson Declaration”) in support of its contentions. Dr. Wilson was cross-examined. *See* Ex. 2016 (deposition transcript of Dr. Wilson).

Patent Owner relies on declarations of William P. Alberth Jr. (Ex. 2001, “the First Alberth Declaration”; Ex. 2015, “the Second Alberth Declaration”) in support of its arguments. Mr. Alberth was cross-examined. *See* Ex. 1047 (deposition transcript of Mr. Alberth).

II. ANALYSIS

A. *Principles of Law*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Petitioner bears the burden of persuasion to prove unpatentability of each challenged claim by a preponderance of the evidence. 35 U.S.C. § 316(e). This burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, “would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art;

(3) the level of skill in the art; and (4) when in evidence, any objective evidence of obviousness or non-obviousness.⁹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). “While the sequence of these questions might be reordered in any particular case” (*KSR*, 550 U.S. at 407), the Federal Circuit has explained that an obviousness determination can be made only after consideration of all of the *Graham* factors. *See, e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012).

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. “[O]bviousness must be determined in light of *all the facts*, and . . . a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine” teachings from multiple references. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (emphasis added); *see also PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014) (“The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact.”).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

⁹ The parties do not present objective evidence of non-obviousness.

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art (“POSITA”) is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022). “The patent’s purpose can also be informative.” *Id.*

Petitioner asserts that at the time of the invention a person of ordinary skill in the art would have had “a bachelor’s degree in electrical engineering, computer engineering, computer science, or an equivalent field, or an advanced degree in those fields, as well as [at] least 3–5 years of academic or industry experience in mobile wireless communications, or comparable industry experience.” Pet. 14 (citing Ex. 1003 ¶¶ 53–54).

Patent Owner responds that “[t]he levels of ordinary skill in the art proposed by Petitioner and its expert, Dr. Wilson, are internally inconsistent, incorrect, and contrary to the Board’s prior findings” in the -01468 proceeding. PO Resp. 6. Patent Owner, relying on the declaration testimony of Mr. Alberth, contends that “the level of skill in the art already adopted by the Board in the -1468 IPR (i.e., bachelor degree with two years of experience) is substantially correct.” *Id.* at 9–10 (citing Ex. 2015

¶¶ 19–20). Mr. Alberth “substantially agrees” that the proper level of ordinary skill in the art is “a ‘Bachelor’s degree in an academic area emphasizing electrical engineering or a similar discipline,’ and only ‘two years of experience in the field working with, teaching, or researching wireless communication networks.’” Ex. 2015 ¶ 18–19 (citing *Dell Inc. v. Neo Wireless LLC*, IPR2021-01468, Paper 12, 9).

Petitioner replies arguing that the Board should reject Patent Owner’s characterization of an ordinarily skilled artisan “because it does not accurately reflect the level of skill needed to evaluate the ’941 patent and the prior art.” Pet. Reply 30. Petitioner argues that Patent Owner’s “alleged level of skill in the art is nearly identical to the one proposed in the Petition—i.e., a minimum of a bachelor’s degree and at least 3 years of experience.” *Id.* at 28 (citing Pet. 14 (citing Ex. 1003 ¶ 53); Ex. 1047, 4:44:9–11, 78:9–79:3; Ex. 2015 ¶ 22). In addition, Petitioner points out that the Board’s determination in the -01468 proceeding “was an Institution Decision and was therefore preliminary adopted solely ‘for purposes of this decision.’” *Id.* at 28 (citing Ex. 1022, 9–10).

We agree with Petitioner that Patent Owner’s “alleged level of skill in the art is nearly identical to the one proposed in the Petition—i.e., a minimum of a bachelor’s degree and at least 3 years of experience.” Pet. Reply 28 (citing Pet. 14 (citing Ex. 1003 ¶ 53); Ex. 1047, 4:44:9–11, 78:9–79:3; Ex. 2015 ¶ 22). The main distinction between Petitioner’s ordinarily skilled artisan and Patent Owner’s is that Patent Owner’s definition requires a lesser “two years of experience” whereas Petitioner’s requires at least three years of experience. However, as Mr. Alberth acknowledges during deposition, “[a] difference of bachelor’s plus two or

bachelor's plus three does not make that much of a big a difference" (Ex. 1047, 78:9–12), both would be able to understand the '941 patent and cited prior art (*id.* at 78:13–18), perform the same analysis, and come to the same conclusions regarding the prior art (*id.* at 78:19–79:3).

Thus, we determine that Petitioner's proposal is consistent with the level of skill reflected in the prior art references of record. *See Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (listing the type of problems encountered in the art, prior art solutions to those problems, and the sophistication of the technology as factors that may be considered in determining the level of ordinary skill in the art). The prior art itself may be sufficient to demonstrate the level of skill in the art at the time of the invention. *See Okajima*, 261 F.3d at 1355 (explaining that specific findings regarding ordinary skill level are not required "where the prior art itself reflects an appropriate level and a need for testimony is not shown") (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)).

In view of this and based on the complete record before us, we view the parties' proposals as substantially the same because Petitioner's proposed definition includes the requisite education Patent Owner's definition requires, and as Patent Owner's declarant admits, the small difference in experience would not lead to any materially different conclusions about the '941 patent or the applied prior art." *See* Ex. 1047, 78:9–79:3; Ex. 2015 ¶ 22). Thus, we find (as we did in the Institution Decision) that Petitioner's level of ordinary skill in the art is consistent with the level of ordinary skill in the art reflected by the '941 patent and the prior art of record. *See* Inst. Dec. 17–18 (citing *Okajima*, 261 F.3d at 1355). We

note that, based on the record and evidence before us, our decision and analysis would be the same applying either party's definition of a person of ordinary skill in the art.

C. Claim Construction

In an *inter partes* review proceeding for a petition filed on or after November 13, 2018, a patent claim shall be 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). 37 C.F.R. § 42.100(b).¹⁰ This rule adopts the same claim construction standard used by Article III federal courts, which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*), and its progeny.

Under that standard, the words of a claim are generally given their “ordinary and customary meaning,” which is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *See Phillips*, 415 F.3d at 1312–13. “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).

We address the following claim terms.

1. “*transmission parameters allocated to the mobile station*”
(limitations 1C, 6C)
“*transmission parameters specific to the mobile station*”
(limitations 8C, 13C)

¹⁰ The Petition in this case was accorded a filing date of September 15, 2022. See Paper 3, 1.

*“mobile station-specific transmission parameters”
(limitations 1D, 1H, 6D, 6H, 8D, 8H, 13D, 13H)*

For purposes of the Institution Decision, we determined that the terms “transmission parameters allocated to the mobile station” of limitations 1C and 6C, “transmission parameters specific to the mobile station” of limitations 8C and 13C, or “mobile station-specific transmission parameters” of limitations 1D, 1H, 6D, 6H, 8D, 8H, 13D, and 13H should not be construed to be limited to transmission parameters for only a single mobile station, but rather should be construed as encompassing transmission parameters for multiple mobile stations. Inst. Dec. 25. Further we determined that these same terms should not be construed to be limited to adaptable or adjustable transmission parameters. *See id.* at 23.

Based on the complete record, we maintain these constructions for the same reasons discussed in the Institution Decision (*see* Inst. Dec. 19–25), to the extent necessary to reach a final decision (*see infra* § II.D (discussing, with respect to claim 1, the meaning of “subchannel configuration,” which is indicated by “the mobile station-specific transmission parameters”)).

2. *“the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme and”
(limitations 1F, 6F, 8F, 13F)
and
“the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain; and”
(limitations 1G, 6G, 8G, 13G)*

Although we determined preliminary constructions for limitations 1F, 6F, 8F, 13F, 1G, 6G, 8G, and 13G in the Institution Decision (Inst. Dec. 25–30), we need not determine final constructions to reach our decision. During trial, the parties presented arguments regarding Petitioner’s Ground 1

over 802.16a-2001 and 802.16a-2003, with or without the addition of Heath, that turn on the proper constructions for limitations 1F, 6F, 8F, 13F, 1G, 6G, 8G, and 13G. *See, e.g.*, PO Resp. 19–30; Pet. Reply 17–23. However, as discussed in greater detail below, we determine that Petitioner shows, by a preponderance of evidence, that claims 1–14 would have been obvious based on Ground 2 for reasons unrelated to these limitations.

For Petitioner’s Ground 2, based on the combination of Walton040 and Li017, and Ground 3, based on the combination of Walton040, Li017, and Tufvesson, the parties have not presented arguments that turn on the proper constructions for limitations 1F, 6F, 8F, 13F, 1G, 6G, 8G, and 13G. *See* PO Resp. 30–64; Pet. Reply 1–16.

Accordingly, limitations 1F, 6F, 8F, 13F, 1G, 6G, 8G, and 13G do not require explicit constructions to reach our decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (per curiam) (claim terms need to be construed “only to the extent necessary to resolve the controversy” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

We determine that no other terms require explicit construction to reach a decision. *See Nidec*, 868 F.3d at 1017.

D. Obviousness over Walton040 and Li017 (Ground 2)

Petitioner asserts that claims 1, 3–8, and 10–14 are unpatentable as obvious over Walton040 and Li017. Pet. 75–107. Petitioner also relies on the testimony of Dr. Wilson to support its arguments. *Id.* Patent Owner responds to Petitioner’s assertions. *See* PO Resp. 30–65; PO Sur-reply 1–13. Patent Owner relies on the testimony of Mr. Alberth to support its arguments. *See* Ex. 2015.

We begin our discussion with a brief summary of Walton040 and Li017 and then address the evidence and arguments presented.

1. *Overview of Walton040 (Ex. 1008)*

Walton040 is titled “Multiple-Access Multiple-Input Multiple-Output (MIMO) Communication System.” Ex. 1008, code (54). Walton040’s Figure 1, which is reproduced below, depicts multiple-access communication system 100. *Id.* ¶ 43.

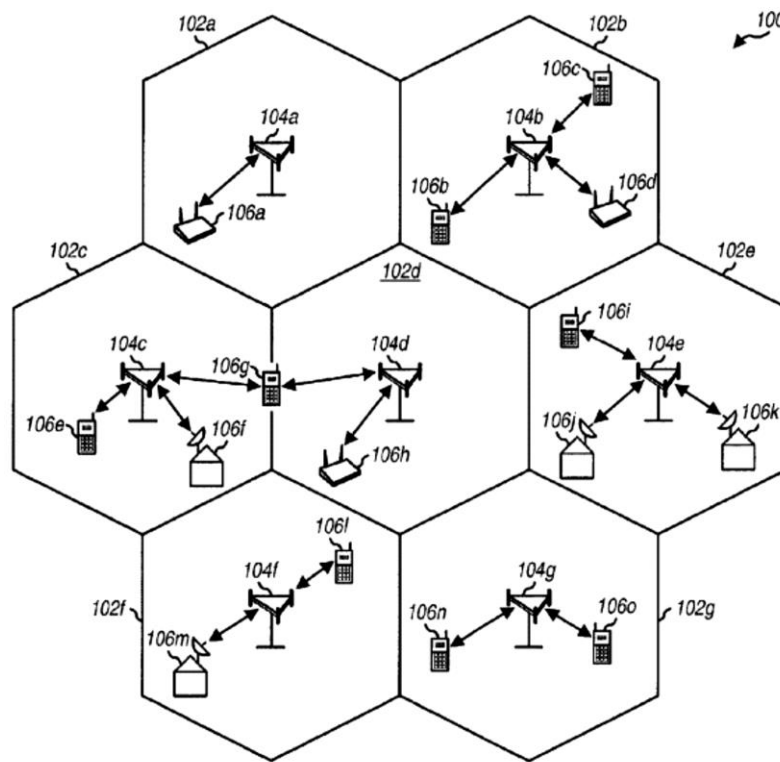


FIG. 1

System 100 supports a number of users by providing “communication for a number of coverage areas 102a through 102g, each of which is serviced by a corresponding base station 104.” *Id.* Walton040 states that “various terminals 106 are dispersed through the system, and each terminal may be fixed (i.e., stationary) or mobile.” *Id.* ¶ 44.

According to Walton040, its “techniques may be advantageously employed in a MIMO system, a multiple-access system (e.g., a CDMA, TDMA, or FDMA system), an OFDM system, or a communication system that employs any combination of the above (e.g., a multiple-access MIMO system, a MIMO system that employs OFDM, and so on).” Ex. 1008 ¶ 10. For instance, Walton040 describes “[t]he use of multiple antennas at both the transmitter unit and receiver unit” and that “[s]ystem 100 may be designed to support a number of operating modes[, such as MIMO].” *Id.* ¶¶ 55–56.

Walton040 describes the base station as controlling access to the system by allocating resources to users. Ex. 1008 ¶ 74. More particularly, Walton040 explains that:

When users are allocated resources, information may be provided to the users via a control channel to indicate the particular operating mode to use. Moreover, the system may adjust various operating parameters (e.g., the operating mode, channel, data rate, antenna(s) to transmit from, transmit power, and so on) in an adaptive manner based on system loading and/or some combination of performance metrics, as described below.

Id. ¶ 74. For instance, “[t]he schedule, antenna assignments, coding and modulation schemes, other information, or any combination thereof, may be conveyed to the scheduled terminals (e.g., via a control channel).” *Id.* ¶ 482.

2. Overview of Li017 (Ex. 1009)

Li017 is titled “Multi-Carrier Communications with Adaptive Cluster Configuration and Switching.” Ex. 1009, code (54). Li017 “relates to the field of wireless communications; more particularly, the invention relates to multi-cell, multi-subscriber wireless systems using orthogonal frequency division multiplexing (OFDM).” *Id.* ¶ 2.

Li017 describes subscribers measuring the signal to noise ratio (“SINR”) of each subcarrier cluster and reporting the measurement to the subscriber’s base station. Ex. 1009 ¶ 45. The base station receives the feedback from the subscriber, selects one or more clusters for the subscriber, and “notifies the subscriber about the cluster allocation through a downlink common control channel or through a dedicated downlink traffic channel.” *Id.* ¶¶ 46, 48.

Li017 further explains that “there are two categories of clusters: coherence clusters, containing multiple subcarriers close to each other and diversity clusters, containing multiple subcarriers with at least some of the subcarriers spread far apart over the spectrum.” Ex. 1009 ¶ 111. Li017 describes an embodiment in which a selection is made “between diversity clusters and coherence clusters depending on subscribers mobility.” *Id.* ¶ 120. Specifically, the process “tests whether the results of the channel/interference variation detection indicate that the user is mobile or in a fixed position close to the edge of the cell.” *Id.* ¶ 121. According to Li017, “[i]f the user is not mobile or is not in a fixed position close to the edge of the cell,” the process selects coherence clusters. *Id.* Otherwise, the process selects diversity clusters. *Id.*

3. *Claim 1*

Petitioner asserts claim 1 would have been obvious over Walton040 and Li017. Pet. 75–99; Pet. Reply 1–16. Patent Owner contends that Petitioner has failed to demonstrate how or why one of ordinary skill in the art would have combined Walton040 and Li017. PO Resp. 30–53; PO Sur-reply 1–11. Patent Owner further contends that Petitioner has failed to establish that the combination of Walton040 and Li017 teaches or suggests

“transmitting a parameter to the mobile station that indicates a ‘subchannel configuration.’” PO Resp. 53–65; PO Sur-reply 12–13.

We begin our analysis by reproducing, for context, Petitioner’s assertions regarding claim 1 as set forth in the Petition. Pet. 84–99.

4. Petitioner’s Contentions for Claim 1

We use Petitioner’s notations to identify the claim elements.

- a) *1A: A link adaptation method by a base station serving a plurality of mobile stations in an Orthogonal Frequency Division Multiplexing (OFDM) communication system, the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the method comprising:*

Petitioner asserts that “Walton040’s system 100 supports multiple mobile stations,” “utilizes OFDM, which partitions the ‘frequency band into a number of (N_F) frequency subchannels,’” and uses time slots. Pet. 84–86 (citing Ex. 1008 ¶¶ 5, 43–44, 47–48, 52, 55, 71, 74, 76, 91, 129–135, 140, 170–171, 283, 293, 323, 325, 332–333, 462, Fig. 1; Ex. 1003 ¶¶ 377–383).

- b) *1B: transmitting a control message to a mobile station over a control channel, wherein:*

Petitioner contends that Walton040 describes providing “information via a control channel to indicate the particular operating mode to use.”

Pet. 86 (citing Ex. 1008 ¶ 74). Petitioner also argues that “Li017 also discloses ‘transmitting a control message to a mobile station over a control channel.’” *Id.* at 88 (citing Ex. 1009 ¶¶ 39, 48, 89; Ex. 1003 ¶ 388).

- c) *1C: the control message contains transmission parameters allocated to the mobile station for a subsequent transmission of data by the base station over a frequency subchannel to the mobile station in a time slot; and*

Petitioner argues that “Walton040 provides information to ‘users via a control channel to indicate the particular operating mode to use’” and that

information is provided to the mobile station for a subsequent transmission of data because Walton040 describes that “coding and modulation for each frequency subchannel data stream . . . may be adjusted based on the coding and modulation control signals.” Pet. 88–90 (citing Ex. 1008 ¶¶ 74, 82, 93, 100, 130–131, 328, 367, 462, 482, Fig. 3E; Ex. 1003 ¶¶ 389–400).

d) 1D: the mobile station-specific transmission parameters indicate an antenna transmission scheme and

Petitioner contends that Walton040 teaches a base station using channel state information (“CSI”) to schedule a downlink transmission to terminals and to determine channel and antenna assignments and the operating mode. Pet. 90 (citing Ex. 1008 ¶¶ 82, 93; Ex. 1003 ¶¶ 401–405). The operating mode includes various antenna transmission schemes, such as MIMO and Multiple-Input, Single-Output (“MISO”). Pet. 90–91 (citing Ex. 1008 ¶¶ 57–68, 74, 82, 93, 148, 482; Ex. 1003 ¶¶ 402–406).

e) 1E: a corresponding subchannel configuration,

Petitioner asserts that “Walton040’s BS transmits the control message containing transmission parameters to the mobile station and transmits data to the mobile station over ‘subcarriers’ but does not explicitly disclose that the control information includes an indication of a corresponding subchannel configuration for these ‘subcarriers.’” Pet. 91. Petitioner argues that Li017 teaches limitation 1E. *Id.* (citing Ex. 1003 ¶¶ 407–409).

Specifically, Petitioner contends that Li017 describes “‘coherence clusters’ contain ‘multiple subcarriers close to each other’ and ‘diversity clusters’ contain ‘multiple subcarriers with at least some of the subcarriers spread far apart over the spectrum.’” Pet. 92 (citing Ex. 1009 ¶ 111). Petitioner argues that the coherence clusters correspond to the claimed localized subcarriers and the diversity clusters correspond to the claimed

distributed subcarriers. *Id.* at 92–93 (citing Ex. 1009 ¶¶ 111–112, Fig. 9; Ex. 1001, 7:1–9; Ex. 1003 ¶¶ 410–413). Petitioner further asserts that Li017 teaches the selection of “diversity or coherence clusters depending on subscribers’ mobility.” *Id.* at 93–94 (citing Ex. 1009 ¶¶ 118–121, Fig. 11; Ex. 1003 ¶¶ 414–420; Ex. 1001, 7:1–9). According to Petitioner, Li017 further describes notifying a subscriber of the cluster allocation via a control channel. *Id.* at 95 (citing Ex. 1009 ¶ 48; Ex. 1003 ¶ 421).

Petitioner contends that it would have been obvious to use Walton040’s “CSI to determine the mobility of the mobile station, select the appropriate subchannel configuration to achieve good performance, and inform the mobile station of the selected subchannel configuration—coherence cluster or diversity cluster,” in view of Li017’s subcarrier allocation method. Pet. 95 (citing Ex. 1003 ¶ 422). Petitioner argues that one of ordinary skill in the art “would have recognized that Li017’s process for intelligent selection between diversity and coherence clusters, depending on Walton040’s subscriber’s mobility and location, would have improved performance and mitigated the effect of intercell interference.” *Id.* at 81 (citing Ex. 1009 ¶¶ 113–114, 118–119). In particular, Petitioner asserts Li017 teaches that the diversity clusters “would ‘provide interference diversity gain’ for a mobile station close to a cell boundary or moving quickly through a cell,” and that the coherence clusters “would ‘achieve[] good performance’ for a stationary mobile station located away from a cell boundary.” *Id.* (citing Ex. 1009 ¶¶ 113–114, 118–119).

Petitioner also argues that one of ordinary skill in the art would have been motivated to combine Walton040 and Li017 because they are in the same field and address the same problem of “improving the performance of

wireless communication systems,” and because the combination would rely on known methods and have predictable results. *Id.* at 83 (citing Ex. 1003 ¶¶ 372–373).

f) 1F: the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme and

Petitioner argues that Walton040’s “system 100 ‘support[s] a number of operating modes’” and Walton040 teaches its base station and terminals “may be equipped with both multiple transmit and receive antennas.” Pet. 95–96 (citing Ex. 1008 ¶¶ 56, 68; Ex. 1003 ¶¶ 424–427). Specifically, Petitioner contends that Walton040’s MISO scheme functions as a transmission diversity scheme and Walton040 also discloses a MIMO scheme. *Id.* at 96–97 (citing Ex. 1008 ¶¶ 60–61, 63–65, 462; Ex. 1003 ¶¶ 428–430). Petitioner also argues that Walton040’s base station provides information regarding allocated resources to a mobile station via a control channel to indicate the operating mode. *Id.* at 97 (citing Ex. 1008 ¶¶ 74, 82, 93, 482, claims 1–5, 8–9).

g) 1G: the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain; and

Petitioner asserts that the combination of Walton040 and Li017 teaches limitation 1G, citing its arguments for limitation 1E.¹¹ Pet. 98 (citing Ex. 1003 ¶¶ 435–436). As discussed above with regard to limitation 1F, Walton040 describes the use of a MISO scheme (that Petitioner asserts is

¹¹ Petitioner cites section “VIII.B.2(g),” which is the same section (limitation 1G). Pet. 98. Based upon the cited combination of Walton040 and Li017 and subchannel recitations common to both limitations 1E and 1G, we understand that Petitioner refers to its arguments for limitation 1E.

a transmission diversity scheme) and a MIMO scheme. Ex. 1008 ¶¶ 60–61. Li017 describes the use of coherence clusters (that Petitioner argues are localized subcarriers) and the use of diversity clusters (that Petitioner contends are distributed subcarriers). Ex. 1009 ¶¶ 111–112. And, as discussed above with regard to limitation 1E, Petitioner contends that one of ordinary skill in the art would have modified Walton040 to use Li017’s subchannel configurations, including conditions when to use the subchannel configurations (i.e., based on a subscriber’s mobility).

h) 1H: transmitting a data packet to the mobile station over the frequency subchannel in accordance with the mobile station-specific transmission parameters.

Petitioner contends that Walton040 describes packet error rates and discloses a transmitter unit that codes and modulates for each frequency subchannel data stream and adjusts based on coding and modulation control signals. Pet. 98–99 (citing Ex. 1008 ¶¶ 100, 130, Fig. 3E; Ex. 1003 ¶¶ 437–443).

5. Patent Owner’s Contentions for Claim 1

Patent Owner argues that Petitioner’s proffered motivation to combine Walton040 and Li017—to improve performance and mitigate the effect of intercell interference—relies on a false assumption: “that Walton040 supposedly does not disclose its own channel allocation method.” PO Resp. 31–32. In particular, Patent Owner asserts that a “main aspect” of Walton040 “is how to allocate channels to users,” and that Walton040 “devotes **over 150 paragraphs on** ‘Scheduling,’ divided into four sections including 25 paragraphs on ‘Channel Assignments.’” *Id.* at 33.

Patent Owner also argues that Walton040’s method of channel allocation “has a fundamentally different principle of operation than Li017.”

PO Resp. 32. Specifically, Patent Owner asserts that “Walton040 assigns OFDM subcarriers to users on a subcarrier-by-subcarrier basis based on subcarrier-specific assessments,” whereas “Li017 groups OFDM subcarriers together to form ‘clusters,’ and then assigns a cluster as a whole to each user.” *Id.* at 35. Patent Owner argues that “Li017’s logic for selecting a diversity or coherence cluster simply does not work in Walton040” because “[t]here are no pre-defined groups of subcarriers similar to Li017’s clusters to then be classified as coherence or diversity and assigned to users in bulk.” *Id.* at 37. Accordingly, Patent Owner argues that Petitioner has not shown there would be a reasonable expectation of success in the proposed combination of Walton040 and Li017. PO Resp. 43.

Additionally, Patent Owner contends that the combination of Walton040 and Li017 does not meet the limitation of “the mobile station-specific transmission parameters indicate . . . a corresponding subchannel configuration” (claim limitations 1D and 1E). PO Resp. 53. Specifically, Patent Owner argues that parameters in Petitioner’s combination “merely indicate a *subchannel*, not a *subchannel configuration*.” *Id.* Patent Owner asserts claim 1 requires more than an indication of a subchannel (*id.* at 53–60), and that it would not have been obvious to indicate the configuration of a subchannel (*id.* at 61–65).

6. *Analysis of Claim 1*

a) *Motivation to Combine Li017 with Walton040*

At the outset, we note Patent Owner asserts that Walton040 uses the term “channel” to refer to a single subcarrier (*see* PO Resp. 35; *see also* Ex. 1008 ¶ 50 (“channel—a transmission unit that may be . . . a frequency subchannel”), ¶ 54 (“frequency subchannel—a frequency bin in an OFDM

system”)), which is different than the use of that term in the ’941 patent and the use of the term “cluster” in Li017 (*see* PO Resp. 36 (citing Ex. 1003 ¶ 356); *see also* Ex. 1009 ¶ 111 (defining a “cluster” in terms of multiple subcarriers)), and that Petitioner’s proposed combination is dependent on a misunderstanding about whether Walton040 assigns individual subcarriers or groups of subcarriers (*see* PO Resp. 41 (“Dr. Wilson appears to have misapprehended Walton040’s channels as being analogous to Li017’s clusters and each consisting of multiple OFDM subcarriers.”)).

We disagree with Patent Owner’s characterization of Petitioner’s understanding of the disclosures underlying the proposed combination. Petitioner states that “Walton040 does not explicitly describe how to assign or *group* subcarriers for use in the MIMO system utilizing OFDM.” Pet. 77 (emphasis added). Petitioner also states that “[w]hile Walton040 refers to ‘frequency subchannels,’ a POSITA would have understood that these correspond to the claimed ‘subcarriers,’” and that “[w]hile Li017 refers to a ‘cluster’ of subcarriers, this corresponds to the claimed ‘subchannel.’” *Id.* at 77 n.3 (citing Ex. 1003 ¶¶ 346–350), 78 n.4 (citing Ex. 1003 ¶ 356). Accordingly, Petitioner appreciates the proposed combination involves modifying Walton040 to assign groups of subcarriers, i.e., clusters, as per Li017.

Patent Owner’s arguments against this combination are contrary to principles regarding obviousness. Even if Walton040 already explains in detail how to assign an individual subcarrier to a mobile station (*see* PO Resp. 31–33), this does not show the absence of a motivation to apply a different advantageous technique in Walton040, in light of Li017’s disclosure of assigning clusters of subcarriers. Patent Owner maintains that

only if Walton was in fact a blank slate would one of ordinary skill in the art have “looked to the prior art, such as Li, for determining how to assign subcarriers.” Tr. 28. This logic, however, is at odds with the law on obviousness. In *KSR*, the Supreme Court articulated that “when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one.” 550 U.S. 398, 417 (2007). “If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *Id.*

Patent Owner directs our attention to *Virtek Vision Int’l v. Assembly Guidance Systems, Inc.*, 97 F.4th 882 (Fed. Cir. 2024), in relation to the alleged “flaw in the Petition that [Petitioner] assume[s] that Walton is a blank slate trade off.” Tr. 28–29. But we see nothing in the *Virtek* case that bars a combination that modifies an existing work, and only permits adding to a “blank slate.” Rather, the issue in *Virtek* was not simply that the petitioner there proposed a substitution of “the one-camera angular direction system in Keitler and Bridges with the two-camera 3D coordinate system disclosed in Briggs,” but rather that there was “no argument in the petition regarding why a skilled artisan would make this substitution—other than that the two different coordinate systems were ‘known to be used.’” 97 F.4th at 887. Accordingly, *Virtek* reinforces that “*KSR* did not do away with the requirement that there must exist a motivation to combine various prior art references in order for a skilled artisan to make the claimed invention.” *Id.* This holding does not bear on the Petition in this case because, as discussed further below, Petitioner has proposed a specific motivation to combine the references.

Here, Petitioner’s proposed combination, in which Li017 prompts a variation, or modification, of the subcarrier allocation method in Walton040 is supported by the evidence of record and follows the general principle in *KSR* that variations of a work may be obvious. That is, Petitioner’s proposed combination applies one variation of a method for allocating subcarriers in one system (Li017) to replace a different variation in another system (Walton040), where the systems are in the same field.

More particularly, Walton040 and Li017 are both in the field of wireless communications and address the same general problem of efficiently allocating a finite resource—wireless spectrum—for communication between a base station and terminals/subscribers. *See, e.g.*, Ex. 1008 ¶ 10 (“Aspects of the invention provide techniques that may be used to achieve better utilization of the available resources . . . and robust performance for the downlink and uplink in a wireless communication system,” such as “a MIMO system that employs OFDM, and so on.”); Ex. 1009 ¶¶ 24–25 (“A method and apparatus for allocating subcarriers in an orthogonal frequency division multiple access (OFDMA) system is described. . . . The techniques apply to multi-carrier systems in general”).

Although Walton040 may not address the specific problem for which Li017 is optimized—how to “adaptively allocate the subcarriers so as to mitigate the effect of intercell interference” (*see* Ex. 1009 ¶ 7)—given the overlap in the types of systems in which Walton040 and Li017’s methods are implemented, one of ordinary skill in the art would understand this problem to also be present in the operating context of Walton040. *See* Pet. 75–76 (citing Ex. 1008, ¶¶ 43–45, 55, Fig. 1; Ex. 1003 ¶¶ 342–344);

Pet. Reply 2 (citing Ex. 1003 ¶¶ 367–374). In fact, Patent Owner states that there is no “dispute that Walton040’s own methodology already accounts for time varying factors including user mobility, frequency-selective fading and intercell interference.” PO Sur-reply 10 (citing PO Resp. 46–49; Ex. 2027, 133:11–135:6). In view of Li017’s solution for the intercell interference problem, and the similarity of the technical environments of the two references, there is ample evidence that Li017’s technique would operate predictably well in Walton040.

For example, Li017 describes that “each subscriber continuously monitors the reception of the pilot symbols and measures the SINR and/or other parameters,” in order “to select one or more clusters with good performance.” Ex. 1009 ¶ 44. Thereafter, each subscriber may “report[] these SINR measurements to their base station through an access channel.” *Id.* ¶ 45. The SINR for a given subcarrier cluster “may comprise the average of the SINR values of each of the subcarriers in the cluster,” “may be the worst SINR among the SINR values of the subcarriers in the cluster,” or may be “a weighted averaging of the SINR values of the subcarriers in the cluster.” *Id.* ¶ 45. “Upon receiving the feedback from a subscriber, the base station further selects one or more clusters for the subscriber among the candidates.” *Id.* ¶¶ 45, 47. Similarly, Walton040 describes that “the terminals may derive the SNR for each transmission channel and report downlink CSI to the base station via a reverse channel,” and that “[t]he base station would then use this information . . . to determine the channel . . . assignments.” Ex. 1008 ¶ 93. Petitioner’s proposed modification simply allocates subcarriers as a group, as opposed to individually, where both Walton040 and Li017 use similar methods to determine which subcarriers

are best for a given terminal/subscriber. In particular, Petitioner argues that “modifying Walton040’s BS to incorporate Li017’s cluster selection process and informing the subscriber of the selected subchannel configuration would have required minimal modifications (e.g., providing logic in Walton040’s BS to select the configuration based on existing CSI and inform the terminal).” Pet. 82 (citing Ex. 1003 ¶¶ 370–371).

Given the compatibility of Walton040 and Li017, we find evidentiary support in the record for Petitioner’s explicit motivation to combine these references, namely, to “improve[] performance and mitigate[] the effect of intercell interference.” Pet. 81. In particular, modifying Walton040 to allocate subcarrier clusters would provide Walton040 with the respective advantages of the two different categories of clusters Li017 discloses: coherence clusters, which achieve good performance for static subscribers; and diversity clusters, which are beneficial for subscribers close to cell boundaries that are thus more subject to inter-cell interference, and which can also provide robustness and alleviate overhead for subscribers having large channel time variance. See Pet. 78–79 (citing Ex. 1009 ¶¶ 111, 113–114, 118; Ex. 1003 ¶¶ 356–359). *KSR* endorses such a rationale, stating that “if 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.” 550 U.S. at 417.

In this regard, Dr. Wilson testifies that the minimal modifications to Walton040 required for Petitioner’s combination would consist of implementing “the control logic described in Li017 . . . in Walton040’s base station to select between diversity clusters and coherence clusters depending

on subscribers' mobility using existing channel state information (CSI) and informing the subscriber of the selected subchannel configuration using the existing control channel." Ex. 1046 ¶ 22 (citing Ex. 1003 ¶ 371).

Accordingly, we determine that applying Li017's cluster-based subcarrier allocation technique in Walton040 would have been within the level of skill in the art, and so would not present a "uniquely challenging or difficult" implementation. *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157 (Fed. Cir. 2007).

When asked at the hearing as to whether it would be beyond the level of skill in the art to make the proposed combination, Patent Owner's counsel asserted that Walton looks at "subcarrier-specific metrics, and then figures out this individual subcarrier is the best one for this user," whereas Li does not "decide which of the individual subcarriers are best for this user," but rather "prepackages blindly." Tr. 30. Patent Owner's counsel offered that "I have a master's degree, I don't know how it would combine these two," and asserted that it is "not shown whether it is within or beyond the POSITA, how you would reconcile a prepackaged group assignment of subcarriers with one in Walton that specifically a[ss]esses all individual subcarriers and tells the user, this is the one subcarrier that's best based on all of your characteristics." *Id.* at 31. But the level of skill reflected in the Li017 reference itself suggests how a skilled artisan could make the proposed combination.

As quoted above, Li017 describes that the subscriber's measurement of the SINR for each subcarrier cluster that is reported to the BS can be based on values for each of the subcarriers in the cluster. Ex. 1009 ¶ 45. In view of this disclosure, one of ordinary skill in the art would recognize how

Walton040's CSI for a particular channel (i.e., subcarrier), which can be based on a terminal-derived SNR for the channel (Ex. 1008 ¶ 93), could be combined with CSI's for other channels to assess the suitability of a cluster of channels for communication with a terminal.

Patent Owner argues that Li017 “*pre*-packages groups of subcarriers into clusters without regard to any specific user, and assigns the pre-packaged clusters to users based on the user's mobility or proximity to a cell boundary.” PO Sur-reply 2–3. This characterization, however, fails to appreciate that in the relevant embodiment in Li017 “the subscriber and the base station intelligently selects diversity clusters to mobile subscribers or fixed subscribers at cell boundaries, and coherence clusters to fixed subscribers close to the base station,” where the selection is based on “[t]he channel/interference variation detector measur[ing] the channel (SINR) variation from time to time for each cluster.” Ex. 1009 ¶ 119. Here, Li017 shows how subscriber-specific channel measurements, which Li017 suggests may be based on a combination of individual subcarrier measurements (*see id.* ¶ 45), can be used to assign coherence or diversity clusters. We note that although a dispute has arisen during trial regarding the exact level of education and experience possessed by a skilled artisan with respect to the '941 patent, our reliance here on the references themselves for assessing the level of skill in the art renders unnecessary a determination as to whether the different proposed skill levels would require different results. *See Okajima*, 261 F.3d at 1355; *see also* Ex. 1047, 78:9–79:3; Ex. 2015 ¶ 22.

Patent Owner's argument that the modification of Walton040 would not in fact result in the improvement Li017 describes (*see* PO Resp. 45–53), is unavailing. As already noted, Petitioner identifies the respective

advantages of allocating coherence and diversity clusters to subscribers taught by Li017. *See* Pet. 78–79, 81–82 (citing Ex. 1009 ¶¶ 113–114, 118–119; Ex. 1003 ¶¶ 356–359). This is sufficient for reliance on the “known technique” rationale, where “if there’s a known technique to address a known problem using ‘prior art elements according to their established functions,’ then there is a motivation to combine.” *See Intel Corp. V. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023). Moreover, “[i]t’s not necessary to show that a combination is the *best* option, only that it be a *suitable* option.” *Id.* (alteration and emphases in original).

We are not persuaded by Patent Owner’s argument that Walton040 and Li017 have fundamentally different principles of operation, thus barring Petitioner’s combination. *See* PO Resp. 35–36. There is nothing in Petitioner’s combination that would essentially render Walton040 inoperable; rather, the combination would modify Walton040 to achieve the respective advantages of coherence and diversity clusters. Walton040 would remain operable to allocate subcarriers to terminals to provide for wireless communication between the BS and the terminals.

Patent Owner appears to present Walton040’s allocation of individual subcarriers—its alleged principle of operation—as an impediment to combination with Li017’s allocation of a group of subcarriers. *See, e.g.*, PO Resp. 38 (“Li017’s logic for selecting a diversity or coherence cluster simply does not work in Walton040.”). But the record shows no technological barrier to Petitioner’s combination based on the level of ordinary skill in the art as noted above. *See supra* § II.B. “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 421. One of ordinary skill in the art would be more than capable of envisioning

the use of Walton040's CSI information for each of several subcarriers to select not just a single subcarrier for a mobile station, but a group of subcarriers, in light of Li017's disclosure. *See id.* at 418 (approving consideration "of the inferences and creative steps that a person of ordinary skill in the art would employ").

Patent Owner's argument that there would be no reasonable expectation of success to Petitioner's combination is also not supported by the record. Given the similarities between how Walton040 and Li017 assess subcarriers for BS communication with terminals/subscribers as noted above, and in view of Dr. Wilson's testimony that minimal modification would be required to adapt Walton040's BS (Ex. 1003 ¶ 371; Ex. 1046 ¶ 22), the record provides no reason why one of ordinary skill in the art would not expect Walton040 to operate as proposed by Petitioner when modified according to Li017.

In sum, the record supports Petitioner's proffered motivation for combining Li017 with Walton040 based on certain advantages of Li017's approach, and Petitioner provides sufficient guidance on how the combination would be implemented in Walton040. Moreover, the record shows it would not require a uniquely challenging effort to make the combination, but rather would have been well within the level of ordinary skill in the art.

b) *"the mobile station-specific transmission parameters indicate . . . a corresponding subchannel configuration" (claim limitations 1D and 1E)*

We agree with Patent Owner that we must give meaning to the term "configuration" (*see* PO Resp. 54), but we disagree with Patent Owner that the combination of Walton040 and Li017 fails to meet the limitation of parameters that indicate a subchannel configuration (*see id.* at 61).

Patent Owner does not propose a specific construction of “subchannel configuration.” Rather, Patent Owner asserts that the plain meaning requires something more than an indication of a subchannel. *See* PO Resp. 53–54, 60. This comports with the general preference for “[a] claim construction that gives meaning to all the terms of the claim.” *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005). We thus look to Petitioner’s combination for the indication of something more than solely an indication of the identity of a subchannel, namely, information encompassed by the term “configuration.”¹²

As noted above, Petitioner points to Li017’s notification of a cluster allocation through a control channel. Pet. 95 (citing Ex. 1009 ¶ 48; Ex. 1003 ¶ 421). Petitioner emphasizes that an allocated cluster can be either a coherence or diversity cluster, and that “[t]hese different subcarrier configurations correspond to different subchannel configurations.” Pet. Reply 13–14 (citing Ex. 1009 ¶ 111, Figs. 9, 12). Patent Owner argues that Li017 discloses informing a user of an assigned base station subchannel, but not a “subchannel configuration.” PO Resp. 61. In other words, “the parameter transmitted to the user is only a cluster/subchannel selection.” *Id.* at 63.

We disagree with Patent Owner that Li017’s notification is solely an indication of a subchannel. *See* PO Resp. 62. As shown in Li017, the

¹² To the extent Patent Owner continues to pursue the line of argument presented in the Preliminary Response that the claimed subchannel configuration must be specific to a single mobile station, and must be adaptable (*see id.* at 56–60; Prelim. Resp. 36–47), we do not need to address Patent Owner’s proposed interpretation for the reasons discussed above (*see supra* § II.C).

allocation of a coherence cluster indicates a close grouping of subcarriers, whereas use of a diversity cluster indicates a disparate grouping of subcarriers—i.e., “coherence” and “diversity” are indicators of a particular configuration of an allocated subchannel. *See* Ex. 1009 ¶ 111. Limitation 1G, addressed below, defines a subchannel configuration as being “characterized by localized subcarriers or distributed subcarriers,” and Patent Owner does not dispute that localized subcarriers and distributed subcarriers correspond to coherence clusters or diversity clusters. *See, e.g.*, PO Resp. 36 (“Li017’s ‘clusters’ are a collection of OFDM subcarriers, and are akin to the ’941 Patent’s subchannels.”). It thus follows that the term “subchannel configuration” includes an indication that the subchannel is comprised of either coherence or diversity clusters comprised of subcarriers, such as Li017’s notification to a subscriber of its allocated cluster. *See* Ex. 1009 ¶¶ 48, 111.

Thus, we find that Petitioner has proven, by a preponderance of the evidence, that Li017 teaches or suggests the claimed “subchannel configuration” included in the “mobile-station-specific transmission parameters.” The parties do not dispute whether Walton040 and Li017 teach or suggest the other limitations of claim 1. Accordingly, upon review of the information in the Petition and corresponding evidence, and considering Patent Owner’s arguments and evidence, we find Petitioner has proven, by a preponderance of the evidence, on the complete trial record, that the combination of Walton040 and Li017 teaches or suggests the subject matter of claim 1.

c) Conclusion for Claim 1

Based on the analysis above, we conclude that Petitioner has proven, by a preponderance of the evidence, that claim 1 is unpatentable under 35 U.S.C. § 103 over the combination of Walton040 and Li017.

7. Claims 6, 8, and 13

Independent claim 6 is substantially similar to claim 1 except that claim 6 is directed to a base station instead of a link adaption method. *Compare* Ex. 1001, 9:5–31, *with id.* at 9:43–67. Petitioner cites its arguments for claim 1 when asserting that claim 6 would have been unpatentable over Walton040 and Li017. Pet. 99–100 (citing Ex. 1003 ¶¶ 444–452).

Independent claim 8 recites a link adaption method and includes limitations similar to those of claim 1. *Compare* Ex. 1001, 10:4–26, *with id.* at 9:5–31. Petitioner cites the arguments for claim 1, with additional arguments addressing differences with claim 8’s limitations. Pet. 101–103 (citing Ex. 1008, code (57), ¶¶ 44, 93; Ex. 1003 ¶¶ 453–463).

Independent claim 13 recites a mobile station and includes limitations similar to those of claim 8. *Compare* Ex. 1001, 10:43–67, *with id.* at 10:4–26. Petitioner asserts that claim 13 is unpatentable over Walton040 and Li017 by citing its arguments for claims 1 and 8. Pet. 103–104 (citing Ex. 1003 ¶¶ 464–472).

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for modifying Walton040 with Li017’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Walton040 and Li017 teaches or suggests the subject matter of claims 6, 8, and 13. Patent Owner does not

dispute Petitioner's contentions with respect to claims 6, 8, and 13, other than the arguments made with respect to claim 1, which we address above. *See, e.g.*, PO Resp. 1 n. ("Independent Claims 6, 8 and 13 recite corresponding limitations, and said arguments equally apply to those claims.").

8. *Claims 3–5, 7, 10–12, and 14*

Claims 3–5 depend from claim 1 (Ex. 1001, 9:35–42), claim 7 depends from claim 6 (*id.* at 10:1–3), claims 10–12 depend from claim 8 (*id.* at 10:34–42), and claim 14 depends from claim 13 (*id.* at 11:1–3). Petitioner provides citations to evidence of record, including Walton040, Li017, and Dr. Wilson's testimony on how the combination of Walton040 and Li017 teaches or suggests the subject matter these claims. Pet. 104–107 (citing Exs. 1003, 1008, 1009).

Upon review of the information in the Petition and corresponding evidence, including Petitioner's reasons for modifying Walton040 and Li017's teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Walton040 and Li017 teaches or suggests the subject matter of claims 3–5, 7, 10–12, and 14.¹³ Patent Owner does not dispute Petitioner's contentions with respect to these claims, other than the arguments made with respect to claims 1, 6, 8, and 13, which we address above.

9. *Conclusion for Ground 2*

Based on the analysis above, we conclude that Petitioner has proven, by a preponderance of the evidence, that claims 1, 3–8, and 10–14 are

¹³ We addressed claims 3–5, 7, 10–12, and 14 in a limitation-by-limitation analysis in our Institution Decision. *See* Inst. Dec. 57–61.

unpatentable under 35 U.S.C. § 103(a) over the combination of Walton040 and Li017.

E. Obviousness over Walton040, Li017, and Tufvesson

Petitioner asserts that claims 2 and 9 are unpatentable as obvious over Walton040, Li017, and Tufvesson.¹⁴ Pet. 107–110. Petitioner also relies on the testimony of Dr. Wilson to support its arguments. *Id.* Patent Owner does not dispute Petitioner’s contentions with respect to claims 2 and 9, other than the arguments made with respect to Ground 2, which we address above. *See, e.g.*, PO Resp. 30 (citing Pet. 7) (“Ground 3 only challenges dependent claims 2 and 9, and adds Tufvesson to the combination of Walton040 and Li017.”).

Upon review of the information in the Petition and corresponding evidence, including Petitioner’s reasons for combining Walton040, Li017, and Tufvesson’s teachings, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Walton040, Li017, and Tufvesson teaches or suggests the subject matter of claims 2 and 9. *See* Pet. 107–110.

F. Ground 1

Petitioner contends that claims 1–14 are unpatentable as obvious over 802.16a-2001 and 802.16a-2003, with or without further combination with Heath. Pet. 29–75. Because Petitioner has shown that claims 1–14 are unpatentable based on the asserted grounds analyzed above, we do not reach these additional asserted grounds. *See Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (“The Commission . . . is at perfect liberty to

¹⁴ We addressed claims 2 and 9 in a limitation-by-limitation analysis in our Institution Decision. *See* Inst. Dec. 62–63.

reach a ‘no violation’ determination on a single dispositive issue.”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (recognizing that “[t]he Board has the discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

III. CONCLUSION

Based on the full record, we conclude that Petitioner has proven, by a preponderance of the evidence, that claims 1–7 are unpatentable.¹⁵

In summary:

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–14	103(a)	802.16a-2001, 802.16a-2003, Heath		
1, 3–8, 10– 14	103(a)	Walton040, Li017	1, 3–8, 10–14	
2, 9	103(a)	Walton040, Li017, Tufvesson	2, 9	
Overall Outcome			1–14	

¹⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has established by a preponderance of evidence that claims 1–14 of U.S. Patent No. 10,075,941 B2 are unpatentable as obvious under 35 U.S.C. § 103; and

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

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