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Paper 12
Entered: March 14, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DELL INC. and DELL TECHNOLOGIES INC.,
Petitioner,

v.

NEO WIRELESS LLC,
Patent Owner.

IPR2021-01468
Patent 10,075,941 B2

Before CHARLES J. BOUDREAU, MICHELLE N. ANKENBRAND, and MATTHEW S. MEYERS, *Administrative Patent Judges.*

MEYERS, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Dell Inc. and Dell Technologies, Inc. (collectively, "Petitioner") filed a Petition to institute an *inter partes* review of claims 1–14 (the "challenged claims") of U.S. Patent 10,075,941 B2 (Ex. 1001, the "'941 patent"). Paper 3 ("Petition" or "Pet."). Neo Wireless LLC ("Patent Owner") filed a Preliminary Response. Paper 9 ("Preliminary Response" or "Prelim. Resp.").

An *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . shows 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) (2018). We have authority, acting on the designation of the Director, to determine whether to institute an *inter partes* review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a). Having considered the arguments and evidence presented by Petitioner and Patent Owner, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing on at least one of the challenged claims of the '941 patent. Accordingly, we do not institute an *inter partes* review of the challenged claims.

B. Real Parties in Interest

The parties identify themselves as the real parties in interest. Pet. 99; Paper 7, 1.

C. Related Proceedings

The parties identify, as matters involving or related to the '941 patent, *Neo Wireless LLC v. Dell Technologies Inc.*, Case No. 6:21-cv-0024 (W.D. Tex.) ("the parallel district court litigation"). Pet. 99; Paper 7, 1. Patent

Owner also identifies two former district court proceedings and two proceedings before the Board: IPR2021-01480 and IPR2021-01486. Paper 7, 1–2.

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.

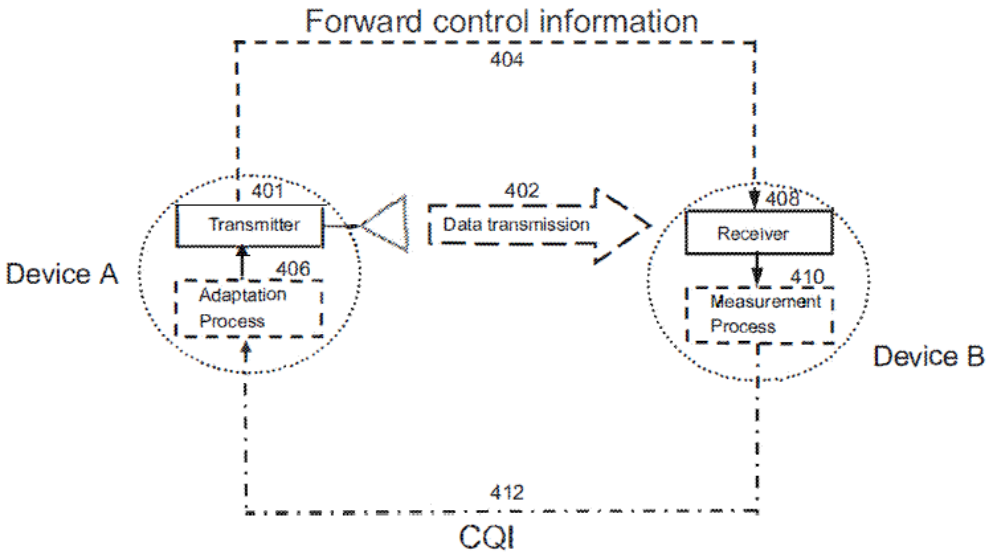

FIG. 4

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, 4:63–66. 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. Illustrative Claim

Petitioner challenges claims 1–14 of the '941 patent. Pet. 2. Claims 1, 6, 8, and 13 are the independent challenged claims. Claim 1, reproduced below with Petitioner's bracketing, labels, and formatting, is representative.

> 1. [1pre-1] A link adaptation method by a base station serving a plurality of mobile stations in an Orthogonal Frequency Division Multiplexing (OFDM) communication system,
>
> [1pre-2] the communication system utilizing a transmission structure with time slots in the time domain and frequency subchannels in the frequency domain, the method comprising:
>
> [1a] transmitting a control message to a mobile station over a control channel,
>
> [1b] wherein:
>
> 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
>
> [1c] the mobile station-specific transmission parameters indicate an antenna transmission scheme and a corresponding subchannel configuration,
>
> [1c-1] the antenna transmission scheme comprising a transmission diversity scheme or a multiple-input multiple-output (MIMO) scheme and
>
> [1c-2] the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain; and

> [1d] 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 iv.

F. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–14 of the '941 patent are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §	References
1–14	103(a)[1]	Walton '269,[2] Li[3]
2, 9	103(a)	Walton '269, Li, Gupta[4]
1, 3–8, 10–14	103(a)	PCT819,[5] Airy[6]

Petitioner also relies on the Declaration of Dr. Zhi Ding (Ex. 1003, "the Ding Declaration") in support of its arguments. Patent Owner relies on the Declaration of William P. Alberth Jr. (Ex. 2001, "the Alberth Declaration") in support of its arguments.

II. ANALYSIS

A. Legal Standards

"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.

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[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. § 103. Because the '941 patent is alleged to have an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA version of 35 U.S.C. § 103.
[2] US 9,473,269 B2, issued Oct. 18, 2016 (Ex. 1006, "Walton '269").
[3] US 6,947,748 B2, issued Sept. 20, 2005 (Ex. 1007, "Li").
[4] US 2004/0165683 A1, published Aug. 26, 2004 (Ex. 1008, "Gupta").
[5] WO 02/093819 A1, published Nov. 21, 2002 (Ex. 1009, "PCT819").
[6] US 6,400,699 B1, issued June 4, 2002 (Ex. 1010, "Airy").

Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (2012) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics*, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A claim is unpatentable for obviousness if, to one of ordinary skill in the pertinent art, "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." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). The question of obviousness is resolved on the basis of underlying factual determinations, including "the scope and content of the prior art"; "differences between the prior art and the claims at issue"; and "the level of ordinary skill in the pertinent art."[7] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 550 U.S. at 418. An obviousness determination requires finding "both '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

[7] Additionally, secondary considerations, such as "commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy." *Graham*, 383 U.S. at 17–18. Neither party, however, has presented any such evidence for us to consider.

artisan would have had a reasonable expectation of success in doing so.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418 (for an obviousness analysis, "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does").

"Although the *KSR* test is flexible, the Board 'must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.'" *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (citation omitted). Further, an assertion of obviousness "cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); accord *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (stating that "'conclusory statements'" amount to an "insufficient articulation[] of motivation to combine"; "instead, the finding must be supported by a 'reasoned explanation'" (citation omitted)); *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) ("To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.").

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

B. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (internal quotation marks and citation omitted).

Petitioner asserts that at the time of the invention a person of ordinary skill in the art ("POSITA") "would have had at least a Bachelor's degree in an academic area emphasizing electrical engineering or a similar discipline, and at least two years of experience in the field working with, teaching, or researching wireless communication networks" and that "[s]uperior education could compensate for a deficiency in work experience, and *vice-versa*." Pet. 5 (citing Ex. 1003 ¶¶ 32–33).

Patent Owner does not provide its own assessment regarding the level of skill in the art, or otherwise dispute Petitioner's assertion. *See generally* Prelim. Resp.; *see also* Ex. 2001 ¶ 23 (Patent Owner's expert "accept[s] Dr. Ding's proposed qualifications of a POSITA.").

Based on our review of the record at this stage, we find 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 v. Bourdeau, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (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)).

Accordingly, for purposes of this decision, we adopt Petitioner's definition of the 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).[8] 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).

[8] The Petition in this case was accorded a filing date of September 15, 2021. *See* Paper 4, 1.

Petitioner submits that "[n]o formal claim constructions are necessary because 'claim terms need only be construed to the extent necessary to resolve the controversy.'" Pet. 5 (citing *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011)).

Patent Owner responds that in the parallel district court litigation, it has asserted that the limitation "'the mobile station-specific transmission parameters indicate . . . a corresponding subchannel configuration . . . the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain' is entitled to its plain and ordinary meaning." Prelim. Resp. 2 (citing Ex. 2014, 23–25).[9] In this proceeding, however, other than asserting that it "applies that plain and ordinary meaning" to this limitation in its Preliminary Response (*id.*), Patent Owner provides little explanation with respect to its application. Thus, we address the meaning of the argued limitation below.

In doing so, we find it useful to first review the parties' arguments in the parallel district court litigation (Exs. 2011, 2014, 2015, 2016) for context before considering the argued limitation's meaning based on the language of the claim, the written description (Ex. 1001), and the prosecution history (Ex. 1002). *See Phillips*, 415 F.3d at 1319 ("[E]xtrinsic evidence may be useful to the court, but it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.").

[9] Patent Owner also points out that the parties have agreed upon a meaning for limitations [1c] and [1c-1] in the parallel district court litigation that we need not reach in this decision. Prelim. Resp. 1–2.

In the parallel district court litigation, Petitioner contends that the argued limitation should be construed to mean "[t]he mobile station-specific transmission parameters indicate whether the subchannels are either distributed subcarriers, or localized subcarriers in the frequency domain." Ex. 2011, 16. In contrast, Patent Owner takes the position that this limitation "need not be construed and instead should be given its plain and ordinary meaning." Ex. 2014, 23. Patent Owner argues that Petitioner's interpretation adds additional limitations beyond the scope of what would be considered the plain and ordinary meaning of the limitation. Ex. 2014, 23. According to Patent Owner, the limitation at issue "does not require the mobile station-specific transmission parameters to include a specific, separate parameter whose only purpose is to disclose whether the subchannels are either distributed or localized subcarriers in the frequency domain." *Id.* Rather, Patent Owner asserts that "[t]he plain and ordinary meaning only requires mobile station-specific transmission parameters that indicate a corresponding subchannel configuration that is *characterized* by distributed subcarriers or localized subcarriers in the frequency domain." *Id.* Patent Owner "does not dispute that the claim requires the parameters be capable of indicating (alternatively) both a distributed and localized subcarrier configuration" (*id.*), but reasons that there is no need to indicate a type of subchannel configuration because "[a] subchannel configuration can be 'characterized by distributed or localized subcarriers' merely by employing either of those configurations." *Id.*

Petitioner responds first by pointing out that Patent Owner "admits that 'the claim requires the parameters be capable of indicating (alternatively) both a distributed and localized subcarrier configuration.'"

Ex. 2016, 13 (citing Ex. 2014, 23). Petitioner then argues that the "only dispute remaining is whether the transmission parameters must affirmatively indicate this feature," and takes the position that the prosecution history of the '941 patent supports an interpretation that the argued limitation "requires an affirmative indication of whether the subcarriers are distributed or localized." *Id.*

To support its position, Petitioner directs our attention to the '941 patent's prosecution history, where Applicant argued, to overcome the prior art of record,[10] "that the claims had been amended to indicate that [the] system transmitted subchannel information 'including **whether** the subchannels are "distributed subcarriers or localized subcarriers in the frequency domain."'" Ex. 2016, 13 (quoting Ex. 1002, 49). Petitioner, thus, concludes that "[b]y confirming that the transmitted information must include **whether** the subchannels are distributed or localized, the applicant represented that there must be something in the information affirmatively indicating this feature." *Id.* at 14.

Having considered the parties' arguments in the parallel district court litigation, we now turn to the intrinsic evidence of the '941 patent. *Sunovion Pharm., Inc. v. Teva Pharm. USA, Inc.*, 731 F.3d 1271, 1276 (Fed. Cir. 2013) ("When construing claim terms, we first look to, and primarily rely on, the intrinsic evidence, including the claims themselves, the specification, and the prosecution history of the patent, which is usually dispositive.").

We begin our analysis by considering the language of claim 1 as a whole. *See Brookhill-Wilk 1, LLC. v. Intuitive Surgical, Inc.*, 334 F.3d 1294, 1299 (Fed. Cir. 2003) ("While certain terms may be at the center of the

[10] US 7,436,757 B1, issued Oct. 14, 2008 ("Wilson").

claim construction debate, the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms."). Claim 1 first recites the transmission of "a control message to a mobile station over a control channel" that "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." Ex. 1001, 9:11–19 (Limitations [1a], [1b]). Claim 1 further recites that "the mobile station-specific transmission parameters indicate an antenna transmission scheme and a corresponding subchannel configuration," and identifies, *inter alia*, that "the corresponding subchannel configuration [is] characterized by distributed subcarriers or localized subcarriers in the frequency domain." *Id.* at 9:20–22, 9:25–27 (Limitations [1c], [1c-2]).

This language specifies that a "control message" that contains "transmission parameters" for "a subsequent transmission of data" is sent to a mobile station. This language further specifies that these "transmission parameters" are first transmitted to "indicate an antenna transmission scheme and a corresponding subchannel configuration." This language still further specifies that "the corresponding subchannel configuration [is] characterized by distributed subcarriers or localized subcarriers in the frequency domain." Thus, claim 1 explicitly recites the transmission of a control message that includes "transmission parameters" that "indicate . . . a corresponding subchannel configuration . . . characterized by distributed subcarriers or localized subcarriers in the frequency domain."

Turning to the Specification, the '941 patent states:

> Given the fact that different configurations of subchannel compositions are suitable for different scenarios or user profiles,

> subchannel configuration is included in the transmission adaptation process. In one embodiment, the subchannel configuration information is broadcast on the common forward control channel to all users such that each user is informed of its subchannel configuration.

Ex. 1001, 7:10–16; *see also id.* at 7:17–18 ("In another embodiment, the subchannel configuration is adjusted according to deployment scenarios."). Thus, the '941 patent describes that during its link adaptation process, a "subchannel configuration is included in the transmission adaptation process" to inform each user of the subchannel configuration, i.e., "distributed subcarriers or localized subcarriers," for a subsequent transmission of data in order for the system to adapt to different scenarios or user profiles.

Based on the language of claim 1 when viewed in the context of the '941 patent's Specification, we understand the argued limitation to require that the mobile station-specific transmission parameters contained in the control message would indicate[11] "a corresponding subchannel configuration," and as such, would indicate whether the subchannel configuration for a subsequent transmission is either "characterized by distributed subcarriers or localized subcarriers in the frequency domain."

We recognize that this understanding is similar to the construction that Petitioner advocates for in the parallel district court litigation. Ex. 2011, 16. However, we find this understanding to be supported by the language of claim 1 and consistent with the Specification of the '941 patent.

[11] We note that a meaning of the term "indicate" is "to state or express briefly" (https://www.merriam-webster.com/dictionary/indicate).

In the parallel district court litigation, Patent Owner argues that such an interpretation "adds additional limitations beyond the scope of what would be considered the plain and ordinary meaning of the limitation." Ex. 2014, 23. According to Patent Owner, the limitation at issue "does not require the mobile station-specific transmission parameters to include a specific, separate parameter whose only purpose is to disclose whether the subchannels are either distributed or localized subcarriers in the frequency domain. *Id.* Rather, Patent Owner asserts that "[t]he plain and ordinary meaning only requires mobile station-specific transmission parameters that indicate a corresponding subchannel configuration that is *characterized* by distributed subcarriers or localized subcarriers in the frequency domain." *Id.*

At least one difficulty with Patent Owner's arguments is that they appear to be inconsistent with the language of claim 1 and the '941 patent's Specification. Patent Owner asserts that clam 1 does not require a limitation that "include[s] a specific, separate parameter whose only purpose is to disclose whether the subchannels are either distributed or localized subcarriers in the frequency domain." Ex. 2014, 23. However, as discussed above, claim 1 explicitly recites the transmission of a control message that includes "transmission parameters" that "indicate . . . a corresponding subchannel configuration . . . characterized by distributed subcarriers or localized subcarriers in the frequency domain." Thus, we find the argued limitation does require some affirmative indication, i.e., a mobile station-specific transmission parameter, that would at least "indicate . . . a corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain" for a subsequent transmission from a base station to a mobile station.

Patent Owner's arguments also appear to be inconsistent with arguments made during the '941 patent's prosecution history. *See, e.g.*, Ex. 1002, 49. As briefly summarized above, to overcome Wilson, Applicant argued that Applicant's claims, as newly amended at that time, were different from Wilson because they were amended "to ***indicate*** that applicant's system transmits subchannel configuration information, including ***whether*** the subchannels are 'distributed subcarriers or localized subcarriers in the frequency domain.'" Ex. 1002, 49 (emphases added).[12] Applicant asserted that "such configuration information might be useful when assigning subchannels to users moving at different speeds." *Id.* Applicant also distinguished Wilson from the newly amended claims explaining that "Wilson is silent as to the transmission of subchannel information as defined by the applicant." *Id.* The Examiner, apparently finding these arguments persuasive, allowed the claims thereafter. *Id.* at 33.

Having reviewed the '941 patent's prosecution history, we find the intrinsic evidence suggests clearly that the claims were amended "to ***indicate*** that applicant's system transmits subchannel configuration information, including ***whether*** the subchannels are 'distributed subcarriers or localized subcarriers in the frequency domain.'" Ex. 1002, 49 (emphases added). Applicant further argued that "such configuration information might be useful when assigning subchannels to users moving at different speeds." *Id*.

[12] Applicant further distinguished Wilson, from the newly amended claims, by asserting that "Wilson specifically limits its teaching to a MIMO system." Ex. 1002, 49. Applicant argued that "[b]y being exclusively directed to a MIMO system, Wilson has no need to transmit an antenna transmission scheme, and therefore fails to either disclose or suggest the use of the antenna transmission scheme as claimed by applicant." *Id.*

Thus, we find the '941 patent's prosecution history also supports the understanding that the mobile station-specific transmission parameter would affirmatively "indicate . . . a corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain" for a subsequent transmission from a base station to a mobile station.

Patent Owner also argues in the parallel district court litigation that use of the transitional term "characterized by" suggests that the claim does not "require the subchannel configuration to explicitly include a 'localized' or 'distributed' indicator" (Ex. 2014, 24) because the subchannel configuration "could be determined based on the subchannel configuration itself (e.g., based on the allocation of resources across the subchannel)." *Id.* at 24–25. However, we need not reach this issue here in order to resolve the issue of whether to institute an *inter partes* review.

In the parallel district court litigation, the parties agree that "the claim requires the [mobile station-specific transmission] parameters be capable of indicating (alternatively) both a distributed and localized subcarrier configuration." Ex. 2014, 23; Ex. 2016, 13. We find this understanding to be consistent with the language of the claim and supported by the '941 patent's Specification. Because construing the argued limitation to require that the mobile station-specific transmission "parameters be capable of indicating (alternatively) both a distributed and localized subcarrier configuration" is sufficient to resolve the issue of whether to institute an *inter partes* review, we decline to speculate on whether the argued limitation "require[s] the subchannel configuration to explicitly include a 'localized' or 'distributed' indicator" or could simply be satisfied "based on the

subchannel configuration itself (e.g., based on the allocation of resources [sent] across the subchannel)." Ex. 2014, 24–25.

Therefore, while we do not provide an explicit construction of "the mobile station-specific transmission parameters indicate . . . a corresponding subchannel configuration . . . the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain," we determine that the correct construction requires, at a minimum, that the mobile station-specific transmission parameters are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations. Independent claims 6, 8, and 13 include similar limitations. *See* Ex. 1001, 9:61–63, 10:23–25, 10:61–63.

We determine that no other terms require explicit construction to reach a decision on institution. *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))).

D. Alleged Obviousness over Walton '269 and Li

Petitioner asserts that claims 1–14 are unpatentable as obvious over Walton '269 and Li. Pet. 9–53. Petitioner also relies on the testimony of Dr. Ding to support its arguments. *Id*. (citing Ex. 1003). Patent Owner responds to Petitioner's assertions. Prelim. Resp. 3–21.

1. Overview of Walton '269 (Ex. 1006)

Walton '269 is titled "Method and Apparatus for Providing an Efficient Control Channel Structure in a Wireless Communication System."

Ex. 1006, code (54). Walton '269 relates "to a method and apparatus for providing an efficient control channel structure in a wireless local area network (WLAN) communication system." *Id.* at 1:10–13.

Figure 1 of Walton '269 is reproduced below.

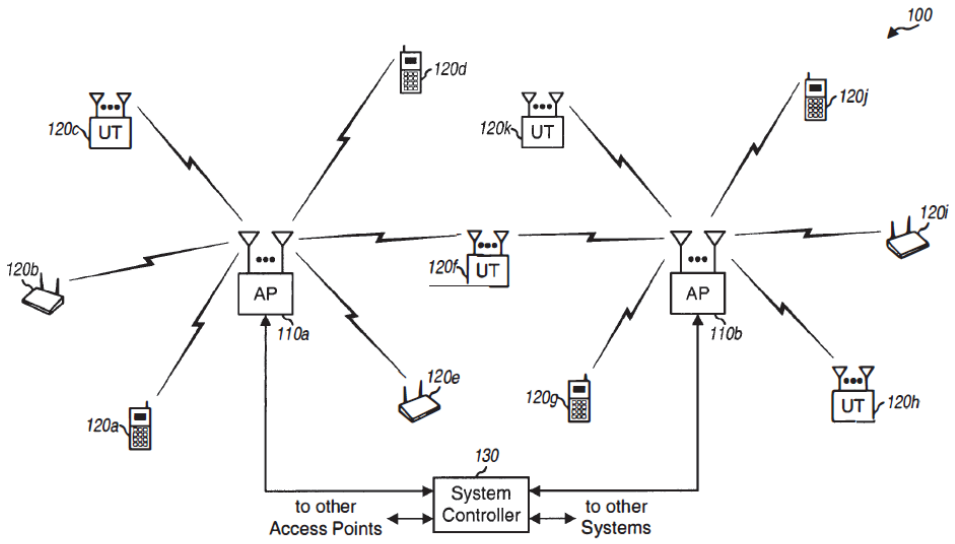

FIG. 1

Walton '269 depicts MIMO WLAN system 100 in Figure 1 includes access points 110a, 110b that support communication for user terminals 120a–120k. Ex. 1006, 3:24–28, 3:44–46. System 100 further includes system controller 130 that couples to access points 110a, 110b and may further couple to other systems and networks, such as "to a packet data network (PDN), a wired local area network (LAN), a wide area network (WAN), the Internet, a public switched telephone network (PSTN), a cellular communication network, etc." *Id.* at 3:60–66.

Walton '269 describes the use of various transmission modes for the system and the use of orthogonal frequency division multiplexing ("OFDM") to partition system bandwidth into orthogonal subbands. Ex. 1006, 4:56–5:9, 5:33–35. Walton '269 further describes the estimation of a downlink to obtain channel state information ("CSI"). *Id.* at 8:14–16.

Walton '269 explains that a system controller can receive CSI and packet/frame status to determine feedback information that is to be sent to an access point. *Id.* at 8:19–22. According to Walton '269, the feedback information is used "to perform a number of functions such as (1) selecting a set of user terminals for data transmission on the downlink and uplink, (2) selecting the transmission rate(s) and the transmission mode for each selected user terminal, and (3) assigning the available FCH/RCH resources to the selected terminals." *Id.* at 8:35–41.

Walton '269 describes an embodiment of a WLAN system that uses a channel structure, which further includes transport channels, designed to support efficient downlink and uplink transmissions. Ex. 1006, 2:8–16. Walton '269 explains that "[v]arious attributes of these transport channels may be configurable, which allows the system to easily adapt to changing channel and loading conditions." *Id.* at 2:16–19. For instance, Walton '269 describes using the forward control channel ("FCCH") by an "access point to allocate resources (e.g., channel assignments) on the downlink and uplink." *Id.* at 2:19–22.

2. Overview of Li (Ex. 1007)

Li is titled "OFDMA With Adaptive Subcarrier-Cluster Configuration and Selective Loading." Ex. 1007, code (54). Li "relates to multi-cell, multi-subscriber wireless systems using orthogonal frequency division multiplexing (OFDM)." *Id.* at 1:8–10. Li describes the phenomenon of frequency-selective fading, which causes different gains for different subcarriers. *Id.* at 1:43–44. Li explains that subcarriers can be allocated so each subscriber enjoys a high channel gain. *Id.* at 1:48–50. However, Li also explains that another problem, intercell interference, arises when the

same spectrum is used for multiple neighboring cells. *Id.* at 1:57–60. Li states that "it is advantageous to adaptively allocate the subcarriers so as to mitigate the effect of intercell interference." *Id.* at 1:60–63. Li describes one approach for subcarrier allocation is a joint optimization operation but that requires activity and channel knowledge of all subscribers in all cells, as well as frequent rescheduling every time a subscriber is dropped off the network or a new subscriber is added. *Id.* at 1:64–2:2.

Li describes a method for subcarrier selection that uses "a subscriber measuring channel and interference information for subcarriers based on pilot symbols received from a base station." Ex. 1007, 2:9–15. The method includes a "subscriber selecting a set of candidate subcarriers, providing feedback information on the set of candidate subcarriers to the base station, and receiving an indication of subcarriers of the set of subcarriers selected by the base station for use by the subscriber." *Id.* at 2:15–19.

Li further describes two categories of subcarrier clusters. These categories are depicted in Figure 9, which is reproduced below.

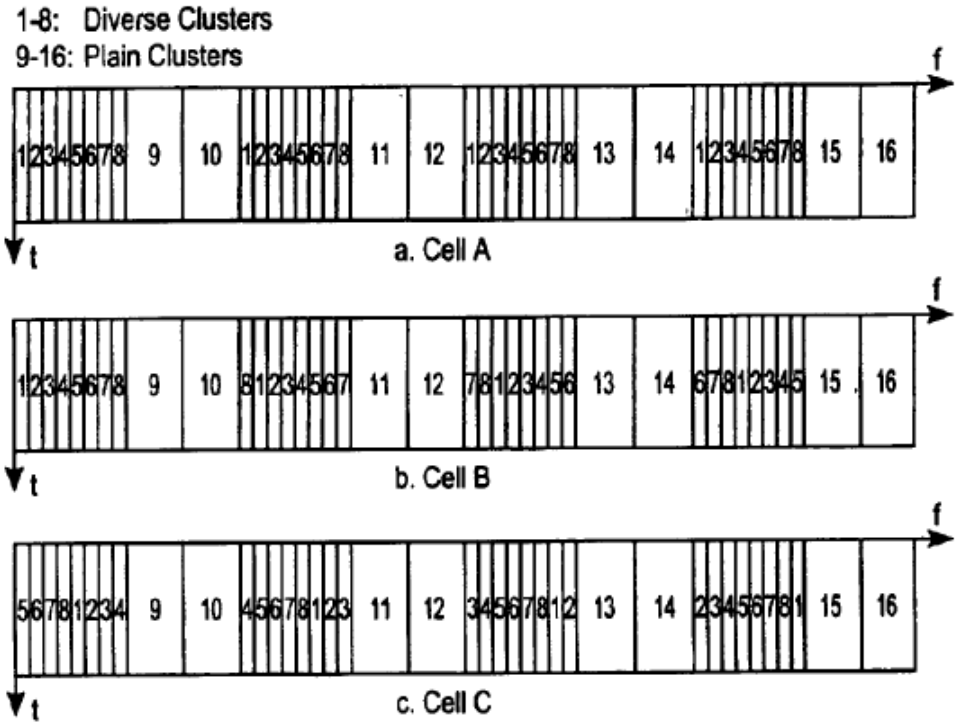

FIG. 9

Li explains that coherence clusters contain "multiple subcarriers close to each other." Ex. 1007, 14:17–18. Li explains that clusters 9–16 in Figure 9 are coherence clusters and frequencies having the same number in a cell (e.g., 9) are in the same coherence cluster. *Id.* at 14:36–37, 14:40–41. Conversely, Li describes diversity clusters as "containing multiple subcarriers with at least some of the subcarriers spread far apart over the spectrum." *Id*. at 14:18–20. Clusters 1–8 in Figure are diversity clusters and frequencies labeled the same number in a cell (e.g., 1) are part of one diversity cluster and frequencies labeled with a different number (e.g., 2) are part of another diversity cluster. *Id.* at 14:35–39.

Li states that "[t]he diversity clusters can be configured differently for different cells to reduce the effect of inter-cell interference through interference averaging." Ex. 1007, 14:42–44. For instance, Li explains that

the cluster configuration shown in Figure 9 results in the interference due to Cell A's cluster 1 being distributed to Cell B's clusters 1, 8, 7, and 6, which reduces the interference to any particular cluster in Cell B. *Id.* at 14:45–50.

3. Analysis of Claim 1

Petitioner asserts claim 1 would have been obvious over Walton '269 and Li. Pet. 20–39. We use Petitioner's notations to identify the claim elements, and focus on the dispositive claim limitation.

a) [1c-2] the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain; and

(1) Petitioner's Contentions

Petitioner asserts that the combination of Walton '269 and Li teaches the subject matter of limitation [1c-2]. Pet. 35–37. More particularly, Petitioner asserts that "Walton '269 teaches that the frequency ***channels have subbands*** and that 'each subband is associated with a ***respective subcarrier*** that may be modulated with data. For a MIMO system that utilizes OFDM, each spatial channel of each subband may be viewed as an independent transmission channel.'" *Id.* at 35 (quoting Ex. 1006, 5:32–43).

With regard to subchannel configurations being characterized by distributed subcarriers or localized subcarriers in the frequency domain, Petitioner contends that Li discloses the use of a cluster of subcarriers in the frequency domain. Pet. 36 (citing Ex. 1007, 5:9–19, Fig. 1A). Petitioner argues that Li discloses the use of "coherence clusters, which contain 'multiple subcarriers close to each other' and would have been understood by a POSITA to be '***localized subcarriers in the frequency domain***.'" *Id.* (citing Ex. 1007, 14:14–30; Ex. 1003 ¶¶ 126–127). Petitioner also contends that Li teaches the use of "diversity clusters, which contain 'multiple

subcarriers with at least some of the subcarriers spread far apart over the spectrum' and would have been understood by a POSITA to be '***distributed subcarriers.***'" *Id.* (citing Ex. 1007, 14:14–30; Ex. 1003 ¶¶ 126–127). Petitioner further asserts that Li's Figure 9 depicts diversity and coherence clusters. *Id.* at 36–37 (citing Ex. 1007, 14:31–44, Fig. 9; Ex. 1003 ¶ 127).

With regard to combining Walton '269 and Li, Petitioner contends that "Walton '269 discloses a system in which a base station serves a plurality of cells associated with mobile stations." Pet. 18 (citing Ex. 1006, 2:64–65, 3:24–58, Fig. 1). Petitioner argues that "Li is directed to avoiding issues arising from a base station that serves multiple cells." *Id.* (citing Ex. 1007, 1:15–63). According to Petitioner, "[i]t would have been obvious for a POSITA to combine the teachings of Walton '269 with the teaching of Li to enable Walton '269's system to avoid intercell interference and benefit from higher channel gain." *Id.* (citing Ex. 1003 ¶ 71). In an example of such a combination, Petitioner asserts that "coherence clusters may be used when a mobile station is mobile or is not in a fixed position close to the edge of a cell" and "[w]hen neither of these conditions is present, the base stations selects diversity clusters." *Id.* at 19 (citing Ex. 1007, 16:8–19, Fig. 11). Petitioner argues that "[d]iversity clusters are also desirable to reduce inter-cell interference through interference averaging." *Id.* at 19 (citing Ex. 1007, 14:42–44, 5:53–64; Ex. 1003 ¶ 71).

Petitioner further contends that it would have been obvious to one of ordinary skill in the art to configure Walton '269's frequency subbands in accordance with Li's diversity clusters or coherence clusters. Pet. 37 (citing Ex. 1006, 5:32–43; Ex. 1007, 14:14–44, Fig. 9; Ex. 1003 ¶ 128). Petitioner asserts that "[b]ecause of frequency-selective fading, uneven gains across

subcarriers, and uncorrelated channels and subscribers, Li explains that 'it is advantageous in an OFDMA system to adaptively allocate the subcarriers to subscribers so that each subscriber enjoys a high channel gain.'" *Id.* at 35 (citing Ex. 1007, 1:48–50). According to Petitioner, the combination of Walton '269 and Li

> would have merely involved combining prior art elements (e.g., Li's subchannel configuration of diversity clusters and coherence clusters with Walton '269's system) according to known methods (Li's subcarrier allocation method) to yield predictable and foreseeable results and would have been an application of a known technique to a known system (Walton '269's system) ready for improvement (e.g., less intercell interference, higher channel gain).

Id. at 19–20 (citing Ex. 1003 ¶ 72).

(2) Patent Owner's Contentions

Patent Owner contends that Petitioner's ground of unpatentability based on Walton '269 and Li is deficient. *See* Prelim. Resp. 3–21. Patent Owner asserts that the Petition fails to show a rationale to combine Walton '269 and Li "because the purported rationale to combine is premised on an assumption that the POSITA would have been motivated to avoid intercell interference in Walton-'269." Prelim. Resp. 3. Patent Owner contends there is no basis for this because the Petition does not establish that Walton '269 discloses any interfering cells. *Id.* at 3–4. More particularly, Patent Owner argues that Petitioner's rationale is founded on an assumption that Walton '269 teaches cells that may interfere with each other, but Petitioner has not shown that Walton '269 discloses cells. *Id.* at 5; *cf.* Pet. 18 (citing Ex. 1006, 2:64–65, 3:24–58, Fig. 1) ("Walton '269 discloses a system in which a base station serves a plurality of cells associated with mobile stations."). Patent Owner explains that Petitioner's citations to Walton '269 do not "support

even a preliminary finding that Walton-'269 teaches cells interfering with each other" because they do not mention cells. *Id.* at 5–6 (citing Ex. 1006, 2:64–64, 3:23–58, Fig. 1). Patent Owner concedes that Walton '269 mentions cells once, but only to teach that they are part of other systems that may couple to Walton '269's system, which demonstrates that the latter is not a network of cells. *Id.* at 6–7 (citing Ex. 1006, 3:60–66, Fig. 1).

According to Patent Owner, a "POSITA would have understood that Walton-'269 does not teach base stations serving any cells because, as Petitioner repeatedly admits, Walton-'269 teaches a WLAN system." Prelim. Resp. 9 (citing Pet. 9–11, 20–22, 30–31, 49). Relying on the declaration testimony of its expert, Patent Owner explains that WLAN is known colloquially as "WiFi" and "WiFi networks like those in Walton-'269, and indeed WLAN systems in general, do not have 'cells' like those discussed in Li, and so do not suffer from the 'intercell' interference problems discussed in Li." *Id.* at 9 (citing Ex. 1006 1:25–29, 5:51–56; Ex. 2001 ¶ 26).

Patent Owner contends that Walton '269's WLAN "does not have or support frequency subchannels like those in Li," and adding Li's frequency subchannels to Walton '269 "would require reengineering Walton-'269's entire frequency grouping structure, along with its control mechanisms, *and* losing compatibility with 802.11, for no clear reason other than to attempt using hindsight to recreate the claims." Prelim. Resp. 19 (citing Ex. 2001 ¶ 31). Patent Owner also asserts:

> Walton-'269's WiFi system does not share the same concerns as Li's cellular system. Li teaches that in a cellular system, there are fast-moving "mobile subscribers" that rapidly travel within a cell and between cells, e.g., in a car. And there are "fixed subscribers," some close to the base station and some at the cell

> boundaries. Ex. 1007 [Li] 15:52–59. 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." *Id.* WiFi networks don't have this mix of users. Most devices in a WLAN/WiFi network are slow moving or stationary and, in any event, stay within the coverage area of the access point. Ex. 2001 [Alberth Decl.] ¶¶ 32–33. Fast-moving users, in a WiFi network like that in Walton-'269, are generally an aberration. *Id.* Essentially, these devices are all fixed or nearly all fixed subscribers close to the "base station." *Id.* ¶ 33.

Id. at 19–20.

Patent Owner argues that Dr. Ding's testimony repeats the same allegation that Walton '269 serves a plurality of cells, but does not provide any additional basis for this allegation because "[i]t simply repeats the same statement as the attorney argument." Prelim. Resp. 7 (citing Ex. 1003 ¶ 71).

b) Discussion

Having considered the conflicting positions of the parties, we conclude that Petitioner has not shown a reasonable likelihood that it would prevail in challenging the patentability of independent claim 1. Instead, we agree with Patent Owner that Petitioner has not adequately established a rationale to combine Walton '269 and Li, as proposed.

Petitioner's analysis for the combination of Walton '269 and Li begins with the contention that "Walton '269 discloses a system in which a base station serves a plurality of *cells* associated with mobile stations." Pet. 18 (citing Ex. 1006, 2:64–65, 3:24–58, Fig. 1) (emphasis added). As Petitioner states, Walton '269 discloses a MIMO-WLAN system, an example of which is depicted in Walton '269's Figure 1. Pet. 10–11; Ex. 1006, 2:64–65. Figure 1 is reproduced below.

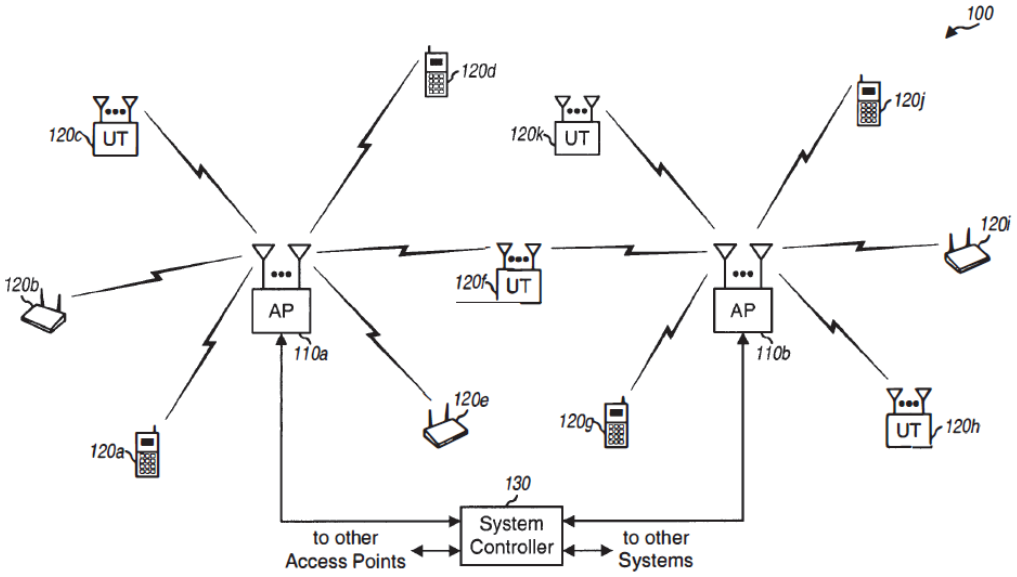

FIG. 1

Walton '269's MIMO WLAN system 100 includes access points 110a, 110b that support communication for user terminals 120a–120k. Ex. 1006, 3:25–28, 3:44–46. To the extent Petitioner asserts that access points 110a, 110b create cells that could interfere with one another, Petitioner has not explained adequately why access points 110a, 110b do so but instead provides only conclusory assertions. *See* Pet. 21 (citing Ex. 1006, 1:25–35) ("The base stations 110a, 110b serve the plurality of mobile stations 120a-120k at least because they 'act like hubs and/or routers and provide connectivity for' the mobile stations 120a-120k and may also allow the mobile stations 120a-120k access to LAN resources.").

While discussing what Walton '269 discloses (Pet. 9–12), Petitioner characterizes Walton '269 as being directed to "a Wireless Local Area Network (WLAN) Multiple-Input, Multiple-Output Orthogonal Frequency Division Multiplexing (MIMO-OFDM) communication system that includes an access point/base station and user terminals." Pet. 9 (citing Ex. 1006, FIG. 1, 1:25–35, 1:61–2:7, 2:64–65, 3:24–58). However, in its analysis of

the challenged claims, Petitioner asserts that "[a]s explained above, Walton '269 discloses a system in which a base station serves a plurality of cells associated with mobile stations." *Id.* at 18. The difficulty with Petitioner's later assertion, however, is that it mischaracterizes the scope and content of Walton '269's disclosure. As discussed in greater detail below, we find the record supports a finding that Walton '269 is not directed to a cellular system but is instead directed to a MIMO WLAN system that "includes a number of access points (APs) 110 that support communication for a number of user terminals (UTs) 120." Ex. 1006, 3:25–31.

When asserting that Walton '269's system serves cells, Petitioner makes several citations to Walton '269's disclosure. Pet. 18 (citing Ex. 1006, 2:64–65, 3:24–58, Fig. 1). The first citation is merely a brief description of Walton '269's Figure 1. *See* Ex. 1006, 2:64–65 ("FIG. 1 shows a block diagram of a MIMO LAN system in which the teachings of the invention are implemented."). The second citation is a description of system 100 shown in Walton '269's Figure 1, which does not mention cells. Although Petitioner does not cite to Dr. Ding's declaration to support its contention that Walton '269's base station serves a plurality of cells, Dr. Ding's testimony regarding Walton '269, and the proposed combination of Walton '269 and Li, mirrors the same conclusory assertions advanced in the Petition. *See, e.g.*, Ex. 1003 ¶¶ 59–64, 71–72, 125–128. As a result, we agree with Patent Owner that Dr. Ding's testimony does not provide an additional basis to support Petitioner's "allegation . . . that Walton-'269 'discloses a system in which a base station serves a plurality of cells associated with mobile stations.'" Prelim. Resp. 7; *see also* 37 C.F.R.

§ 42.65 ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

In contrast, we find persuasive the declaration testimony of Mr. Alberth, Patent Owner's expert, that Walton '269 is not directed to a cellular system. Ex. 2001 ¶¶ 25–26, 32–35. More particularly, Mr. Alberth states that WLANs are "based on the IEEE 802.11 standards . . . and are commonly called Wi-Fi." *Id.* ¶ 26. Mr. Alberth identifies that "Walton-'269 is based on Wi-Fi" (*id.* (citing. Ex. 1006, 1:25–29, 5:51–56)), and states that "[u]nlike a cellular network, WLANs like Wi-Fi do not have cells." *Id.* This understanding is also consistent with Walton '269's disclosure. In this regard Walton '269's only reference to cells, or a cellular network, is with respect to its ability to couple to "other systems and networks" such as "a packet data network (PDN), a wired local area network (LAN), a wide area network (WAN), the Internet, a public switched telephone network (PSTN), a cellular communication network, etc." Ex. 1006, 3:60–66.

Based on the current record, we find that Patent Owner's arguments and evidence, summarized above, undermine Petitioner's contention that "Walton '269 discloses a system in which a base station serves a plurality of cells associated with mobile stations." Pet. 18; *see* Prelim. Resp. 10 ("[T]he Petition simply assumes a plurality of interfering cells in Walton-'269, without supporting evidence or even argument."). Thus, we agree with Patent Owner that "[t]he Petition does not establish a rationale to combine Walton-'269 and Li as proposed, because the purported rationale to combine is premised on an assumption that the POSITA would have been motivated to avoid intercell interference in Walton-'269." Prelim. Resp. 3. *See*

Magnum Oil, 829 F.3d at 1380 ("To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements.").

As noted above, Walton '269 is directed to a WLAN system (Ex. 1006, 1:9–13), also known as a Wi-Fi system, whereas Li is directed to a system for reducing interference between cells of a "multi-cell, multi-subscriber wireless system" (Ex. 1007, 1:7–10, 1:57–63, 14:42–44). According to Petitioner, "Li is directed to avoiding issues arising from a base station that serves multiple cells." Pet. 18 (citing Ex. 1007, 1:15–63). Given that the record does not support Petitioner's assertion that Walton '269 is concerned with cells, we are not persuaded that the proposed combination of Walton '269 and Li would have, as Petitioner suggests,

> merely involved combining prior art elements (e.g., Li's subchannel configuration of diversity clusters and coherence clusters with Walton '269's system) according to known methods (Li's subcarrier allocation method) to yield predictable and foreseeable results and would have been an application of a known technique to a known system (Walton '269's system) ready for improvement (e.g., less intercell interference, higher channel gain).

Id. at 19–20 (citing Ex. 1003 ¶ 72).

Instead, we agree with Patent Owner that "Walton-'269 does not teach that a base station serves a plurality of cells, nor that its system suffers from intercell interference that could be ameliorated by any teachings in Li concerning reduction of such interference." Prelim. Resp. 8; *see, e.g.*, Ex. 1007, 1:57–60 ("[W]ith aggressive frequency reuse plan, e.g., the same spectrum is used for multiple neighboring cells, the problem of intercell interference arises."). In making this determination, we credit the expert declaration testimony of Mr. Alberth stating that "Walton-'269's WLAN/Wi-Fi system does not share the same concerns as Li's cellular

system." Ex. 2001 ¶ 32. According to Mr. Alberth, "users in a cellular system travel rapidly within cells and between cells" (*id.* ¶ 31) whereas "[m]ost devices in a WLAN/Wi-Fi network like that taught in Walton-'269 are either stationary or move slowly." *Id.* ¶ 33. Here, Mr. Alberth states that

> [a] key feature of cellular is the ability to support moving devices which can hand off between cells. In 2004 Wi-Fi did not support fast handoff between the Wi-Fi access points. Wi-Fi access points are deployed and devices can migrate between the access points, but not with the robust handoff mechanisms supported between cells of a cellular system.

Id. ¶ 26.

Based on the current record, we are not persuaded that Petitioner has articulated sufficient rationale to explain why one of ordinary skill in the art would have combined the references in the manner claimed. *See KSR*, 550 U.S. at 418–19 ("[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."). Other than speculation that "Walton '269 discloses a system in which a base station serves a plurality of cells associated with mobile stations" (Pet. 18), the record describes no problem in Walton '269 that one of ordinary skill in the art would have resolved with the techniques used in Li to address intercell interference. *Id.* (citing Ex. 1007, 1:48–50).

To the extent Petitioner argues that one of ordinary skill in the art would have found it obvious to combine Walton '269 and Li simply because both are related to similar methods and systems (Pet. 20), the fact that two references are related to similar disclosures, without more, is insufficient to establish a reason to combine their teachings. *See* Pet. 20; *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9 at 10–11 (PTAB

Oct. 16, 2018) (informative) ("Mere compatibility of the references is . . . not sufficient."); *see also Securus Techs., Inc. v. Global Tel*Link Corp.*, 701 F. App'x 971, 977 (Fed. Cir. 2017) (unpublished) (holding that "a broad characterization of [two references] as both falling within the same alleged field," without more, was not "a sufficient rationale to support an obviousness conclusion," as "[s]uch short-cut logic would lead to the conclusion that any and all combinations of elements known in th[e] broad field would automatically be obvious, without the need for any further analysis"); *Microsoft Corp. v. Enfish, LLC*, 662 F. App'x 981, 990 (Fed. Cir. 2016) (unpublished) (holding that the fact that two references "were directed to the same art or same techniques" was "inadequate to show persuasively that a relevant skilled artisan would have been motivated to combine the references").

Therefore, based on the current record, we determine that Petitioner has not shown a reasonable likelihood of demonstrating that independent claim 1 would have been obvious over Walton '269 and Li.

4. Claims 2–14

We have considered Petitioner's arguments and evidence for independent claims 6, 8, and 13, and for dependent claims 2–5, 7, 9–12, and 14. Petitioner relies on the same arguments and evidence to address independent claims 6, 8, and 13, and so, does not provide contentions for these claims that remedy the deficiency discussed with respect to claim 1. *See* Pet. 46, 48, 51. Accordingly, for the reasons discussed with respect to claim 1, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claims 2–14 are unpatentable under 35 U.S.C. § 103(a) as obvious over Walton '269 and Li.

E. Alleged Obviousness over Walton '269, Li, and Gupta

Petitioner challenges claims 2 and 9 by adding Gupta to the teachings of Walton '269 and Li, in case claims 2 and 9 are not obvious over the combination of Walton '269 and Li. Pet. 54–56. Petitioner relies upon Gupta for teaching the added limitations of these dependent claims and, thus, does not remedy the deficiencies of the asserted art with respect to claim 1. *Id.* Accordingly, for the same reasons discussed above, Petitioner fails to demonstrate a reasonable likelihood of prevailing in its assertion that the subject matter of claims 2 and 9 would have been obvious over the combination of Walton '269, Li, and Gupta.

F. Alleged Obviousness over PCT819 and Airy

Petitioner asserts that claims 1, 3–8, and 10–14 are unpatentable as obvious over PCT819 and Airy. Pet. 56–93. Petitioner also relies on the testimony of Dr. Ding to support its arguments. *Id*. (citing Ex. 1003). Patent Owner responds to Petitioner's assertions. Prelim. Resp. 21–33.

1. Overview of PCT819 (Ex. 1009)

PCT819 is titled "Method and Apparatus for Allocating Resources in a Multiple-Input Multiple-Output (MIMO) Communication System." Ex. 1009, code (54). PCT819 explains that "[e]ach MIMO channel between the base station and a terminal typically experiences different link characteristics and is associated with different transmission capability, so the spatial subchannels available to each terminal have different effective capacities." *Id.* ¶ 1005. PCT819 states that the "[e]fficient use of the available downlink resources (and higher throughput) may be achieved if the N_C available spatial subchannels are effectively allocated such that data is transmitted on these subchannels to a 'proper' set of terminals in the MIMO

system." *Id.* In view of this, PCT819 describes "a need in the art for techniques to allocate downlink resources in' a MIMO system to provide improved system performance." *Id.* ¶ 1006.

PCT819 describes a "MIMO mode," in which "all available downlink data streams are allocated to a single terminal that employs multiple antennas (i.e., a MIMO terminal)," and an "N-SIMO mode," in which "a single data stream is allocated to each of a number of distinct terminals, with each terminal employing multiple antennas (i.e., SIMO terminals)." Ex. 1009 ¶ 1007. Figure 1 of PCT819 depicts a MIMO communication system, which is reproduced below.

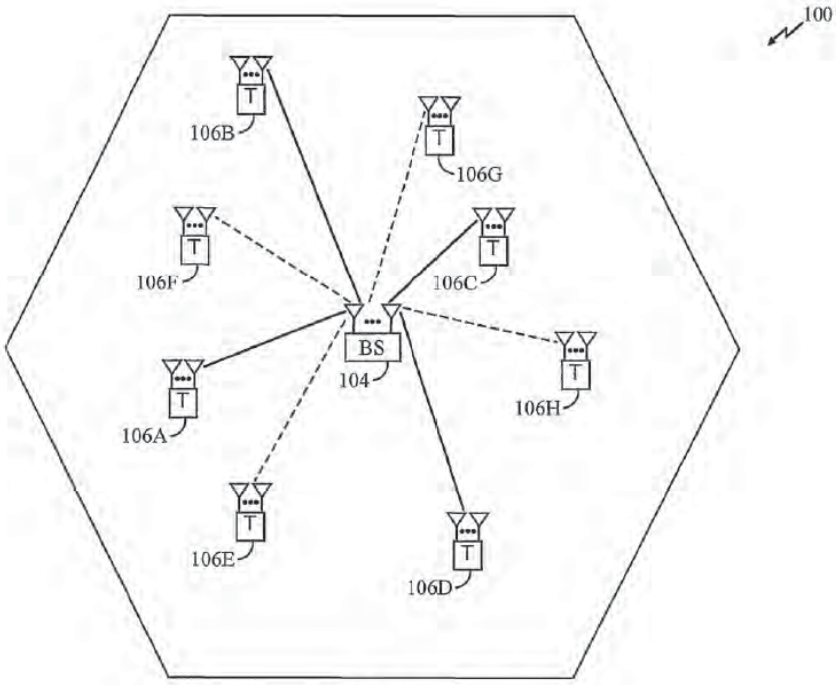

FIG. 1

Figure 1 of PCT819 illustrates MIMO communication system 100 using multiple transmit antennas and multiple receive antennas and includes base station 104 that communicates with terminals 106. Ex. 1009 ¶ 1023. PCT819 further describes encoding data in accordance with a particular coding scheme for transmission, interleaving encoded data based on a

particular interleaving scheme, and mapping the interleaved bits into modulation symbols for one or more transmission channels that have been selected for data transmission. *Id.* ¶ 1121. According to PCT819, the interleaving provides time diversity for the coded bits and may further provide frequency diversity. *Id.*

PCT819 also describes a receiver structure "when each data stream is transmitted over a respective transmit antenna (i.e., one data stream corresponding to each transmitted signal)." Ex. 1009 ¶ 1142. PCT819 states that "[f]or some other transmit processing schemes, a data stream may be transmitted over multiple transmit antennas, frequency subchannels, and/or time intervals to provide spatial, frequency, and time diversity, respectively." *Id.*

2. Overview of Airy (Ex. 1010)

Airy is titled "Transmission Scheduler for a Multiple Antenna Wireless Cellular Network." Ex. 1010, code (54). Airy "relates to scheduling of data wirelessly transmitted between a base control station having multiple antennas, and subscriber units." *Id.* at 1:7–9. Airy describes spatial multiplexing as "a transmission technology that exploits multiple antennae at both the base transceiver station and at the subscriber units to increase the bit rate in a wireless radio link with no additional power or bandwidth consumption." *Id.* at 1:20–24. Airy explains that this technique "typically results in fading of the modulated carrier signal" due to the multiple paths traveled by a modulated carrier signal, which "causes the modulated carrier signal to attenuate in amplitude when multiple paths subtractively combine." *Id.* at 2:3–6.

Airy also describes antenna diversity, which "is a technique used in multiple antenna-based communication system[s] to reduce the effects of multi-path fading." Ex. 1010, 2:9–11. Airy explains that "[a]ntenna diversity can be obtained by providing a transmitter and/or a subscriber with two or more antennae." *Id.* at 2:11–12. Airy further explains that "[i]t is desirable that the scheduling be adaptive to the quality of transmission links between the base station transceiver antennas and each of the subscribers (subscriber) units." *Id.* at 2:50–55.

Airy describes a process in which a scheduler receives information about the quality of transmission links between a base station transceiver and subscriber units. Ex. 1010, 5:29–31. Airy explains that "[t]he quality of the links can be used to determine whether the transmission of data should include spatial multiplexing or communication diversity." *Id.* at 5:31–34.

Airy further describes dividing the available frequency bandwidth into multiple data carriers. Ex. 1010, 9:3–5. Airy's Figure 6, which is reproduced below, depicts a frequency spectrum of OFDM sub-carrier signals. *Id.* at 3:60–61.

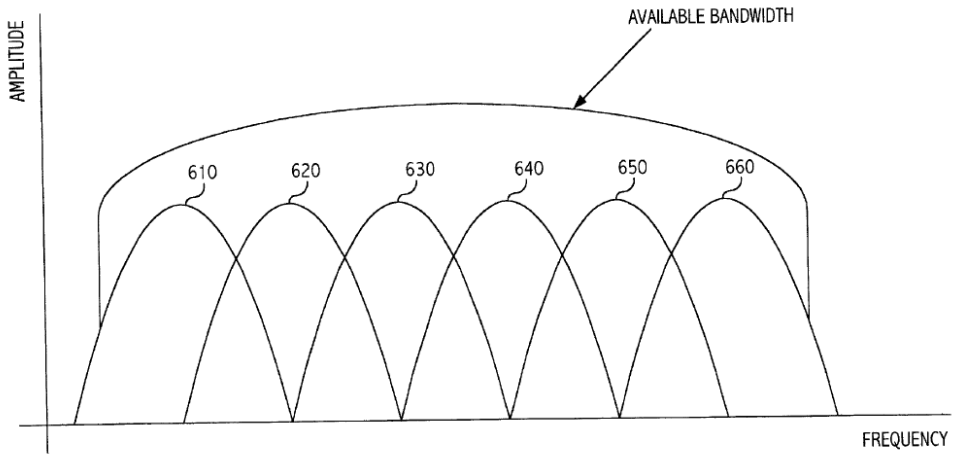

FIGURE 6

Specifically, Airy describes Figure 6 as showing OFDM sub-carrier signals 610, 620, 630, 640, 650, 660 that are each "modulated by separate symbols or combinations of symbols." *Id.* at 9:15–18.

Airy's Figure 7A is reproduced below.

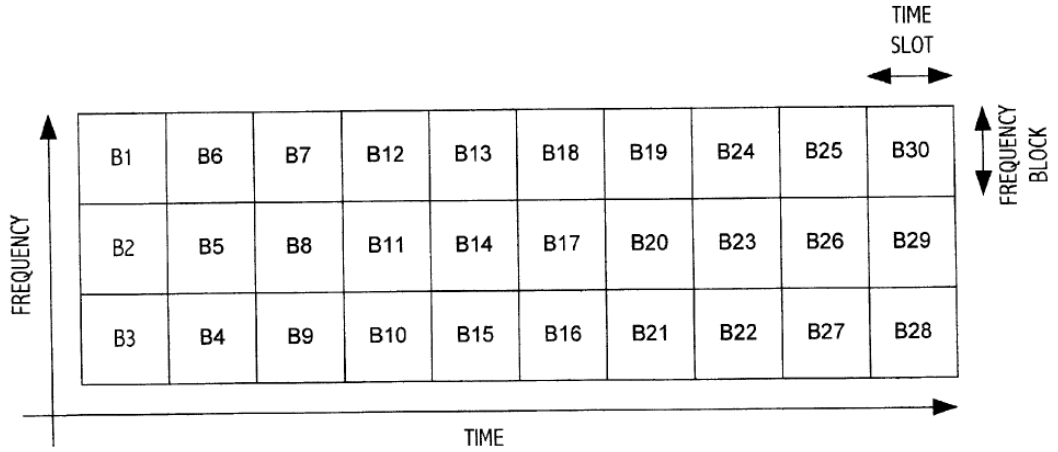

FIGURE 7A

Airy's Figure 7a depicts "a frame structure depicting blocks of transmission data defined by transmission time slots and transmission frequency blocks." Ex. 1010, 9:31–33. Airy explains that "data blocks B1, B2, and B3 can be transmitted during a first time slot, but over different frequency ranges or blocks." *Id.* at 9:34–37. Airy states that "[t]he different frequency ranges can be defined as different groupings or sets of the above described OFDM symbols." *Id.* at 9:39–41.

3. Analysis of Claim 1

Petitioner asserts claim 1 would have been obvious over PCT819 and Airy. Pet. 64–79. We use Petitioner's notations to identify the claim elements, and focus on the dispositive claim limitation.

a) [1c-2] the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain;

(1) Petitioner's Contentions

Petitioner asserts that the combination of PCT819 and Airy teaches the subject matter of limitation [1c-2]. Pet. 76–78. More particularly, Petitioner asserts that "[w]hile PCT819 does not explicitly reveal that the 'subchannel configuration [is] characterized by distributed subcarriers or localized subcarriers in the frequency domain,' Airy does describe this feature." *Id.* at 76 (citing Ex. 1003 ¶ 129).

According to Petitioner, "Airy discloses that the available frequency bandwidth can be divided into multiple data carriers in implementations involving OFDM." Pet. 76. (citing Ex. 1010, 9:1–14, 2:47–55, 6:50–56). Petitioner argues that Airy's Figure 6 shows subcarrier signals 610, 620, 630, 640, 650, 660, and Airy's Figure 7A "depicts 'a frame structure depicting blocks of transmission data defined by transmission time slots and

transmission frequency blocks' having different frequency ranges." *Id.* (citing Ex. 1010, 9:15–17, 9:31–44; Ex. 1003 ¶ 130).

Petitioner provides annotated copies of Airy's Figure 6 and Figure 7A to support its contentions, which are reproduced below.

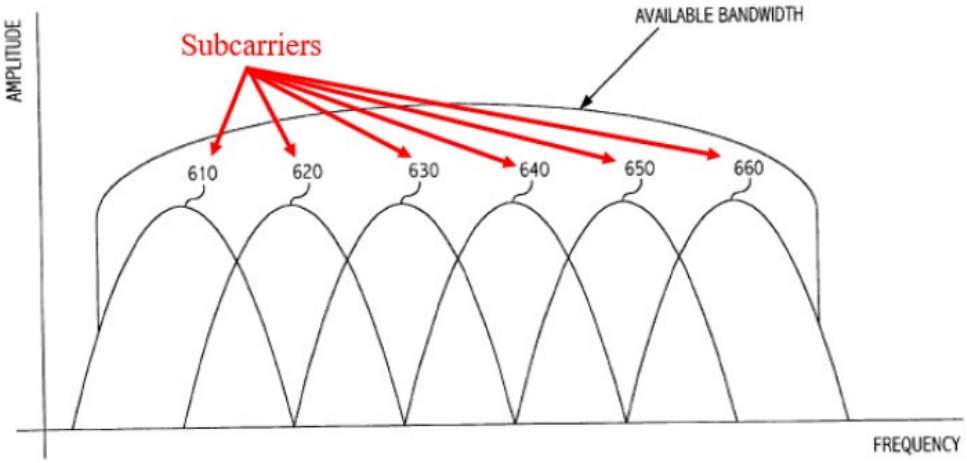

FIGURE 6
EX-1010, FIG. 6

FIGURE 7A
EX-1010, FIG. 7A

Petitioner asserts that "[a]s shown in Airy's FIGS. 6 and 7A, Airy discloses dividing an OFDM channel band into subbands that are characterized by subcarriers that are equally distributed across the channel bandwidth." *Id.* at 78. Thus, Petitioner concludes that Airy "discloses a 'subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain.'" *Id.* (citing Ex. 1003 ¶ 131).

(2) Patent Owner's Contentions

Patent Owner contends that Petitioner's ground of unpatentability based on PCT819 and Airy is deficient because "Airy does not disclose whether a mobile device's subcarriers are localized . . . or distributed." Prelim. Resp. 25 (citing Ex. 2001 ¶ 37; Ex. 1001, 7:1–3, 7:6–7). To support its argument, Patent Owner points out that Petitioner relies solely on Airy to teach "a corresponding subchannel configuration that is characterized by distributed subcarriers or localized subcarrier," but asserts that "the Petition does not contend that Airy teaches use of such localized and distributed subcarriers." *Id.* at 24–25 (citing Pet. 76–79).

Patent Owner argues that Petitioner improperly relies on Airy's Figures 6 and 7A as disclosing the argued limitation. Prelim. Resp. 24–26. According to Patent Owner, Airy's Figure 6 "merely shows that subcarriers exist and says nothing about whether or how they are *grouped*." *Id.* at 25 (citing Ex. 2001 ¶¶ 36–37). Similarly, Patent Owner argues that Airy's Figure 7A simply "involve[s] frequency blocks that are assigned to subscribers, but Airy does not say how these frequency blocks are selected, what frequencies they include, or how the maps are built." *Id.* at 26 (citing Ex. 2001 ¶ 39).

Not conceding that Airy "teach[es] either distributed or localized subcarriers as claimed" (Prelim. Resp. 26 (citing Ex. 2001 ¶ 29)), Patent Owner argues that even if Airy does disclose "'equally distributed' subcarriers,"

> Petitioner has not explained why the combined PCT819/Airy system would send a parameter to a mobile station that indicates a corresponding subchannel configuration that is characterized by distributed subcarriers or localized subcarrier when Petitioner has not shown that PCT819/Airy can use anything other than "distributed subcarriers" (indeed, Petitioner has not established that Airy teaches *either* distributed or localized subcarriers).

Id. at 23–24. Thus, Patent Owner concludes that "[b]ecause Airy is not said to use any particular configuration of subcarriers, Petitioner has not shown that the combination of PCT819 and Airy has any need to transmit a subchannel configuration." *Id.* at 27 (citing Ex. 2001 ¶ 38).

b) Discussion

Having considered the conflicting positions of the parties, we conclude that Petitioner has not shown a reasonable likelihood that it would prevail in challenging the patentability of independent claim 1. Instead, we agree with Patent Owner that Petitioner has not demonstrated that Airy teaches a "corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain," as limitation [1c-2] recites.

As discussed above in our claim construction analysis, the correct construction of "the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain" requires, at a minimum, mobile station-specific transmission parameters that are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations.

Therefore, even if we were to agree with Petitioner that Airy teaches distributed subcarriers (*see* Pet. 78 ("Airy discloses . . . subbands that are characterized by subcarriers that are equally distributed across the channel bandwidth.")), limitation [1c-2] does not simply require a corresponding subchannel configuration characterized by distributed subcarriers. Instead, claim 1 requires mobile station-specific transmission parameters that are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations.

However, other than asserting that "Airy therefore discloses a 'subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain'" (Pet. 78), Petitioner does not assert that Airy, alone or in combination with PCT819, teaches or suggests mobile station-specific transmission parameters that are capable of indicating, as alternatives, both distributed subcarriers and localized subcarriers in the frequency domain as subchannel configurations, as required by claim 1.

Petitioner's expert, Dr. Ding, also limits his opinion regarding limitation [1c-2] to whether Airy teaches distributed subcarriers. Ex. 1003 ¶ 131. Dr. Ding's declaration testimony regarding Airy's disclosure about distributed subcarriers simply mirrors the attorney arguments set forth in the Petition. *See id.* ¶¶ 129–132. For example, Dr. Ding states that "[a]s shown in Airy's FIGS. 6 and 7A, Airy discloses applying OFDM to divide an allocated channel band into subbands that are characterized by subcarriers that are equally distributed across the channel bandwidth." *Id.* ¶ 131. And, based on this statement, Dr. Ding concludes, without explaining, that "Airy therefore discloses a 'subchannel configuration characterized by distributed

subcarriers or localized subcarriers in the frequency domain.'" *Id.* Like Petitioner's attorney arguments, however, Dr. Ding's testimony only asserts that Airy teaches distributed subcarriers. As a result, Dr. Ding's testimony does not provide an additional basis to support Petitioner's contentions that Airy teaches limitation [1c-2] when properly construed. *See* 37 C.F.R. § 42.65 ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

Based on the above, we conclude that Petitioner has not shown sufficiently that Airy teaches or suggests "the corresponding subchannel configuration characterized by distributed subcarriers or localized subcarriers in the frequency domain," as recited by limitation [1c-2]. Moreover, Petitioner does not rely on PCT819 for that limitation. Accordingly, we further conclude that Petitioner has not shown that the proposed combination of PCT819 and Airy teaches or suggests the limitation.

In addition, we agree with Patent Owner that "[b]ecause Airy is not said to use any particular configuration of subcarriers, Petitioner has not shown that the combination of PCT819 and Airy has any need to transmit a subchannel configuration." Prelim. Resp. 27. Here, we find persuasive the declaration testimony of Patent Owner's expert, Mr. Alberth, who states:

> [t]he '941 patent teaches localized or distributed configurations for one particular mobile station (Ex. 1001 ['941 Patent] 7:1–7); but Airy's distribution in Fig. 6 is generic to OFDM and all mobile stations interacting with the system. Given this generic distribution of subcarriers there is no reason why Airy would have had a control message to indicate whether the subchannel configuration uses localized or distributed subcarriers.

Ex. 2001 ¶ 38. Thus, we also agree with Patent Owner that "Petitioner has not explained why the combined PCT819/Airy system would send a

parameter to a mobile station that indicates a corresponding subchannel configuration that is characterized by distributed subcarriers or localized subcarrier when Petitioner has not shown that PCT819/Airy can use anything other than 'distributed subcarriers.'" Prelim. Resp. 24.

Based on the above, we determine that Petitioner has not shown sufficiently that Airy teaches or suggests subchannel configurations "characterized by distributed subcarriers or localized subcarriers in the frequency domain," as claim 1 requires. Therefore, Petitioner has not adequately established on this record a reasonable likelihood of success that it would prevail in demonstrating that claim 1 is unpatentable over the combination of PCT819 and Airy.

c) Conclusion on Claim 1

Having considered the parties' arguments and evidence, we determine that Petitioner has not shown a reasonable likelihood of demonstrating that independent claim 1 would have been obvious over PCT819 and Airy.

4. Claims 3–8 and 10–14

We have considered Petitioner's arguments and evidence for independent claims 6, 8, and 13 and for dependent claims 3–5, 7, 10–12, and 14. Petitioner relies on the same arguments and evidence to address independent claims 6, 8, and 13, and so, does not provide contentions for these claims that remedy the deficiency discussed with respect to claim 1. *See* Pet. 85, 88, 92. Accordingly, for the reasons discussed with respect to claim 1, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claims 3–8 and 10–14 are unpatentable under 35 U.S.C. § 103(a) as obvious over PCT819 and Airy.

III. DISCRETIONARY DENIAL

Patent Owner argues that we should exercise our discretion to deny institution of *inter partes* review in this case under 35 U.S.C. § 314(a), because of the parallel district court litigation and because Petitioner failed to disclose or apply their claim construction positions in the parallel district court litigation. Prelim. Resp. 93–98. Because we have considered the merits of the Petition and decline to institute an *inter partes* review on that basis, we need not determine whether it would be appropriate to discretionarily deny the Petition under § 314(a).

IV. CONCLUSION

For the foregoing reasons, we are not persuaded that the Petition establishes a reasonable likelihood that Petitioner would prevail in any of its challenges to claims 1–14 of the '941 patent.

V. ORDER

In consideration of the foregoing, it is hereby ordered that the Petition is *denied*, and no trial is instituted.

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