United States Court of Appeals for the Federal Circuit

TQ DELTA, LLC,
Appellant

v.

CISCO SYSTEMS, INC., DISH NETWORK LLC, COMCAST CABLE COMMUNICATIONS, LLC, COX COMMUNICATIONS, INC., TIME WARNER CABLE ENTERPRISES LLC, VERIZON SERVICES CORP., ARRIS GROUP, INC.,
Appellees

2018-1766, 2018-1767

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2016-01020, IPR2016-01021, IPR2017-00254, IPR2017-00255, IPR2017-00417, IPR2017-00418.

Decided: November 22, 2019

PETER J. MCANDREWS, McAndrews, Held & Malloy, Ltd., Chicago, IL, argued for appellant. Also represented by ANDREW B. KARP, JAMES P. MURPHY.

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Before REYNA, HUGHES, and STOLL, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* STOLL.

Circuit Judge HUGHES dissents without opinion.

STOLL, *Circuit Judge*.

In a pair of inter partes review proceedings, the Patent Trial and Appeal Board invalidated all claims of two related patents. TQ Delta, LLC, the patent owner, appeals the Board's determination that all claims of the challenged patents would have been obvious in view of the prior art asserted by Cisco Systems, Inc., and the other appellees (collectively, "Cisco"). TQ Delta also raises several other challenges to the IPR proceedings relating to the admissibility of evidence, claim construction, and due process. Because fact findings underlying the Board's obviousness determinations are not supported by substantial evidence, we reverse the Board's decisions on that ground.

BACKGROUND

This is a consolidated appeal from the final written decisions in a pair of IPRs, IPR2016-01020 and IPR2016-

01021,[1] in which the Board invalidated all claims of two related patents, U.S. Patent Nos. 9,014,243 and 8,718,158, respectively. The Board held each claim unpatentable as obvious in view of various prior art combinations that include the two references at issue on appeal, U.S. Patent Nos. 6,144,696 (Shively) and 6,625,219 (Stopler).

I

The challenged patents relate to certain improvements to electronic communications systems that lower the peak-to-average power ratio (PAR) of the transmitted signals. PAR is the ratio of the maximum value of a parameter (e.g., voltage) to the time-averaged value of that parameter. Lowering the PAR of a communications system is desirable because it reduces power consumption and the likelihood of transmission errors.

The challenged patents specifically address a PAR problem that arises in the transmission of digital data using multicarrier communications systems, such as digital subscriber line (DSL) systems. *See, e.g.,* '243 patent col. 3 ll. 25–37.[2] In a multicarrier communications system, multiple bits are transmitted simultaneously across a series of narrow frequency bands called "carriers" in an approach known as "Discrete Multitone Modulation" (DMT). *See id.* at col. 1 ll. 33–47. Each carrier is independently modulated in accordance with its assigned bit, and the carriers are

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[1] IPR2017-00254 and IPR2017-00418 were joined in the IPR2016-01020 proceeding. IPR2017-00255 and IPR2017-00417 were joined in the IPR2016-01021 proceeding.

[2] For brevity, we cite only to the specification of the '243 patent, which is substantively the same as that of the '158 patent. Unless otherwise noted, all citations to the '243 patent reference the analogous passage in the '158 patent.

then combined into a single multicarrier signal for transmission of the data. *See id.*

PAR problems can arise when the carriers are combined into a single signal for transmission of the data. Typically, the transmitted bits are randomly distributed, so they tend to counterbalance each other when summed into the multicarrier transmission signal. But when many of the bits have the same value (i.e., mostly 0 or mostly 1) at or near the same time, they can sum to create multicarrier waveforms with a high amplitude. This situation can arise when multiple carriers are each used to transmit the same data in parallel. As a general matter, high amplitude waves are problematic because the equipment required to deal with them is costlier. But an extremely high amplitude wave also presents a risk of "clipping," a phenomenon in which the peak of the transmitted signal is truncated at the maximum range of the equipment, leading to transmission failure and potential data loss. In the context of DMT systems, when one reduces the probability of these problematic "clipping" events, one is said to have reduced the PAR of the signals transmitted by the system.

The inventors purport to reduce PAR in DMT systems using a new technique. The crux of the invention is to "scramble" the phases of the parallel carriers such that the carriers will not peak at the same time, even if the transmitted bits have mostly the same value. *See id.* at col. 2 l. 34–col. 3 l. 3. The phase of each carrier is shifted in accordance with a value that is determined independently of the bit value carried by that carrier. *Id.* at col. 2 ll. 36–43. The resulting transmission signal has a "substantially minimized" PAR. *Id.* at col. 4 ll. 35–38. The challenged patents disclose a variety of scrambling algorithms that shift the phase of each carrier by some independent amount, thereby reducing PAR. *See id.* at col. 6 l. 58–col. 8 l. 22, col. 9 l. 53–col. 10 l. 44 (Phase Shifting Examples #1–4).

II

Shively is the primary prior art reference asserted by Cisco in the IPRs. Shively is directed to an improvement to the use of DMT by DSL modems—the same field of technology at issue in the challenged patents. Shively col. 1 ll. 5–8. But Shively addresses a different problem: how to increase transmission capacity by efficiently allocating bits across the various carriers in long-loop systems. *See id.* at Abstract. In relevant part, Shively increases data throughput by utilizing carriers in combination that would each be inadequate to transmit data independently. *See id.* at col. 3 l. 54–col. 4 l. 34. Specifically, Shively spreads the transmission of a single bit across several carriers at reduced power levels, and then "despread[s]" the transmission on the receiving end to overcome what would otherwise be unacceptable noise levels in each carrier. *Id.* at col. 3 ll. 58–67. Shively does not discuss PAR or clipping. The parties' experts debated the extent to which PAR and clipping would change under Shively's system.

Stopler is the secondary prior art reference asserted by Cisco in the IPRs. Like the challenged patents and Shively, Stopler is directed to digital data communication systems, including DMT. *See* Stopler col. 1 ll. 7–11, 42–64. But Stopler is focused on a different problem: improving the efficiency of transmission by mitigating noise and other interference. *See id.* at Abstract. Specifically, Stopler discloses a "diagonalization" scheme for interleaving the assignment of bits across the various carriers over time, which mitigates the effect of interference on any particular data stream by spreading its impact across different carriers. *See id.* at col. 5 ll. 10–43, col. 8 ll. 28–53. Like Shively, Stopler never mentions PAR or clipping. Toward the end of its disclosure, Stopler briefly suggests applying a phase scrambling sequence "to randomize the overhead channel symbols" that it sends alongside the transmitted data. *Id.* at col. 12 ll. 24–26. In order "to simplify implementation,"

however, Stopler also suggests applying its phase scrambler to all of the transmitted data. *Id.* at col. 12 ll. 26–28.

III

TQ Delta sued a number of telecommunications companies, including the appellees, for infringement of the '158 and '243 patents (among others) in parallel lawsuits in the U.S. District Court for the District of Delaware. In May 2016, Cisco filed two IPR petitions challenging all claims of the '158 and '243 patents, which the other appellees joined after institution. Every ground in the petitions was based on the combination of Shively and Stopler, either standalone or in combination with other prior art references not at issue on appeal.

In October 2017, the Board issued its final written decisions. The Board's decisions invalidated all of the challenged claims as obvious in view of Shively and Stopler, along with other references not at issue on appeal. In doing so, the Board accepted Cisco's positions as its own findings and conclusions. The Board also relied almost exclusively on the testimony of Cisco's expert, Dr. Tellado, to rebut TQ Delta's arguments that a person of ordinary skill would not have been motivated to combine Shively and Stopler. In the final written decisions, the Board also rejected TQ Delta's proffered claim construction and dismissed as moot TQ Delta's motion to exclude certain portions of Cisco's expert testimony. TQ Delta appeals, and we have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

On appeal, TQ Delta raises a variety of issues, including the admissibility of evidence, the Board's claim construction, the Board's obviousness determinations, and certain due process concerns. We focus on the Board's obviousness determinations, and in particular, its factfinding regarding motivation to combine. We hold that the Board's factfinding is based on conclusory testimony and is

therefore unsupported by substantial evidence. Because the Board's obviousness determinations are not supported by substantial evidence, we reverse the Board's decisions on that ground.

I

A patent is invalid as obvious "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a) (2012).[3] Obviousness is a question of law based on multiple underlying factual determinations, including "whether a [person of ordinary skill in the art] would have been motivated to combine the prior art to achieve the claimed invention and whether there would have been a reasonable expectation of success in doing so." *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)). Identifying a motivation to combine the prior art is important because "inventions in most, if not all, instances rely on building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–19 (2007). We review the Board's obviousness determination de novo and its underlying factual determinations for substantial evidence. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064,

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[3] Because the '158 and '243 patents do not contain any claim with an effective filing date on or after March 16, 2013, the version of 35 U.S.C. § 103 that applies here is the one preceding the changes made by the America Invents Act. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29 § 3(n), 125 Stat. 284, 293 (2011).

1073 (Fed. Cir. 2015) (citing *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013)).

Our review of the Board is rooted not only in the law of obviousness, but also in basic principles of administrative law. We review the Board's decisions under the standards set forth in § 706 of the Administrative Procedure Act. *Yeda Research v. Mylan Pharm. Inc.*, 906 F.3d 1031, 1040 (Fed. Cir. 2018) (first citing *Novartis AG v. Torrent Pharm. Ltd.*, 853 F.3d 1316, 1323 (Fed. Cir. 2017); then citing 5 U.S.C. § 706). Because "[t]he APA requires meaningful review," the Supreme Court has "stressed the importance of not simply rubber-stamping agency factfinding." *Dickinson v. Zurko*, 527 U.S. 150, 162 (1999) (citing *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 490 (1951)). Accordingly, our "[d]eferential judicial review under the Administrative Procedure Act does not relieve the agency of its obligation to develop an evidentiary basis for its findings. To the contrary, the Administrative Procedure Act reinforces this obligation." *In re Lee*, 277 F.3d 1338, 1344 (Fed. Cir. 2002) (first citing *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); then citing *SEC v. Chenery Corp.*, 318 U.S. 80, 94 (1943)). "[O]ur review of a patentability determination is confined to 'the grounds upon which the Board actually relied.'" *Power Integrations, Inc. v. Lee*, 797 F.3d 1318, 1326 (Fed. Cir. 2015) (quoting *In re Applied Materials, Inc.,* 692 F.3d 1289, 1294 (Fed. Cir. 2012)). In order to provide for effective judicial review, then, the Board is obligated to "provide an administrative record showing the evidence on which the findings are based, accompanied by the agency's reasoning in reaching its conclusions." *Lee,* 277 F.3d at 1342 (first citing *In re Zurko*, 258 F.3d 1379, 1386 (Fed. Cir. 2001); then citing *In re Gartside*, 203 F.3d 1305, 1314 (Fed. Cir. 2000)).

II

In finding the challenged patents obvious, the Board expressly adopted as its own findings and conclusions

Cisco's evidence and argument regarding motivation to combine. Cisco, in turn, relied on certain disclosures in Stopler and the declaration of its expert, Dr. Tellado, to support the arguments in its petition regarding motivation to combine. For that reason, we focus our review on the disclosures of Stopler and Dr. Tellado's declaration.[4] Because the issue before us is whether the Board's obviousness determination is supported by substantial evidence, we first examine the substantial evidence standard and examples of how this court has applied it to expert testimony supporting an obviousness determination.

A

The substantial evidence standard asks "whether a reasonable fact finder could have arrived at the agency's decision," and "involves examination of the record as a whole, taking into account evidence that both justifies and detracts from an agency's decision." *Gartside*, 203 F.3d at 1312 (first citing *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938); then citing *Universal Camera*, 340 U.S.

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[4] Although Cisco introduced some additional evidence with its reply to support the Board's factfinding, TQ Delta objected to the admission of the evidence and the Board expressly declined to consider it. As noted above, our review is limited to "the grounds upon which the Board actually relied." *Power Integrations*, 797 F.3d at 1326 (quoting *Applied Materials,* 692 F.3d at 1294). Furthermore, "[i]t is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (quoting 35 U.S.C. § 312(a)(3)). Accordingly, we do not consider the additional evidence provided by Cisco but not considered by the Board.

at 487–88). Conclusory expert testimony does not qualify as substantial evidence. *See, e.g., MobileMedia Ideas LLC v. Apple Inc.*, 780 F.3d 1159, 1172 (Fed. Cir. 2015) ("Conclusory statements by an expert . . . are insufficient to sustain a jury's verdict."); *Regents of Univ. of Minn. v. AGA Med. Corp.*, 717 F.3d 929, 941 (Fed. Cir. 2013) (quoting *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 1001 (Fed. Cir. 2008)) ("Conclusory expert assertions cannot raise triable issues of material fact . . . ."); *Koito Mfg. Co. v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1152 (Fed. Cir. 2004) ("General and conclusory testimony . . . does not suffice as substantial evidence of invalidity."); *Sea Robin Pipeline Co. v. FERC*, 795 F.2d 182, 188 (D.C. Cir. 1986) ("[I]nordinate faith in the conclusory assertions of an expert . . . cannot satisfy the requirement . . . [of] substantial evidence.").

"Rejections on obviousness grounds," in particular, "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)).[5] "This requirement is as much rooted in the Administrative Procedure Act, which ensures due process and non-arbitrary decisionmaking, as it is in § 103." *Kahn*, 441 F.3d at 988 (citing *Lee*, 277 F.3d at 1344–45). Accordingly, "a conclusory assertion with no explanation is inadequate to support a finding that there

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[5] Conclusory expert testimony is equally inadequate as substantial evidence in other areas of patent law. *See, e.g.*, *Trs. of Bos. Univ. v. Everlight Elecs. Co.*, 896 F.3d 1357, 1362–64 (Fed. Cir. 2018) (enablement); *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1337–39 (Fed. Cir. 2016) (written description); *Whitserve, LLC v. Comput. Packages, Inc.*, 694 F.3d 10, 23–24 (Fed. Cir. 2012) (anticipation); *Kim v. ConAgra Foods, Inc.*, 465 F.3d 1312, 1319–20 (Fed. Cir. 2006) (infringement).

would have been a motivation to combine" because "[t]his type of finding, without more, tracks the *ex post* reasoning *KSR* warned of and fails to identify any actual *reason* why a skilled artisan would have combined the elements in the manner claimed." *In re Van Os*, 844 F.3d 1359, 1361–62 (Fed. Cir. 2017) (citing *KSR*, 550 U.S. at 418, 421).

B

This court's opinions have repeatedly recognized that conclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review.

In *InTouch*, the challenger relied solely on the testimony of its expert to establish a motivation to combine the asserted prior art references. *InTouch Techs., Inc. v. VGo Commc'ns, Inc.*, 751 F.3d 1327, 1349 (Fed. Cir. 2014). In addressing a challenged claim relating to remote telepresence robotic systems, the challenger's expert described combining two of the asserted prior art references as "something that that person of ordinary skill in the state of art of the robotics will do." *Id.* at 1351. In addressing another challenged claim, the expert testified that "I do believe that somebody *could* look at a telepresence robot and combine that with what we're really looking at is military telepresence. If you put those two things together, *a person of ordinary skill can do that.*" *Id.* at 1353.

We reversed the district court's judgment of invalidity because the expert's conclusory testimony did not provide substantial evidence to support the jury's finding. *See id.* at 1351–54. We explained that the expert testimony "failed to provide any meaningful explanation for why one of ordinary skill in the art would be motivated to combine these references at the time of this invention." *Id.* at 1353–54. We observed that the expert testimony "primarily consisted of conclusory references to [the expert's] belief that one of ordinary skill in the art *could* combine these references, not that they *would* have been motivated to do so." *Id.* at 1352 (citing *ActiveVideo Networks, Inc. v. Verizon*

Commc'ns, Inc., 694 F.3d 1312, 1327 (Fed. Cir. 2012)). Thus, we concluded that the expert appeared to have improperly "relied on the [challenged] patent itself as her roadmap for putting what she referred to as pieces of a 'jigsaw puzzle' together." *Id.* at 1351.

In *ActiveVideo*, we rejected similarly conclusory expert testimony regarding patent invalidity. *See ActiveVideo*, 694 F.3d at 1327–28. In addressing six prior art references, the challenger's expert testified that "[t]hese are all components that are modular, and when I add one, it doesn't change the way the other one works," without providing any factual basis for that assertion. *Id.* at 1327 (alteration in original). We explained that such a conclusory statement is "not sufficient and is fraught with hindsight bias." *Id.* (first citing *KSR*, 550 U.S. at 418; then citing *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1373–74 (Fed. Cir. 2008)). In particular, "[t]he expert failed to explain how specific references could be combined, which combination(s) of elements in specific references would yield a predictable result, or how any specific combination would operate or read on the asserted claims." *Id.*

The challenger's expert further testified that:

> The motivation to combine would be because you wanted to build something better. You wanted a system that was more efficient, cheaper, or you wanted a system that had more features, makes it more attractive to your customers, because by combining these two things you could do something new that hadn't been able to do before.

Id. at 1328. We rejected this testimony because it "fail[ed] to explain why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does*." *Id.* (first citing *KSR*, 550 U.S. at 418; then citing *Innogenetics*, 512 F.3d at 1373). We explained that "[k]nowledge of a problem and motivation to solve it are entirely different from motivation to combine

particular references." *Id.* (quoting *Innogenetics*, 512 F.3d at 1373).

In *DSS*, we similarly objected to the Board's apparent reliance on conclusory expert testimony in the context of inter partes review proceedings. *See DSS Tech. Mgmt., Inc. v. Apple Inc.*, 885 F.3d 1367, 1374–77 (Fed. Cir. 2018). The sole issue was whether it would have been obvious to modify the base station transmitter of an asserted prior art reference to be "energized in low duty cycle RF bursts," as required by the challenged claims. *Id.* at 1374. The challenger's expert opined that "it would have been obvious to a [person of ordinary skill in the art] to have the base station [in the prior art reference] operate in an analogous manner" to the mobile units of that same prior art reference—which the parties agreed operated in "low duty cycle RF bursts." *Id.* at 1375–76. The expert further testified that, because the base station and mobile stations of the prior art had RF systems with the same physical structure, a person of ordinary skill in the art "would have conceived a system in which . . . the transmitter and the receiver of the base station . . . operate in 'low duty cycle RF bursts.'" *Id.* at 1376.

After identifying several technical gaps in the expert's testimony, *id.*, we explained that "[t]he similarities in transmission hardware cannot close these gaps without additional, reasoned analysis," *id.* at 1376–77. We underscored that the expert's "conclusory statements and unspecific expert testimony" did not qualify as substantial evidence that could support the Board's conclusions regarding obviousness. *Id.* at 1376 (quoting *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1366 (Fed. Cir. 2016)).

In cases like *InTouch*, *ActiveVideo*, and *DSS*, we rejected obviousness determinations based on conclusory and unsupported expert testimony. We repeatedly expressed concerns that crediting such testimony risks allowing the challenger to use the challenged patent as a roadmap to

reconstruct the claimed invention using disparate elements from the prior art—i.e., the impermissible *ex post* reasoning and hindsight bias that *KSR* warned against. *See Van Os*, 844 F.3d at 1361 (citing *KSR*, 550 U.S. at 418, 421). Those same concerns apply here.

III

Here, the Board's obviousness determinations rest on several key findings regarding the scope and content of the prior art. Of particular relevance on appeal, the Board found that Stopler discloses the use of a phase scrambler that an ordinarily skilled artisan would have recognized as a solution to reduce the PAR of Shively. The Board based its findings on the assertions in Cisco's petition, which the Board expressly adopted as its own findings and conclusions. For the reasons that follow, we conclude that no reasonable factfinder could find, based on Cisco's petition and supporting expert declaration, that a person of ordinary skill would have recognized Stopler's disclosure of phase scrambling as a solution to reduce the PAR of Shively. Accordingly, we reverse the Board's conclusions of obviousness.

The Board relied on two paragraphs in Cisco's petition to conclude that Stopler discloses the use of phase scrambling as a solution to reduce the PAR of Shively. *See Cisco Sys., Inc. v. TQ Delta, LLC*, No. IPR2016-01020, 2017 WL 4864547, at *7 (P.T.A.B. Oct. 26, 2017) (*Decision*) (citing J.A. 135–36).[6] Those two paragraphs, in turn, are based on two paragraphs in Dr. Tellado's declaration and two

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[6] For brevity, we cite to documents submitted in IPR2016-01020, which, for the purposes of this appeal, are substantively the same as those submitted in IPR2016-01021. Unless otherwise noted, all citations to IPR2016-01020 should be understood to reference the analogous passage in IPR2016-01021.

sentences of Stopler. *See* J.A. 135–36 (first citing Stopler col. 12 ll. 24–28; then citing J.A. 2928–29 (Tellado Decl. ¶¶ 67–68)).

In the cited paragraphs, Dr. Tellado stated:

> 67. Stopler provides a solution for reducing the PAR of a multicarrier transmitter. Specifically, Stopler teaches that a bit scrambler followed by a phase scrambler can be employed to randomize the phase of the individual subcarriers. [Citation to Stopler col. 12 ll. 24–28.] A POSITA would have recognized that by randomizing the phase of each subcarrier, Stopler provides a technique that allows two or more subcarriers in Shively's system to transmit the same one or more bits, but without those two or more subcarriers having the same phase. Since the two subcarriers are out-of-phase with one another, the subcarriers will not add up coherently at the same time, and thus the peak-to-average power ratio for the overall system will be less than in Shively's original system.
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> 68. Combining Stopler's phase scrambler into Shively's transmitter would have been a relatively simple and obvious solution to reduce Shively's PAR.

J.A. 2928–29.

Stopler's disclosure of phase scrambling, as identified by Cisco in its petition and Dr. Tellado in his declaration, is limited to two sentences at the end of the patent specification:

> In order to randomize the overhead channel symbols, a phase scrambling sequence is applied to the output symbols. However, to simplify implementation, the phase scrambler is applied to all symbols, not just the overhead symbols.

Stopler col. 12 ll. 24–28.[7]

This passage of Stopler provides no express discussion of, nor any connection to, the PAR of a multicarrier transmitter. Instead, Stopler explains that the phase scrambling sequence is applied "[i]n order to randomize the overhead channel symbols," and is only applied to the other symbols in order "to simplify implementation." *Id.* Dr. Tellado fails to identify any other evidence that provides this necessary link. Dr. Tellado instead offers only unsupported and conclusory statements asserting that an ordinarily skilled artisan at the time of the invention would have been motivated to apply the randomization disclosed in Stopler as a means to reduce PAR in Shively. Dr. Tellado first provides a brief, high-level explanation of how randomizing the phase of each subcarrier in Shively will reduce its PAR, but that explanation is unsupported by any evidence other than the disclosure of the invention in the patents-in-suit. J.A. 2928–29 ¶ 67. Then, Dr. Tellado states in conclusory fashion—again without any support—that the combination "would have been a relatively simple and obvious solution to reduce Shively's PAR." J.A. 2929 ¶ 68.

Untethered to any supporting evidence, much less any contemporaneous evidence, Dr. Tellado's *ipse dixit* declaration "fail[s] to provide any meaningful explanation for why one of ordinary skill in the art would be motivated to combine these references *at the time of this invention*."

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[7] Although not cited in support of motivation to combine by Cisco in its petition, nor by Dr. Tellado in his declaration, Stopler includes two additional sentences and a table that provide an example of a phase scrambling sequence generated by a pseudo-random generator. *See* Stopler col. 12 ll. 28–45. This additional passage does not change our determination because it similarly fails to address PAR.

InTouch, 751 F.3d at 1353–54 (emphasis added). It also "fails to explain why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does*." *ActiveVideo*, 694 F.3d at 1328 (first citing *KSR*, 550 U.S. at 418; then citing *Innogenetics*, 512 F.3d at 1373). Without this support, Dr. Tellado's declaration ultimately fails "to resist the temptation to read into the prior art the teachings of the invention in issue." *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 36 (1966). Indeed, the only support for Dr. Tellado's assertions is found in the description of the invention of the patents-in-suit:

> The modulator 46 also includes a phase scrambler 66 that combines a phase shift computed for each QAM-modulated carrier signal with the phase characteristic of that carrier signal. Combining phase shifts with phase characteristics, in accordance with the principles of the invention, substantially scrambles the phase characteristics of the carrier signals in the transmission signal 38. By scrambling the phase characteristics of the carrier signals, the resulting transmission signal 38 has a substantially minimized peak-to-average (PAR) power ratio.

'243 patent col. 4 ll. 29–38.

Dr. Tellado's "conclusory statements and unspecific expert testimony" are thus inadequate to support the Board's factfinding regarding motivation to combine. *DSS*, 885 F.3d at 1376 (quoting *Arendi*, 832 F.3d at 1366). The Board does not identify any evidence beyond Stopler and Dr. Tellado's declaration that it considered to conclude that a person of ordinary skill would have recognized the

disclosure in Stopler as a solution to reduce PAR in Shively.[8] The Board's factual determination on this point is therefore unsupported by substantial evidence. Accordingly, we reverse the Board's obviousness determination.

IV

TQ Delta raises numerous other challenges to the Board's decisions, including that the Board erred in allowing Dr. Tellado to testify after he discarded certain simulations, that the Board erred in its construction of "phase scrambling," and that the Board denied TQ Delta due process when it construed a claim term in the final written decisions and purportedly relied on new evidence first presented in Cisco's reply. We are not persuaded by these arguments, and we decline to discuss them at length considering that we reverse the Board's ultimate conclusion of obviousness because substantial evidence does not support key factual findings underlying its determination.

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[8] In rebutting TQ Delta's hindsight arguments, the Board cited to an additional paragraph of Dr. Tellado's declaration for the proposition that Stopler's phase scrambler reduces PAR. *See Decision*, 2017 WL 4864547, at *12 (citing J.A. 2926 ¶ 60). The cited paragraph is not referenced by Cisco in support of motivation to combine, and is outside the section of Dr. Tellado's testimony regarding motivation to combine. In any event, it does not change the result here because it includes similarly unsupported and conclusory testimony. *See* J.A. 2926 ¶ 60 (asserting without support that "[a] POSITA would have recognized that a purpose for implementing the phase scrambler to randomize the data symbols would be to reduce the PAR of transmitted signals").

CONCLUSION

For the foregoing reasons, we reverse the Board's final written decisions holding all claims of the '158 and '243 patents invalid as obvious.

REVERSED

COSTS

No costs.