United States Court of Appeals for the Federal Circuit

TQ DELTA, LLC,
Appellant

v.

DISH NETWORK LLC,
Appellee

2018-1799

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2016-01470.

Decided: July 10, 2019

RAJENDRA A. CHIPLUNKAR, McAndrews, Held & Malloy, Ltd., Chicago, IL, argued for appellant. Also represented by PETER J. MCANDREWS, DAVID Z. PETTY.

HEIDI LYN KEEFE, Cooley LLP, Palo Alto, CA, argued for appellee. Also represented by JENNIFER VOLK, Reston, VA; STEPHEN R. SMITH, Washington, DC.

Before NEWMAN, LINN, and WALLACH, *Circuit Judges.*

WALLACH, *Circuit Judge.*

Appellee DISH Network ("Dish") sought inter partes review ("IPR") of claims 6, 11, 16, and 20 ("the Challenged Claims") of Appellant TQ Delta, LLC's ("TQ Delta") U.S. Patent No. 8,611,404 ("the '404 patent"). The U.S. Patent and Trademark Office's Patent Trial and Appeal Board ("PTAB") issued a final written decision finding, inter alia, that the Challenged Claims are unpatentable as obvious. *See DISH Network LLC. v. TQ Delta, LLC*, No. IPR2016-01470 (P.T.A.B. Feb. 7, 2018) (J.A. 1–38).

TQ Delta appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A) (2012). We affirm.

BACKGROUND

Entitled "Multicarrier Transmission System with Low Power Sleep Mode and Rapid-On Capability," the '404 patent relates to the field of "multicarrier transmission systems." '404 patent col. 1 l. 31. "Multicarrier transmission systems provide high speed data links between communication points[and have recently been used] . . . for communications over the local subscriber loop that connects a telephone service subscriber to a central telephone office. . . ."[1] *Id.* col. 1 ll. 37–41. The '404 patent generally describes a method for "establishing a power management sleep state in a multicarrier system" and efficiently waking up a transmission system utilized on hardware, such as a computer, from sleep mode. *Id.* col. 1 ll. 32–33; *see id.*, Abstract. The process involved when the transmission system

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[1] The '404 patent explains that the recent application of these systems described in the patent "are commonly referred to as 'xDSL' systems, where the 'x' specifies a particular variant of DSL (digital subscriber loop) communications, e.g., ADSL (asynchronous digital subscriber loop), HDSL (High-Speed Digital Subscriber Loop), etc." '404 patent col. 1 ll. 42–47.

is first powered up prior to sleep mode is referred to as "full . . . initialization." *Id.*, Abstract. Specifically, the '404 patent describes the invention "in the context of an ADSL system having a first transceiver located at the site of a customer's premises," referred to as the "CPE transceiver," as well as "a second transceiver located at a local central telephone office" referred to as the "CO transceiver." *Id.* col. 3 ll. 63–67 (internal quotation marks omitted). The '404 patent explains that "since the CPE transceiver and CO transceiver are very similar, the invention [is] explained in connection with a detailed illustration of the CPE transceiver only." *Id.* col. 4 ll. 11–13. Generally, in DSL systems, "a pair of transceivers communicate with [each] other by dividing the overall bandwidth of the channel interconnecting the subscriber and the central office into a large number of separate subchannels, each of limited bandwidth, operating in parallel with each other." *Id.* col. 1 ll. 48–52.

Independent claim 6 is illustrative and recites:

An apparatus comprising a transceiver operable to:

> receive, in a full power mode, a plurality of superframes, wherein the superframe comprises a plurality of data frames followed by a synchronization frame;
>
> receive, in the full power mode, a synchronization signal;
>
> transmit a message to enter into a low power mode;
>
> store, in a low power mode, at least one parameter associated with the full power mode operation wherein the at least one parameter comprises at least one of a fine gain parameter and a bit allocation parameter;

> receive, in the low power mode, a synchro-
> nization signal; and

> exit from the low power and restore the full
> power mode by using the at least one pa-
> rameter and *without needing to reinitialize*
> the transceiver.

Id. col. 10 ll. 29–43 (emphasis added).

DISCUSSION

TQ Delta challenges the PTAB's claim construction on the basis that the PTAB violated TQ Delta's procedural rights by relying on a new claim construction, *see* Appellant's Br. 25–29, and improperly construed the "without needing to reinitialize" limitation, *see id.* at 29–36. TQ Delta also argues the PTAB's finding of obviousness is not supported by substantial evidence. *See id.* at 36–64. We address each argument in turn.

I. The Administrative Procedure Act

A. Standard of Review and Legal Standard

"IPR proceedings are formal administrative adjudications subject to the procedural requirements of the Administrative Procedure Act ('APA')." *SAS Inst., Inc. v. ComplementSoft, LLC.*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), *rev'd on other grounds sub nom.*, *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348 (2018); *see* APA, 60 Stat. 237 (1946) (codified in scattered sections of 5 U.S.C. (2012)). Pursuant to the APA, we will set aside a PTAB decision that is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). In the context of IPR proceedings, the PTAB "may not change theories in midstream without giving respondents reasonable notice of the change and the opportunity to present argument under the new theory." *SAS*, 825 F.3d at 1351 (internal quotation marks and citation omitted); *see* 5 U.S.C. § 554(b) ("Persons entitled to notice of an agency hearing

shall be timely informed of . . . the matters of fact and law asserted.").[2] The APA and due process require "notice" and a "fair opportunity" to be heard. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015).

B. The PTAB Did Not Violate TQ Delta's APA Rights

In its decision to institute, the PTAB, after identifying a passage in U.S. Patent No. 5,956,323 ("Bowie") that "loop transmission characteristics are 'retrieved from memory and used to enable data transmission to resume quickly by reducing the time needed to determine loop transmission characteristics,'" stated that "[Dish] explains that a person [having] ordinary skill in the art [('PHOSITA')] would understand this [passage] to mean that the 'parameters are used to restore data transmission on the loop without having to perform the 'handshaking' (or initialization) process again." J.A. 229. In its Final Written Decision, the PTAB interpreted the claim term "without needing to reinitialize" as being "satisfied if any step of initialization is avoided." J.A. 29. TQ Delta avers that the PTAB violated its procedural rights "[b]y changing its interpretation of the 'without needing to reinitialize' limitation." Appellant's Br. 25. TQ Delta also asserts that the PTAB "unfairly denied TQ Delta any opportunity to respond [to the change in its interpretation of the term] in a meaningful way." *Id.* (capitalization modified). More specifically, TQ Delta asserts that because neither party advocated for a new claim construction and the PTAB sua sponte construed the "without needing to reinitialize" limitation as being "satisfied if any

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[2]   TQ Delta relies upon 35 U.S.C. § 554, which does not exist in Title 35 of the U.S. Code. *See* Appellant's Br. 25. We believe that TQ Delta intends to cite to 5 U.S.C. § 554, which governs administrative procedure, and that it is clear from its arguments that TQ Delta is raising a claim under the APA pursuant to 5 U.S.C. § 554. We, therefore, construe this claim as an APA challenge.

step of initialization is avoided," TQ Delta was denied a proper chance to respond to the PTAB's understanding of the claim term. *Id.* at 24. We disagree with TQ Delta.

The PTAB did not violate TQ Delta's APA rights. The PTAB never construed the "reinitialize" limitation in its Decision to Institute IPR as TQ Delta contends, and it, therefore, did not change course by construing the term in the Final Written Decision. *See id.* Rather, in its Decision to Institute, the PTAB summarized DISH's arguments addressing how a PHOSITA would interpret the disclosures in Bowie. J.A. 229. In the Final Written Decision, the PTAB explained what its understanding of the limitation was in the context of the prior art. J.A. 29 (explaining that "[the PTAB is] still persuaded that Bowie teaches exiting low power mode and restoring full power mode 'without needing to reinitialize the transceiver' because we interpret that phrase to be satisfied as long as the *entire* initialization process is not needed"); *see also HTC Corp. v. Cellular Comm'cns Equip., LLC*, 701 F. App'x 978, 981 (Fed. Cir. 2017) (explaining the PTAB "engaged in claim construction when it proceeded to determine whether [the prior art] disclosed [certain] limitations" because, "[d]espite the heading under which the [PTAB]'s analysis took place, [its] ruling about the requirement of separate components was clearly a claim construction" by "establish[ing] the scope and boundaries of the subject matter that is patented" (internal quotation marks omitted) (quoting *Netword, LLC v. Centraal Corp.*, 242 F.3d 1347, 1350 (Fed. Cir. 2001))). Thus, the PTAB did not "change course" by construing the limitation in the Final Written Decision because it did not construe the term in its Decision to Institute.

Nevertheless, TQ Delta had notice of the PTAB's understanding of the "reinitialization" limitation as it relates to the prior art before the PTAB issued the Final Written Decision. *See* J.A. 303–04 (arguing, by TQ Delta in its patent owner response, that Bowie does not disclose the

disputed limitation). During the Oral Hearing, the PTAB repeatedly asked TQ Delta about its narrow construction of the term and explained that it disagreed with TQ Delta's interpretation. *See, e.g.*, J.A. 417 ("I'm just not understanding your argument that there's more to avoiding reinitialization than storing because there's nothing in the claim – there's nothing claimed beyond the storing of the parameter and the receiving of the sync signal that would allow it to avoid reinitializing when it exits from low power mode"). After the Oral Hearing, TQ Delta was given the opportunity to respond. *See Intellectual Ventures II LLC v. Ericsson Inc.*, 686 F. App'x 900, 906 (Fed. Cir. 2017) (explaining that the patent owner's APA and due process arguments were meritless because it was on notice of the at-issue construction before the final written decision issued because it had the "opportunity to seek a sur-reply or rehearing" and there was a "continuous focus on [the claim term] before and during oral arguments"); *see also id.* (explaining that "[t]he [PTAB] is not constrained by the parties' proposed constructions and is free to adopt its own construction").

While TQ Delta asserts that this case is similar to *SAS*, which held that, under the APA, the PTAB cannot change theories midstream by adopting a construction in its final written decision that neither party requested or anticipated, *see* 825 F.3d at 1351, we disagree. In *SAS*, the parties agreed to the construction adopted by the PTAB at institution, but the PTAB adopted a different construction in its final written decision, without either party discussing or briefing this new construction. *Id.* at 1351. We held that it was "difficult to imagine either party anticipating that already-interpreted terms were actually moving targets, and it is thus unreasonable to expect that they would have briefed or argued, in the alternative, hypothetical constructions not asserted by their opponent." *Id.*

Here, however, TQ Delta had adequate notice of the PTAB's understanding of the disputed claim limitation, as

demonstrated by TQ Delta's statements throughout the proceedings. For example, in its Patent Owner Response, TQ Delta argued for a narrow interpretation that avoided the reinitialization process and explained that Bowie "teaches that some re-initialization *does* occur as part of going from low power mode to full power mode" and, thus, Bowie does not disclose "without needing to reinitialize the transceiver." J.A. 303; *see* J.A. 304 (explaining that "Bowie teaches that initialization can continue to occur even after reaching the full power mode, but before data transmission begins"). The PTAB explained that it disagreed with this construction at the Oral Hearing, *see* J.A. 414 ("[Dish] doesn't need it to be teaching that it goes through the entire initialization process."), and the PTAB questioned TQ Delta's narrow construction, *see* J.A. 415 ("So how in the world do you avoid needing to reinitialize the transceiver if all you've done is stored parameters if its true that, as you say, there's more to reinitialization than parameter determination?"). TQ Delta, however, responded to the PTAB's interpretation that "there could be some way that [Bowie] determines the temperature's changed short of full reinitialization" with "[t]here's no expert testimony regarding how a modem, other than by using initialization steps can determine that attenuation has changed" and "to the extent there's some suggestion that these modems have some other method without reinitialization to determine that attenuation has changed, there's nothing in the record" that addresses this issue. J.A. 413–17. Clearly, TQ Delta had notice of the PTAB's understanding of the "reinitialize" limitation prior to issuance of the Final Written Decision. Because TQ Delta had notice of the claim construction issue and the opportunity to be heard, the PTAB did not violate the APA. *See Hamilton Beach Brands, Inc. v. f'real Foods, LLC*, 908 F.3d 1328, 1339 (Fed. Cir. 2018) (distinguishing *SAS* because the party asserting the APA violation "had notice of the contested claim construction issues and an opportunity to be heard").

II. Claim Construction

A. Standard of Review and Legal Standard

At the time of the Final Written Decision, the PTAB gave "[a] claim . . . its broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b) (2017). A specification "includes both the written description and the claims" of the patent. *In re Packard*, 751 F.3d 1307, 1320 n.11 (Fed. Cir. 2014). "A patent's specification, together with its prosecution history,[3] constitutes intrinsic evidence to which the PTAB gives priority when it construes claims." *Knowles Elecs. LLC v. Cirrus Logic, Inc.*, 883 F.3d 1358, 1361−62 (Fed. Cir. 2018). "We review the PTAB's assessment of the intrinsic evidence de novo." *Id.* at 1362.

B. The PTAB Properly Construed the "Without Needing to Reinitialize" Limitation[4]

The PTAB determined that the "without needing to reinitialize" limitation, in the context of comparing it to that which is disclosed in the prior art, is "satisfied as long as the *entire* initialization process is not needed." J.A. 29. More specifically, the PTAB explained that the limitation "is satisfied if any step of initialization is avoided[] and does not require that *every* step of initialization be

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3   A patent's prosecution history "consists of the complete record of the proceedings before the [US]PTO," which provides "evidence of how the [US]PTO and the inventor understood the patent." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1317 (Fed. Cir. 2005) (en banc) (citation omitted).

4   TQ Delta concedes that, "even though the [PTAB] construed 'without needing to reinitialize' in the context of applying that limitation to the prior art . . . and not in the 'Claim Construction' section of the Final Written Decision . . . review of the construction . . . is proper." Appellant's Br. 29.

avoided." J.A. 29. TQ Delta asserts that the "[PTAB]'s con-struction conflicts with the plain meaning of the claim lan-guage," because "both parties agreed that the plain meaning of [the term] is without needing to perform any step of the initialization process." Appellant's Br. 30 (cap-italization modified). We disagree with TQ Delta.

The '404 patent's claims and specification teach that "reinitialize" does not require that every step of initializa-tion is avoided, but rather that it is satisfied if *any* step is avoided, thereby supporting the PTAB's construction. We begin our analysis with the claim language. *In re Power Integrations, Inc.,* 884 F.3d 1370, 1376 (Fed. Cir. 2018) ("Claim construction must begin with the words of the claims themselves." (internal quotation marks, brackets, and citation omitted)). Independent claim 6 discloses a transceiver operable to "exit from the low power and re-store the full power mode by using the at least one param-eter and *without needing to reinitialize the transceiver.*" '404 patent col. 10 ll. 41–43 (emphasis added). The express language of the Challenged Claims does not recite a prior or first initialization and therefore uses the term "reinitial-ize" to mean repeating the same prior initialization process over again. *See, e.g.*, *id.*

The surrounding claims and broader specification pro-vide additional support for our interpretation. *See Phillips*, 415 F.3d at 1314 ("[T]he claims themselves provide sub-stantial guidance as to the meaning of particular claim terms."); *see also Trs. of Columbia Univ. v. Symantec Corp.,* 811 F.3d 1359, 1363 (Fed. Cir. 2016) ("The specification is *always* highly relevant to the claim construction analysis and is, in fact, the single best guide to the meaning of a disputed term." (internal quotation marks, brackets, and citation omitted)). The Challenged Claims' use of "re" in "*re*initialize" refers to repeating that prior initialization process. *See Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233 (Fed. Cir. 2001) (citing a dictionary defining "the prefix 're-' as 'again, anew, over again'" and

explaining that "in common parlance, it is customary to speak of 'circulating' something once (*e.g.*, an inter-office memorandum), without 'recirculating' it a second time"). Independent claim 1 also uses language similar to claim 6 and recites "stor[ing] . . . at least one parameter . . . compris[ing] at least one of a fine gain parameter and a bit allocation parameter," and then "restor[ing] the full power mode by using the at least one parameter and without needing to reinitialize the transceiver." '404 patent col. 10 ll. 10–13, 16–18. The consistent use of similar language in both independent claims indicates that following the parameters under which the DSL transceivers operate, the "without needing to reinitialize" the full initialization process is a parameter determined during the transceiver's beginning initialization. *See id.*; *see also id.* col. 3 ll. 25–30 (explaining that "in an already-operating installation, the time required to initialize or re-initialize the system after a suspension of operation in connection with power conservation is generally unacceptable, since it is typically desired to have the modem respond to [a] request for service nearly instantaneously").   This beginning initialization is required to establish stable data communication between transceivers and indicates that not all of the transmission parameters determined during the beginning initialization can be stored and, thus, some form of initialization is necessary to resume subsequent data transmission. *See id.* col. 3 ll. 7–20. The Challenged Claims, therefore, support the conclusion that "reinitialize" means initialization after the transceiver's beginning initialization and power down into sleep mode.

Moreover, the specification provides an overview of the transceiver initiation process. *See* '404 patent col. 3 ll. 7–20. The specification explains that transceivers, at the time, performed "full . . . initialization" when waking from inactivity. *Id.*, Abstract. The specification indicates that the purpose of the invention is to avoid full initialization and offer a more convenient "rapid-on capability," *id.* col. 3

l. 33, so transceiver services resume "nearly instantane-
ously," *id.* col. 3 ll. 29–30, or "within a few frames" after
periods of inactivity, *id.* col. 6 ll. 5–6; *see id.* col. 3 ll. 24–33.
The specification twice discusses avoiding reinitializations
and does not expressly require avoiding the entire initiali-
zation process. First, the '404 patent explains that after a
transceiver is idling in sleep mode, "[t]he full transmission
and reception capabilities of the transceiver are quickly re-
stored when needed, without requiring the full (and time-
consuming) initialization." *Id.*, Abstract. Second, the spec-
ification explains that the transceiver "need not repeat the
initialization that was earlier required to establish the req-
uisite parameters . . . required for reliable communica-
tions." *Id.* col. 8 ll. 6–12. This also refers to the full
initialization process because it describes the process from
exiting sleep mode through waking up from sleep mode.
See id. col. 8 ll. 1–12. Therefore, the "without needing to
reinitialize" limitation is "satisfied as long as the entire in-
itialization process is not needed."

TQ Delta's primary counterargument is unavailing.
TQ Delta asserts that "the [PTAB]'s construction improp-
erly reads the word [full] from the Abstract into the claims"
as the "claim language does not include the word 'full.'" Ap-
pellant's Br. 32. Additionally, TQ Delta states that "re-
gardless of the import of [full] as used in the
Abstract . . . by omitting the word 'full' in the claims, it is
reasonable to assume that the applicant intended for the
claim language to have a different scope than the language
found in the Abstract." *Id.* As such, TQ Delta recognizes
that the specification's use of "full" in the Abstract, '404 pa-
tent, Abstract, and the phrase "the initialization that was
earlier required," *id.* col. 8 ll. 6–7, together imply that any
form of initialization less than the "full" or "earlier" initial-
ization is sufficient to achieve the '404 patent's purpose of
rapid-on capability, *see* Appellant's Br. 32. This language
in the patent is critical to understand the meaning of the
disputed limitation given the '404 patent's objective of

providing rapid-on capability. *See* '404 patent col. 3 ll. 31–33; *see also Netword*, 242 F.3d at 1352 ("The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose."). Tellingly, nothing in the specification suggests that the only way to achieve rapid-on capabilities is by avoiding the initialization process entirely. *See generally* '404 patent. Thus, we do not understand the claims as being limited to only achieving rapid-on capabilities by avoiding the initialization process altogether.

III. Obviousness

A. The Relevant Prior Art

1. Bowie

Entitled "Power Conservation for [Plain Old Telephone Service ('POTS')] and Modulated Data Transmission," U.S. Patent No. 5,956,323 ("Bowie") discloses "a power conservation system for modulated data communications." Bowie col. 1 ll. 4–5. Bowie describes an ADSL technology "used to transmit wide-bandwidth modulated data over a two-wire loop using high frequency carrier signals." *Id.* col. 3 ll. 24–25. Bowie explains that, prior to transmitting any data, "signals are exchanged . . . to adapt the ADSL [transceivers] to the electronic characteristics of the particular wire loop 220" over which those ADSL transceivers communicate. *Id.* col. 4 l. 64–col. 5 l. 1. When it is in low power mode and ready to wake up, the transceiver wakes from low power mode and "retrieve[s] from memory" any saved or stored "parameters" "to enable data transmission to resume quickly by reducing the time needed to determine loop transmission characteristics." *Id.* col. 5 ll. 64–66. Further, Bowie explains there are some instances where ADSL receivers "may" need to "exchange handshaking[5]

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[5]   "Th[e] exchange of information [over a loop between the customer premises equipment ('CPE') and

information to establish reliable data communication," even after the parameters are restored. *Id.* col. 6 ll. 36–37; *see id.* col. 5 l. 66 col. 6 l. 2. For example, "[h]andshaking information may be required where . . . loop characteristics have changed due, for example, to temperature-dependent changes in loop resistance." *Id.* col. 6 ll. 37–41.

2. The ADSL Standard

In 1995, the American National Standards Institute ("ANSI") published the "Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface," known as ANSI T1.413-1995 ("the ADSL Standard") (J.A. 1199–301). J.A. 1199. The ADSL Standard is the first technical standard defining the requirements for a single ADSL for interfaces between a telecommunications network and the customer installation in terms of their electrical characteristics and interactions. *See, e.g.*, J.A. 1220, 1223.[6] The ADSL Standard discloses a set of requirements for transmissions between ADSL transceivers, including the initialization process that all ADSL transceivers must perform. J.A. 1220 (explaining that "[t]he system reference model . . . illustrates the functional blocks required to provide ADSL service"). During initialization, the ADSL Standard mandates that

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central office terminal ('COT') units] is often referred to as handshaking. Once handshaking is completed, transmission of user data may begin." Bowie col. 5 ll. 3–5; *see id.* col. 4 l. 64–col. 5 l. 3.

[6] The parties have used "ANSI T1.413" and "the 1995 ADSL Standard" interchangeably because they both refer to the ADSL Standard. *See* Appellant's Br. 10; Appellee's Br. 4. As such, we refer to the 1995 ADSL Standard and ANSI T1.413 as the ADSL Standard unless otherwise noted.

"transceiver initialization is required . . . to establish a communications link." J.A. 1301.

3. Vanzieleghem

Entitled "Multi-Carrier Telecommunication System with Power Reduction Means," European Patent No. 0 883 269 A1 ("Vanzieleghem") (J.A. 1188–98) discloses an ADSL transmitter that operates according to the ADSL Standard. J.A. 1189. Vanzieleghem explains that "[w]hen idle data are received, the power dissipated in the transmitter is reduced because the symbols are then merely derived from a few or even a single carrier (the 'pilot tone') instead as from all the available carriers." J.A. 1188. Vanzieleghem also discloses that a "pilot tone," or synchronization signal, is transmitted during low power mode for the purpose of "maintain[ing] the frequency synchronization between the transmitter and the receiver." J.A. 1192. Vanzieleghem discloses that when the transmitter wakes up, it can restart transmitting data faster. *See* J.A. 1189 (explaining that "[t]he transmission system remains thus efficient in that it allows a fast restart").

B. Standard of Review and Legal Standard

"We review the PTAB's factual findings for substantial evidence and its legal conclusions de novo." *Redline Detection, LLC v. Star Envirotech, Inc.*, 811 F.3d 435, 449 (Fed. Cir. 2015) (citation omitted). "Substantial evidence is something less than the weight of the evidence but more than a mere scintilla of evidence," meaning that "[i]t is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *In re NuVasive, Inc.*, 842 F.3d 1376, 1379–80 (Fed. Cir. 2016) (internal quotation marks and citations omitted). "If two inconsistent conclusions may reasonably be drawn from the evidence in record, the PTAB's decision to favor one conclusion over the other is the epitome of a decision that must be sustained upon review for substantial evidence." *Elbit Sys. of Am., LLC v. Thales Visionix, Inc.*, 881 F.3d 1354, 1356 (Fed. Cir.

2018) (internal quotation marks, brackets, and citation omitted).

A patent claim is invalid "if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a [PHOSITA]." 35 U.S.C. § 103 (2012).[7] Obviousness "is a question of law based on underlying findings of fact." *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). Those underlying findings of fact include (1) "the scope and content of the prior art," (2) "differences between the prior art and the claims at issue," (3) "the level of ordinary skill in the pertinent art," and (4) the presence of objective indicia of nonobviousness such "as commercial success, long felt but unsolved needs, failure of others," and unexpected results. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17 (1966); *see United States v. Adams*, 383 U.S. 39, 50–52 (1966). In assessing the prior art, the PTAB also "consider[s] whether a PHOSITA 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) (internal quotation marks, brackets, and citation omitted).

C. Substantial Evidence Supports the PTAB's Obviousness Finding

The PTAB held that the Challenged Claims would have been obvious over a combination of Bowie, the ADSL Standard, and Vanzieleghem. J.A. 34. Specifically, the

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[7]   Congress amended § 103 when it enacted the Leahy-Smith America Invents Act ("AIA"). Pub. L. No. 112-29, § 3(c), 125 Stat. 284, 287 (2011). Because the '404 patent has an effective filing date after March 16, 2013, the AIA applies. *See id.* § 3(n)(1), 125 Stat. at 293.

PTAB determined that "it would have been within the level of ordinary skill in the art to select a frequency for Bowie's resume signal such that Vanzieleghem's pilot tone would not be mistaken for the resume signal." J.A. 34. TQ Delta asserts that "the [PTAB] erred in finding the Challenged Claims unpatentable" because "Bowie does not teach avoiding any steps of the initialization process." Appellant's Br. 51 (capitalization modified).[8] Regarding motivation to combine, TQ Delta argues Bowie teaches away from the claimed reinitialization limitation because "Bowie and the '404 patent are fundamentally different in how they teach going back to transmitting data in full power mode operation after coming out of a low power mode." *Id.* at 54 (internal quotation marks and citation omitted). Moreover, TQ Delta asserts the prior art teaches away from the Challenged Claims because "using Vanzieleghem's synchronization signal in combination with Bowie, as proposed by [Dish], would produce an inoperative result." *Id.* at 58 (internal quotation marks omitted). TQ Delta states that the combination would be inoperative because "Vanzieleghem's pilot tone would cause Bowie to constantly wake up to return to full power mode," *id.* at 59 (internal quotation marks and citation omitted), given that Vanzieleghem's pilot tone may have a signal pilot strength of 16 kilohertz ("kHz"), which may "falsely trigger the resume signal detector and cause the modem of Bowie's system to return to full power mode, even if no resume signal is transmitted," *id.* at 60 (internal quotation marks and citation omitted). We disagree with TQ Delta.

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[8]   TQ Delta does not dispute that the prior art teaches nearly every limitation of the Challenged Claims, *see generally* Appellant's Br., and instead confines its challenge to arguing Bowie does not teach the "without needing to reinitialize" limitation, *see id.* at 51.

Substantial evidence supports the PTAB's determina-
tion that Bowie, in view of the ADSL Standard and Van-
zieleghem, renders obvious the Challenged Claims. First,
Bowie teaches ways to reduce power, but does not teach
that maximum power reduction is its intended purpose.
See Bowie col. 1 ll. 26–28 (explaining that "[t]he use of
POTS-compatible transmission frequencies severely limits
the maximum information carrying capacity of the wire
loop"). Bowie, however, explicitly recognizes the need for
some circuitry to remain on during low power mode to re-
ceive signals. *See id.* col. 5 ll. 28–30 ("Circuitry 115 to de-
tect the resume signal must remain capable of signal
detection during low power operation."). For example,
Bowie's specification demonstrates that in some embodi-
ments, its transceiver stores parameters before entering
into a low power mode. *Id.* col. 4 l. 64–col. 5 l. 4 ("Prior to
initiating transport of modulated data over the loop 220,
signals are exchanged over the loop 220 between the COT
unit 232 and the CPE unit 242 to adapt the ADSL
units . . . . This exchange of information is often referred
to as handshaking.").

Second, while Bowie does not provide a list of the types
of parameters it stores, it does specify that the parameters
stored are determined and exchanged *during initialization.*
Id. col. 5 ll. 17–19 ("Upon receipt of the shut-down signal,
the COT unit 232 optionally stores in memory 117 charac-
teristics the of the loop 220 that were determined by CPE
to COT handshaking."). These include bit allocation pa-
rameters and fine gain parameters, which the '404 patent
uses for the same process. J.A. 565 (explaining, by Dish's
expert, that "the 1995 ADSL Standard explicitly discloses
a 'fine gain parameter' and a 'bit allocation parameter'" and
that "these [fine gain parameter and bit allocation param-
eters] are part of the 'loop loss characteristics' already dis-
closed in Bowie as being stored during the unit's 232, 242
low power mode"). It would have, therefore, been obvious
to a PHOSITA for Bowie's system to store bit allocation

parameters and fine gain parameters since those are exchanged during initialization as taught by the ADSL Standard. *See* J.A. 565–66 (testimony, by Dish's expert, that "Bowie would have been operating according to the 1995 ADSL Standard, and a [PHOSITA] would have looked to that [s]tandard for guidance"), 571 (Dish's expert explaining that Bowie's "parameters are used to restore data transmission on the loop without having to perform the 'handshaking' (or initialization) process again").

Third, a PHOSITA would have been motivated to employ Vanzieleghem's synchronization signal, or pilot tone, in combination with Bowie. "[A] reference teaches away from a combination when using it in that combination would produce an inoperative result." *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1382 (Fed. Cir. 2007). It is true that Bowie discloses that "[t]he resume signal may be an [alternating current ('AC')] signal at a frequency above voiceband, such as a 16 kHz AC signal," Bowie col. 2 ll. 27–28, which is the same frequency that TQ Delta asserts Vanzieleghem's pilot tone emits and would cause a false trigger in Bowie, *see* Appellant's Br. 60. However, Bowie supports the PTAB's determination, when it later states that "[t]he resume signal *may* be an AC signal greater than 4 kHz *or* may be a multi-tone AC signal." *Id.* col. 2 ll. 44–46 (emphases added). Bowie, thus, does not require its resume signal to be set to receive a 16 kHz AC signal, such that a PHOSITA could employ Bowie's resume signal at a different frequency without rendering Bowie inoperable. *See* Bowie col. 2 ll. 44–46. Therefore, the combination of prior art renders obvious the Challenged Claims.

TQ Delta's primary counterargument is unpersuasive. TQ Delta argues that "[t]he fact that Bowie *may* perform 'additional handshaking' *after* returning to its full power mode does not change the fact that . . . Bowie's ADSL unit *always* re-determines loop transmission characteristics, i.e., performs handshaking or initialization, *before* returning to full power mode." Appellant's Br. 47 (third emphasis

added). However, Bowie discloses that reinitialization is needed in *some*, but *not all*, instances. *See* Bowie, Abstract; *see id*. col. 5 ll. 20–22 ("Likewise, upon sending the shutdown signal, the CPE unit . . . may also optionally store the loop characteristics that it obtained through CPE to COT handshaking."). Bowie explains that "[h]andshaking information *may* be required where, for example, loop characteristics have changed due, for example, to temperature-dependent changes in loop resistance." *Id*. col. 6 ll. 38–41 (emphasis added). This, however, does not indicate that all steps of initialization are required. *See id.* During the IPR proceedings TQ Delta conceded that "Bowie specifically teaches that some re-initialization *does* occur as part of going from low power mode to full power mode." J.A. 303. TQ Delta's expert similarly explained that "Bowie . . . still ha[s] to go through the process of . . . re-determining loop characteristics upon coming out of low power mode in order to accomplish Bowie's goal of reliable data communications." J.A. 4309. Because the reinitialize limitation is satisfied if any step of initialization is avoided, TQ Delta's interpretation of Bowie satisfies the limitation as interpreted by the PTAB. Thus, given TQ Delta and its expert's admission that Bowie discloses *some* steps during the reinitialization process, and prior to initialization, *see* J.A. 303, 4309, we find no merit in its attempt on appeal to argue the opposite.

CONCLUSION

We have considered TQ Delta's remaining arguments and find them unpersuasive. Accordingly, the Final Written Decision of the U.S. Patent and Trademark Office's Patent Trial and Appeal Board is

AFFIRMED