

**United States Court of Appeals
for the Federal Circuit**

QUALCOMM INCORPORATED,
Appellant

v.

INTEL CORPORATION,
Appellee

**ANDREW HIRSHFELD, PERFORMING THE
FUNCTIONS AND DUTIES OF THE UNDER
SECRETARY OF COMMERCE FOR
INTELLECTUAL PROPERTY AND DIRECTOR OF
THE UNITED STATES PATENT AND TRADEMARK
OFFICE,**
Intervenor

2020-1589, 2020-1590, 2020-1591, 2020-1592, 2020-1593,
2020-1594

Appeals from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in Nos. IPR2018-
01326, IPR2018-01327, IPR2018-01328, IPR2018-01329,
IPR2018-01330, IPR2018-01340.

Decided: July 27, 2021

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Before MOORE, *Chief Judge*, REYNA and STOLL, *Circuit Judges*.

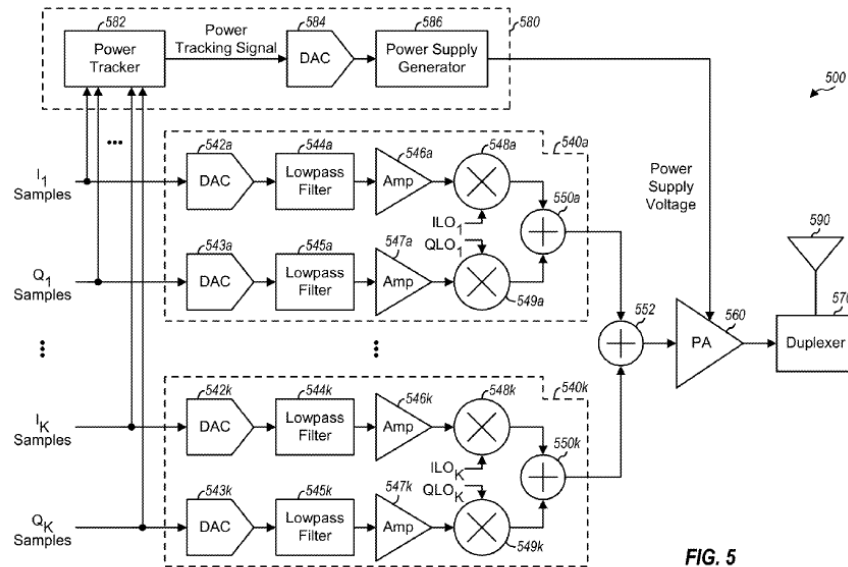
MOORE, *Chief Judge*.

Qualcomm Inc. appeals six *inter partes* review final written decisions from the Patent Trial and Appeal Board determining that claims 1–15, 17–25, and 27–33 of U.S. Patent No. 9,608,675 would have been obvious. We vacate and remand.

BACKGROUND

The '675 patent relates to techniques for generating a power tracking supply voltage for a circuit that processes multiple radio frequency signals simultaneously, using one power amplifier and one power tracking supply generator. '675 patent at 1:8–10, 35–40; 2:17–18; 6:20–27. It discloses a power tracker within a voltage generator that determines a power tracking signal based on the inphase (I) and quadrature (Q) components of transmit signals being sent simultaneously. *Id.* at 1:42–45. A power supply generator

generates a power supply voltage based on the power tracking signal. *Id.* at 1:45–47. The claimed invention purports to increase bandwidth, reduce the number of needed circuit components, reduce power consumption, improve the efficiency of power amplifiers, and provide other advantages.



Id. at 6:6–27. Figure 5 shows an embodiment:

The power tracker 582 receives samples of I and Q signals for all transmit signals to be sent simultaneously and computes the overall power of the transmit signals based on the samples. *Id.* at 6:63–67. It produces a power tracking signal that is used to generate a power supply voltage for the power amplifier (PA 560). *Id.* at 7:1–8. PA 560 uses the power supply voltage to amplify the modulated radio frequency (RF) signal from the summer 552 and provide an output RF signal for all transmit signals being sent simultaneously. *Id.* at 7:9–14. Claims 1 and 28 are representative:

1. An apparatus comprising:

a power tracker configured to determine a single power tracking signal based on a plurality of inphase (I) and quadrature (Q) components of a *plurality of carrier aggregated transmit signals* being sent simultaneously, wherein the power tracker receives the plurality of I and Q components corresponding to the plurality of carrier aggregated transmit signals and generates the single power tracking signal based on a combination of the plurality of I and Q components, wherein the plurality of carrier aggregated transmit signals comprise Orthogonal Frequency Division Multiplexing (OFDM) or Single Carrier Frequency Division Multiple Access (SC-FDMA) signals;

a power supply generator configured to generate a single power supply voltage based on the single power tracking signal; and

a power amplifier configured to receive the single power supply voltage and the plurality of carrier aggregated transmit signals being sent simultaneously to produce a single output radio frequency (RF) signal.

28. An apparatus comprising:

means for determining a single power tracking signal based on a plurality of inphase (I) and quadrature (Q) components of a plurality of carrier aggregated transmit signals being sent simultaneously, wherein a power tracker receives the plurality of I and Q components corresponding to the plurality of carrier aggregated transmit signals and generates the single power

tracking signal based on a combination of the plurality of I and Q components, wherein the plurality of carrier aggregated transmit signals comprise Orthogonal Frequency Division Multiplexing (OFDM) or Single Carrier Frequency Division Multiple Access (SC-FDMA) signals;

means for generating a single power supply voltage based on the single power tracking signal; and

means for receiving the single power supply voltage and the plurality of carrier aggregated transmit signals being sent simultaneously and producing a single output radio frequency (RF) signal.

(emphases added).

Intel petitioned for six *inter partes* reviews (IPRs) challenging the validity of the '675 patent. In each petition, Intel proposed “a plurality of carrier aggregated transmit signals” means “signals for transmission on multiple carriers at the same time *to increase the bandwidth for a user.*” See, e.g., J.A. 1255 (emphasis added). Qualcomm proposed the following construction: “signals from a single terminal utilizing multiple component carriers *which provide extended transmission bandwidth for a user transmission from the single terminal.*” See, e.g., J.A. 1414 (emphasis added). The parties never disputed that the signals were required to increase user bandwidth.¹ In a parallel proceeding before the International Trade Commission, the Commission’s construction of the term also included the increased bandwidth requirement. All briefing by both

¹ We discern no material difference between “signals increasing bandwidth” and “signals which extend bandwidth” for the purposes of this appeal.

parties before the Board as well as the Commission's construction, therefore, included an increased bandwidth requirement. On this matter of law, the parties agreed.

After the parties completed all their briefing in the IPRs, during an approximately two-hour oral hearing before the Board, one judge asked Intel a single question about increasing bandwidth:

[Q:] What is the purpose, and where is the support, for requiring “to increase the bandwidth for a user”?

[A:] That's a good question, Your Honor. . . . We . . . would be comfortable . . . if the Board were inclined to remove the bandwidth for a user portion of it. . . .

J.A. 1649:1–17. Shortly thereafter, the same judge commented while asking Intel a question on simultaneous signal transmission:

[Q:] [I]f we were to construe a plurality of carrier aggregated transmit signals being sent simultaneously, would you agree that the construction is signals for transmission on multiple carriers at the same time? *Potentially to increase the bandwidth for a user, you know, we'll think about whether that's necessary.* But at least is that where the “at the same time” comes from?

[A:] Yes, Your Honor.

J.A. 1651:16–20 (emphasis added). Neither that judge nor the other two judges on the panel asked Qualcomm any questions about the increased bandwidth requirement. In sum, one judge asked one question about the increased bandwidth requirement, directed only at Intel, during the entire hearing. The next day, the Board, *sua sponte*, ordered additional briefing on the meaning of the claim language “generates the single power tracking signal based on a combination of the plurality of I and Q components,” a

topic that was extensively discussed at the hearing. J.A. 1624. It never requested any briefing on the increased bandwidth requirement, a requirement that both parties agreed upon and to which the Board devoted little attention at the hearing.

Ultimately, the Board issued six final written decisions concluding that all challenged claims were unpatentable. In reaching its conclusion, the Board construed the term “a plurality of carrier aggregated transmit signals” in each asserted claim to mean “signals for transmission on multiple carriers,” omitting any requirement that the signals increase or extend bandwidth. *See, e.g.*, J.A. 23. Additionally, in the three decisions in which claim 28 or an associated dependent claim was at issue, the Board held that “means for determining a single power tracking signal . . .” (power tracker limitation) in claim 28 is a means-plus-function limitation and that “power tracker 582” is the corresponding structure. *See, e.g.*, J.A. 348–49. Qualcomm appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

Qualcomm argues that it was not afforded notice of, or an adequate opportunity to respond to, the Board’s construction of “a plurality of carrier aggregated transmit signals.” It also challenges the Board’s construction of the power tracker limitation for failing to include an algorithm in the corresponding structure.² We agree the Board violated Qualcomm’s procedural rights with respect to the “plurality of carrier aggregated transmit signals” limitation. We see no error, however, in the Board’s construction of the power tracker limitation in claim 28.

² In its opening brief to this Court, Qualcomm raised an *Arthrex* challenge, which it has subsequently withdrawn.

I

“A patent owner in [an IPR] is undoubtedly entitled to notice of and a fair opportunity to meet the grounds of rejection,” based on due process and Administrative Procedure Act (APA) guarantees. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015). For IPRs, “the APA imposes particular requirements on the PTO. The agency must ‘timely inform[]’ the patent owner of ‘the matters of fact and law asserted,’ 5 U.S.C. § 554(b)(3), must provide ‘all interested parties opportunity for the submission and consideration of facts [and] arguments . . . [and] hearing and decision on notice,’ *id.* § 554(c), and must allow ‘a party . . . to submit rebuttal evidence . . . as may be required for a full and true disclosure of the facts,’ *id.* § 556(d).” *Dell Inc. v. Acceleron, LLC*, 818 F.3d 1293, 1301 (Fed. Cir. 2016) (alterations in original). Under the APA, we must “hold unlawful and set aside agency action . . . not in accordance with law [or] . . . without observance of procedure required by law.” 5 U.S.C. § 706.

We have held that the Board may adopt a claim construction of a disputed term that neither party proposes without running afoul of the APA. *See, e.g., Praxair Distrib., Inc. v. Mallinckrodt Hosp. Prods. IP Ltd.*, 890 F.3d 1024, 1034 (Fed. Cir. 2018) (rejecting argument that Board violated patent owner’s “procedural rights by adopting a claim construction that neither party proposed”); *Western-Geco LLC v. ION Geophysical Corp.*, 889 F.3d 1308, 1328 (Fed. Cir. 2018) (“The Board is not bound to adopt either party’s preferred articulated construction of a disputed claim term.”). Parties are well aware that the Board may stray from disputed, proposed constructions. *See Western-Geco*, 889 F.3d at 1328 (“Having put it at issue, Western-Geco was well aware that the Board could alter its construction in the final written decision.”). Unlike these cases, the issue of whether increased bandwidth was a required part of the claim construction was not in dispute.

The Board’s construction of “a plurality of carrier aggregated transmit signals” diverged from the agreed-upon increased bandwidth requirement for the term; it did not merely adopt its own construction of a disputed term. In *SAS Institute, Inc. v. ComplementSoft, LLC.*, we explained that it was reasonable for the petitioner to rely on the Board’s institution decision claim interpretation because the patent owner “agreed with [that] interpretation in its patent owner’s response and never suggested that the Board adopt the construction that eventually materialized in the final written decision.” 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). We explained that it “is difficult to imagine either party anticipating that already-interpreted terms were actually moving targets,” and, thus, it is unreasonable to expect parties to “have briefed or argued, in the alternative, hypothetical constructions not asserted by their opponent.” *Id.* Here, the patent owner agreed with the increased bandwidth requirement proposed by the petitioner. While the Board did not change theories midstream or depart from a construction it previously adopted, it is still difficult to imagine either party anticipating that this agreed-upon matter of claim construction was a moving target. And, unlike with disputed terms, it is unreasonable to expect parties to brief or argue agreed-upon matters of claim construction. This is particularly true here given that a separate agency (the Commission) had already adopted the increased bandwidth requirement for the claim term. Accordingly, under the circumstances of this case, the Board needed to provide notice of and an adequate opportunity to respond to its construction.

II

As a threshold matter, Intel argues that Qualcomm’s challenge fails because, assuming a procedural violation, Qualcomm has not demonstrated prejudice. Appellee’s Br. 29–30. Next, Intel argues that the oral hearing provided

Qualcomm notice and an opportunity to respond. Lastly, Intel argues Qualcomm’s option to move for rehearing provided an adequate opportunity to respond. *Id.* at 27–29. We take each argument in turn.

A

Assuming *arguendo* that Qualcomm must show prejudice,³ it has made an adequate showing. Qualcomm argued throughout the IPR proceedings that the prior art did not disclose the increased bandwidth requirement. *See, e.g.*, J.A. 1425, 1438–39, 7766–67, 7780–81, 7853–57. By removing that requirement, the Board eliminated an element on which Intel bore the burden of proof. The Board’s decision to eschew an agreed-upon requirement without notice prejudiced Qualcomm. Further, without notice of the Board’s elimination of the increased bandwidth requirement, Qualcomm had no reason to brief that requirement or establish an evidentiary record supporting it, particularly given the limited word count and breadth of issues in these IPRs. Thus, Qualcomm has made an adequate showing of prejudice.

B

Likewise, we are not persuaded that the hearing provided adequate notice. The single question-answer exchange between one judge and Intel regarding the increased bandwidth requirement, followed by that judge’s offhand comment that the panel would “think about whether that’s necessary,” did not *provide* Qualcomm notice that the Board might depart from the increased bandwidth requirement. *See* J.A. 1649:1–17; 1651:17–20. The

³ Intel cites *WesternGeco*, 889 F.3d at 1329, to assert Qualcomm’s APA challenge requires a showing of prejudice. *See* Appellee’s Br. 29. We need not address whether *WesternGeco* requires such a showing because Qualcomm was prejudiced here.

Board did not announce a construction, criticize the parties' agreed-upon requirement, ask any follow-up questions to Intel, or ask any related questions to Qualcomm. Even after the hearing, the Board *sua sponte* issued an order requesting additional briefing on a completely separate claim term with no mention of the agreed-upon increased bandwidth requirement. Under the facts of this case, the Board's actions failed to provide notice that it would depart from the agreed-upon increased bandwidth requirement.

Intel likens this case to *TQ Delta, LLC v. DISH Network LLC*, in which we held the patent owner had adequate notice of the Board's *sua sponte* construction of a claim term in its final written decision. 929 F.3d 1350, 1354–56 (Fed. Cir. 2019). There, however, the patent owner argued for a narrow interpretation for the term in its Patent Owner Response and, during the hearing, the Board “repeatedly asked [the patent owner] about its narrow construction of the term and explained that it disagreed with [its] interpretation.” *Id.* at 1355–56. Thus, the patent owner's own pre-argument filing recognized a dispute as to the term which was explored extensively at oral argument. Neither of these circumstances is present here. Intel and Qualcomm agreed upon the increased bandwidth requirement throughout the briefing, and there was no exchange at all between the Board and Qualcomm about the increased bandwidth requirement. The comparison to this case is further misplaced given the Board's day-after order requesting additional briefing on completely unrelated claim language.

The hearing also did not provide an adequate opportunity to respond. *Dell Inc. v. Accelaron, LLC* is instructive. There, the parties disputed whether Hipp, a key prior art reference, anticipated several challenged claims. 818 F.3d at 1296. Although the parties had briefed anticipation, the petitioner asserted for the first time at the hearing that Figure 12 of Hipp disclosed a required element of a challenged claim. *Id.* at 1297, 1301. Based upon this assertion

at the hearing, the Board's final written decision found that Hipp's Figure 12 anticipated the challenged claim. *Id.* at 1298. Although the patent owner was questioned about Figure 12 at the hearing, we held the patent owner did not have an adequate opportunity to respond because the hearing presented "no opportunity for [the patent owner] to supply evidence, whether expert or lay or documentary evidence." *Id.* at 1301.

The hearing in this case provided even less opportunity to respond. Unlike the issue of anticipation in *Dell*, the parties here agreed on the increased bandwidth requirement. And at the hearing, the Board failed to provide any theory or rationale for its departure from the agreed-upon requirement to which Qualcomm could have responded. The Board never asked Qualcomm any question of any kind about the requirement. Nor did the Board ask for additional briefing after the hearing, though it did so with respect to another claim construction issue discussed at the hearing. Qualcomm was given no opportunity to supply any evidence, whether expert or documentary, to address why a skilled artisan would have understood "plurality of carrier aggregated transmit signals" to require signals that increase bandwidth. See Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,768 (Aug. 14, 2012) ("No new evidence or arguments may be presented at the oral argument."); cf. *Dell*, 818 F.3d at 1301. Indeed, Qualcomm stated that it would have wanted to introduce extrinsic evidence into the record, including LTE specifications referenced in the specification, to support the increased bandwidth requirement. See '675 patent at 2:63–67; Oral Argument at 10:40–11:07, http://oralarguments.cafc.uscourts.gov/default.aspx?fl=20-1589_02032021.mp3. Accordingly, the hearing did not provide an adequate opportunity to respond.

C

Intel finally argues that Qualcomm’s opportunity to seek rehearing after it received notice through the final written decisions provided an adequate opportunity to respond. We do not agree. Intel’s position would effectively require an aggrieved party to seek rehearing before appealing a Board’s failure to provide notice and an opportunity to respond. We have generally held that a party need not seek rehearing in order to seek relief from a Board decision on appeal. *See In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1377 (Fed. Cir. 2016) (“Nowhere does the statute granting parties the right to appeal a final written decision in an IPR require that the party first file a request for rehearing before the Board”); *see also* 35 U.S.C. § 141(c) (“A party to an inter partes review . . . who is dissatisfied with the final written decision of the [Board] under section 318(a) . . . may appeal the Board’s decision”). We have also vacated Board decisions for violating a patent owner’s procedural rights where the patent owner never requested a rehearing. *See, e.g., Dell*, 818 F.3d at 1301–02 (vacating a Board decision for violating a patent owner’s procedural rights, even though the patent owner did not request rehearing); *In re NuVasive, Inc.*, 841 F.3d 966, 975 (Fed. Cir. 2016) (same). Finally, we “are not free to impose an exhaustion requirement as a rule of judicial administration where the agency action has already become ‘final’” under the APA.⁴ *Darby v. Cisneros*, 509 U.S. 137, 154 (1993).

⁴ The Board’s final written decisions in each IPR are final for APA purposes because they terminated the IPR proceeding and the Board made patentability determinations that affect the patent rights of Qualcomm. *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1361 (Fed. Cir. 2018) (“[A]gency action is final when the agency’s decision-making process is complete and the action determines legal

Though it may have been a more efficient use of resources had Qualcomm sought rehearing, Qualcomm was not required to do so. Accordingly, we reject Intel's argument that Qualcomm's failure to seek rehearing dooms its procedural challenge.

Under the facts of this case, Qualcomm did not receive notice or an opportunity to be heard regarding the Board's construction that departed from the agreed-upon increased bandwidth requirement. Thus, the Board violated Qualcomm's procedural rights under the APA.

III

We next turn to Qualcomm's claim construction challenge. We review questions of claim construction de novo. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1346 (Fed. Cir. 2015). When construing a means-plus-function claim, we first "identify the claimed function," and then "determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Id.* at 1351.

Qualcomm challenges the Board's construction of the power tracker limitation in claim 28, which both parties agree is a means-plus-function term. The Board determined the function to be, in short, "determining a single power tracking signal." *See, e.g.*, J.A. 349. The Board identified power tracker 582, which it found to be a circuit rather than a computer, as the corresponding structure. *Id.* Qualcomm argues that the corresponding structure, in addition to the integrated circuit on which the power tracker may be implemented, must include algorithms for programming that circuit. Appellant's Br. 35. We do not agree.

rights or obligations or otherwise gives rise to legal consequences." (internal quotations omitted)).

In *WMS Gaming, Inc. v. International Game Technology*, we held that a “general purpose computer, or microprocessor, programmed to carry out an algorithm creates ‘a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software.’” 184 F.3d 1339, 1348 (Fed. Cir. 1999). Thus, “[i]n a means-plus-function claim in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm.” *Id.* at 1349. In *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, we further explained that “[b]ecause general purpose computers can be programmed to perform very different tasks in very different ways, simply disclosing a computer as the structure designated to perform a particular function does not limit the scope of the claim to ‘the corresponding structure, material, or acts’ that perform the function, as required by section 112 paragraph 6.” 521 F.3d 1328, 1333 (Fed. Cir. 2008).

We clarified the scope of the algorithm requirement in *In Re Katz Interactive Call Processing Patent Litigation*, holding that it does not apply where the claimed function can be achieved by any general-purpose computer without special programming. 639 F.3d 1303, 1316 (Fed. Cir. 2011). Since then, we have consistently held that if a recited function requires special programming, then the specification must disclose the algorithm that the computer performs to accomplish that function. *See, e.g., Rain Computing, Inc. v. Samsung Elecs. Am., Inc.*, 989 F.3d 1002, 1007 (Fed. Cir. 2021). We have also extended this algorithm requirement to cases in which the corresponding structure amounts to nothing more than a general-purpose computer. *See HTC Corp. v. IPCom GmbH & Co., KG*, 667 F.3d 1270, 1280 (Fed. Cir. 2012) (processor and transceiver

amounted to “nothing more than a general-purpose computer”). But our case law “does not require a specific algorithm when the identified structure is not a general-purpose computer or processor.” *Neuro Corp. v. Bos. Sci. Corp.*, 955 F.3d 35, 42–43 (Fed. Cir. 2020) (discussing *Aristocrat*, 521 F.3d at 1333).

Qualcomm does not argue that power tracker 582 is a general-purpose computer or microprocessor, nor can it. The intrinsic record reveals that power tracker 582 is circuitry. See ’675 patent at 8:42 (“allow for a more efficient power tracking circuitry”), 13:32–35 (“The power tracker . . . may be implemented on an IC [integrated circuit], an analog IC, an RFIC, a mixed-signal IC, an ASIC, a printed circuit board (PCB), an electronic device, etc.”). During prosecution, the applicants asserted that “a power tracker . . . [is] understood by persons of ordinary skill in the art to include a range of specific structural circuits” J.A. 2231. The Board’s unchallenged construction of “power tracker” in claim 1 to mean “component in a voltage generator that computes the power requirement” further supports that power tracker 582 is more than a generic computer. See, e.g., J.A. 347. Because power tracker 582 is not a general-purpose computer, it does not trigger the algorithm requirement of *WMS Gaming*.

Qualcomm asks us to extend the algorithm requirement to circuitry. See Oral Argument at 20:14–40 We decline to do so. The reasoning for the algorithm requirement of *WMS Gaming* does not apply to functions implemented through circuitry. Unlike a general-purpose computer or microprocessor, circuitry does not “perform very different tasks in very different ways.” *Aristocrat*, 521 F.3d at 1333. Nor does circuitry require special programming to perform particular functions. Cf. *WMS Gaming*, 184 F.3d at 1348. Circuitry therefore provides structure that necessarily limits the scope of a claim without the aid of special programming. Our holding is consistent with our prior precedent. See *Neuro*, 955 F.3d at 35, 42–43 (“*Neuro* argues that the

asserted patent specifications' disclosure of a signal generator as the structure for this limitation should end the inquiry. We agree."). Also, Qualcomm's proposed extension would jeopardize a plethora of patents in the electrical arts that rely on circuitry as the corresponding structure for their means-plus-function claim limitations. Accordingly, we see no error with the Board's construction of the power tracker limitation in claim 28.

CONCLUSION

Because the Board failed to provide Qualcomm adequate notice of and opportunity to respond to its *sua sponte* claim construction, we vacate the Board's final written decisions and remand for further proceedings.

VACATED AND REMANDED

COSTS

No costs.