

Filed on behalf of Apple Inc.
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

v.

THETA IP, LLC.,
Patent Owner

Case No. IPR2024-00819
Patent No. 11,564,164

PETITIONER APPLE INC.'S NOTICE OF APPEAL

via E2E
Patent Trial and Appeal Board

via Email efileSO@uspto.gov
Director of the United States Patent and Trademark Office

via CM/ECF
United States Court of Appeals for the Federal Circuit

Pursuant to 35 U.S.C. §§ 141(c), 319 and 37 C.F.R. 90.2(a), Petitioner

Apple Inc. appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision in Case No. IPR2024-00819 entered on November 25, 2025 (Paper 32) (the “Final Written Decision”) by the Patent Trial and Appeal Board, and from all underlying orders, decisions, rulings, and opinions related thereto and included therein. This notice is timely filed within 63 days of the Final Written Decision. 37 C.F.R. § 90.3(a)(1); *see also* 35 U.S.C. § 142; Fed. R. App. P. 15(a)(1); Fed. Cir. R. 15(a)(1). A copy of the Final Written Decision being appealed is attached as Exhibit A.

For the limited purpose of providing the Director with the information required by 37 C.F.R. § 90.2(a)(3)(ii), issues on appeal may include but are not limited to:

(i) the Board’s determination that Apple Inc. did not establish that claim 20 of U.S. Patent No. 11,564,164 (“the ’164 patent”) is unpatentable over “Adaptive Analog IF Signal Processor for a Wide-Band CMOS Wireless Receiver” by Behbahani et al. (“Behbahani”) in view of “A 2.4-GHz Low-IF Receiver for Wideband WLAN in 0.6μm CMOS – Architecture and Front-End” by Behbahani et al (“Leete”) and “A Broad-Band Tunable CMOS Channel-Select Filter for a Low-IF Wireless Receiver” by Behbahani et al. (“Tan”).

(ii) all of the Board’s subsidiary findings supporting its determination that Apple did not establish that claim 20 of the ’164 patent are unpatentable under 35

U.S.C. § 103, the Board's failure to consider evidence of record properly, the Board's legal errors; the Board's findings that conflict with the evidence of record and are not supported by substantial evidence; and

(iii) all other issues decided adversely to Apple in any orders, decisions, rulings, or opinions in this proceeding.

Apple reserves the right to challenge any finding or determination-implicit or explicit-supporting or relating to the issues above.

Simultaneously with this submission to the Board, Apple is filing a true and correct copy of this Notice of Appeal with the Director of the United States Patent and Trademark Office and a true and correct copy (or copies) of the same, along with the required filing fee, with the Clerk of the United States Court of Appeals for the Federal Circuit as set forth in the accompanying Certificate of Filing.

Dated: January 23, 2026

Respectfully submitted,

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ATTORNEYS FOR PETITIONER

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 90.2(a)(1) and 104.2(a), I hereby certify that, in addition to being filed electronically through the Patent Trial and Appeal Board's End to End (PTAB E2E) system, a true and correct original version of the foregoing Petitioner's Notice of Appeal is being filed via Email on January 23, 2026, with the Director of the U.S. Patent and Trademark Office at efileSO@uspto.gov.

Pursuant to 37 C.F.R. 90.2(a)(2) and Federal Circuit Rule 15(a)(1), and Rule 52(a), (e), I hereby certify that a true and correct copy of the foregoing Petitioner's Notice of Appeal is being filed in the United States Court of Appeals for the Federal Circuit using the Court's CM/ECF filing system on January 23, 2026, and the filing fee is being paid electronically using pay.gov.

I hereby certify that on January 23, 2026, I caused a true and correct copy of the foregoing Petitioner's Notice of Appeal to be served via email on the following counsel for Patent Owner:

Aaron R. Hand (ahand@bdiplaw.com)

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BDIP_ThetaIP-Apple@bdiplaw.com

Dated: January 23, 2026

Respectfully submitted,

BY: /s/ *Paul R. Hart*

Paul R. Hart Reg. No. 59,646

COUNSEL FOR PETITIONER

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

THETA IP, LLC,
Patent Owner.

IPR2024-00819
Patent 11,564,164 B2

Before KARA L. SZPONDOWSKI, AARON W. MOORE, and
RUSSELL E. CASS, *Administrative Patent Judges*.

CASS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
Denying Patent Owner's Motion to Strike
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

In this *inter partes* review, Apple Inc. (“Petitioner”) challenges the patentability of claims 1–20 (the “challenged claims”) of U.S. Patent No. 11,564,164 B2 (Ex. 1001, “the ’164 patent”), which is assigned to Theta IP, LLC (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* review. For the reasons discussed below, Petitioner has proven by a preponderance of the evidence that claims 1–19 are unpatentable, and has not proven that claim 20 is unpatentable.

B. Procedural History

In the Petition, Petitioner challenged claims 1–20 of the ’164 patent. Paper 1 (“Pet.”) 1.

Following the Petition, Patent Owner filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). With our permission, Petitioner filed a Preliminary Reply to the Preliminary Response, and Patent Owner filed a Sur-reply to Petitioner’s Preliminary Reply. Papers 10, 11. We instituted trial on all challenged claims. Paper 12 (“Inst. Dec.”) 47. Following institution, Patent Owner filed a Response (Paper 16, “PO Resp.”), Petitioner filed a Reply (Paper 18, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 24, “PO Sur-reply”). Petitioner also filed a Motion to Strike (Paper 23 (“Motion”)), Patent Owner filed an Opposition (Paper 27 (“Opp. Mot.”)), and Patent Owner filed a Reply (Paper 27).

Petitioner submitted a Declaration of Asad Abidi, Ph.D., with its Petition (Ex. 1003, “Abidi Decl.”) and another Declaration from Dr. Abidi in

opposition to the Patent Owner Response (Ex. 1042, “Supp. Abidi Decl.”). Patent Owner submitted a Declaration of Lawrence E. Larson, Ph.D. (Ex. 2020, “Larson Decl.”) with its Patent Owner Response. An oral hearing was held on August 27, 2025, a transcript of which appears in the record. Paper 31 (“Tr.”).

C. Applied References

Petitioner relies upon the following references:

Behbahani et al., *Adaptive Analog IF Signal Processor for a Wide-Band CMOS Wireless Receiver*, 36 IEEE Journal of Solid-State Circuits 1205 (Aug. 2001) (Ex. 1004, “Behbahani”);

Behbahani et al., *A 2.4-GHz Low-IF Receiver for Wideband WLAN in 0.6 μm CMOS—Architecture and Front-End*, 35 IEEE Journal of Solid-State Circuits 1908 (Dec. 2000) (Ex. 1005, “Leete”); and

Behbahani et al., *A Broad-Band Tunable CMOS Channel-Select Filter for a Low-IF Wireless Receiver*, 35 IEEE Journal of Solid-State Circuits 476 (Apr. 2000) (Ex. 1006, “Tan”).

Pet. 11, 79.

D. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–20 of the ’164 patent based on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–20	103(a) ¹	Behbahani, Leete, Tan

Pet. 11.

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included revisions to 35 U.S.C. § 103 that became effective

E. Real Parties in Interest

Petitioner identifies itself as the real party-in-interest. Pet. 77. Patent Owner identifies Theta IP, LLC as the real party in interest. Paper 3, 2.

F. Related Proceedings

The parties identify the following district court case involving the '164 patent: *Theta IP, LLC v. Apple Inc.*, No. 6:23-cv-00314 (W.D. Tex.). Pet. 77; Paper 3, 2.

G. The '164 Patent (Ex. 1001)

The '164 patent is titled “Power Dissipation Reduction in Wireless Transceivers” and is generally directed to “[m]ethods and circuits for reducing power dissipation in wireless transceivers and other electronic circuits and systems.” Ex. 1001, codes (54), (57). The '164 patent states that, in wireless networking, connectivity to the Internet can result in a corresponding drain on battery life in portable devices, such as notebooks and handheld computers. *Id.* at 1:27–38. The problem is further described as follows:

One reason why this power drain is high is that electronic circuits are typically designed to function properly under worst-case operating conditions. For a wireless transceiver, the worst case condition is when a desired signal reception strength is low, while other transceivers or nearby electronic equipment generate interfering signals and other spurious noise.

But a wireless transceiver does not always operate in these worst-case conditions. For example, a base station, router or access point may be nearby such that the received signal is strong. Also, there may be no interfering signals, or they may be relatively weak. In these situations, receiver

after the filing of the application that led to the '164 patent. Therefore, we apply the pre-AIA version of 35 U.S.C. § 103.

circuit currents can be reduced below what is necessary for the worst case condition. If this is done, power dissipation is reduced, and battery life is increased.

Id. at 1:39–53.

The '164 patent describes embodiments that “use bias current reduction, impedance scaling, and gain changes either separately or in combination to reduce power dissipation.” Ex. 1001, code (57). It goes on to explain that, for example, “bias currents are reduced in response to a need for reduced signal handling capability, impedances are scaled thus reducing required drive and other bias currents in response to a strong received signal, or gain is increased and impedances are scaled in response to a low received signal in the presence of no or weak interfering signals.” *Id.*

Figures 2A and 2B, reproduced below, “illustrate examples of desired and interfering signals and noise that may be received by a circuit in a wireless receiver.” Ex. 1001, 3:22–24.

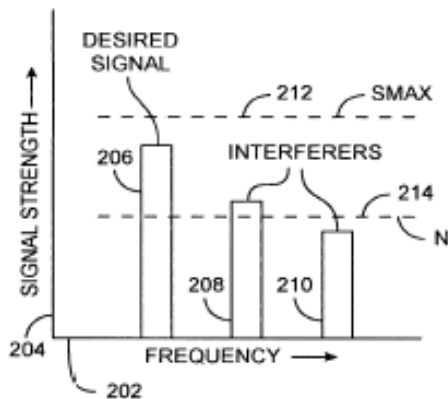


FIG. 2A

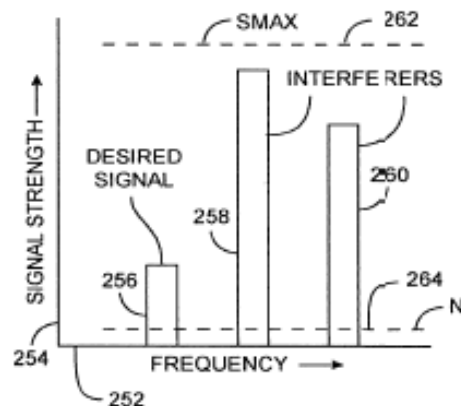


FIG. 2B

Figures 2A and 2B depict examples of desired signals. *Id.* at 5:36. Figure 2A shows received desired signal 206 is large in comparison to interfering signals 208 and 210, and is considered the best-case input signal. *Id.* at

5:41–42, 6:19–20. Figure 2B shows desired signal 256 is relatively weak compared to large interferers 258 and 260, and is considered the worst-case input signal. *Id.* at 5:59–61, 6:11–12.

Figure 6, reproduced below, “is an example of how a circuit’s impedances may be scaled to reduce drive currents, and, depending on the circuit configuration used, to reduce associated bias currents as well.”

Ex. 1001, 7:52–54.

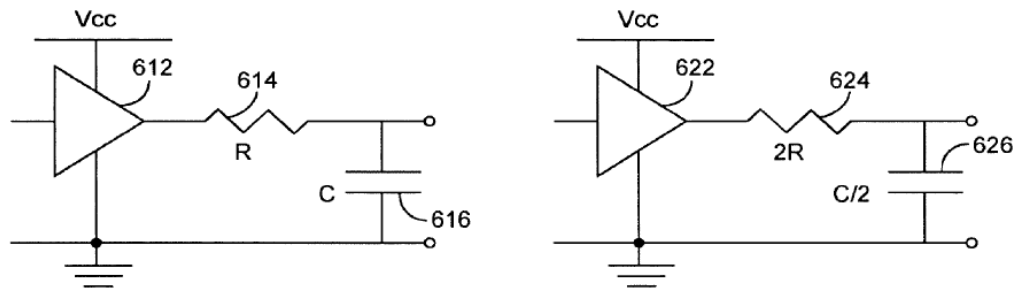


FIG. 6

On the left, Figure 6 shows driver 612 with load R 614 and C 616. *Id.* at 7:55. On the right, Figure 6 shows driver 622 driving an impedance of 2R 624 and C/2 626. *Id.* at 7:55–57. The frequency response of the circuits are the same, “[b]ut the impedance of the load seen by driver 622 is double that seen by 612, thus the output current required by the driver 622 is reduced by one-half.” *Id.* at 7:57–60.

Figure 8A, reproduced below, “is a block diagram of a functional block 820 and optional gain element 810 in accordance with an embodiment of the present invention.” Ex. 1001, 8:28–30.

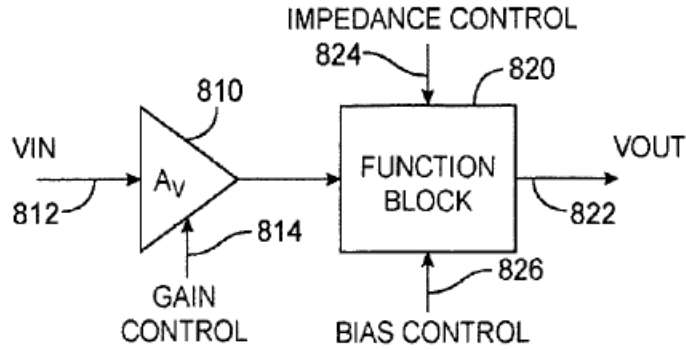


FIG. 8A

Figure 8A shows functional block 820 with bias control lines 826 and impedance control lines 824, and optional gain block 810 with gain control lines 814. Functional block 820 “may be a filter, mixer, amplifier, or other circuit or circuits in a wireless transceiver or other electronic circuits or system.” *Id.* at 8:31–33.

H. Illustrative Claims

Of the challenged claims, claims 1, 5, 10, 15, and 20 are independent.

Claim 1 is illustrative, and is reproduced below.

[1(Pre)]: “1. A system for power dissipation reduction in a battery powered portable wireless communication device, the system comprising:”

[1(a)]: “a battery powered portable wireless communication device, the wireless communication device comprising: a battery configured to supply power for the battery powered portable wireless communication device;”

[1(b)]: “a wireless receiver configured to receive a wireless signal, wherein the wireless signal has a desired signal and an interferer signal,”

[1(c)]: “the wireless receiver having a plurality of circuits that includes circuits in a receiver signal path,”

[1(d)]: “the plurality of circuits designed to operate under a worst-case operating condition where the corresponding

power drain from the battery is a maximum, thereby consuming maximum power from the battery; and”

[1(e)]: “a monitoring circuit associated with the battery powered portable communication wireless device configured to monitor the signal strength of the interferer signal,”

[1(f)]: “wherein a power dissipation control circuit in the wireless receiver causes a bias current to be dynamically adjusted in one or more of the circuits in the receiver signal path as the monitored signal strength of the interferer signal varies during operation when the operating condition is better than the worst-case operating condition, enabling a power dissipation reduction in the wireless receiver, providing a corresponding reduction in a power consumption from the battery of the battery powered portable wireless communication device.”

Ex. 1001, 13:2–33 (bracketed paragraph identifiers added).

II. DISCUSSION

A. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art at the time of the alleged invention would have had “a master’s degree in electrical engineering or the equivalent, and two or more years of experience with wireless communication devices.” Pet. 10 (citing Ex. 1003 ¶¶ 27–29). Petitioner further states that “[a]dditional education or experience might substitute for the above requirements.” *Id.*

Relying on Dr. Larson, Patent Owner argues that a person of ordinary skill “would have at least a Bachelor’s Degree in Electrical or Electronics Engineering, along with ‘approximately five years of relevant experience in the design of transceiver architecture, RF systems and components, and analog and mixed signal circuits, as well as experience in control algorithms for such systems and familiarity with wireless standards.’” PO Resp. 36

(citing Ex. 2019 ¶ 51). Patent Owner further states that “[a]dditional education could substitute for experience and vice versa.” *Id.*

Petitioner thus proposes a Master’s degree with two years of experience, while Patent Owner proposes a Bachelor’s degree with five years of experience. At the institution stage, we did not see a material difference in the proposals given that both parties also indicate that more education could substitute for less experience and vice versa, and thus adopted Patent Owner’s proposal. Inst. Dec. 9. We requested that the parties address during trial if either believed that the choice of one proposal over the other would make a difference in the patentability analysis. *Id.* Neither party has done so. Accordingly, because nothing in the record persuades us that our preliminary finding in the Institution Decision was incorrect, and because neither party has challenged our finding, we maintain our adoption of Patent Owner’s proposed level of ordinary skill in the art.

B. Claim Construction

A claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b) (2024); *see also Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Petitioner “applies the plain and ordinary meaning of all claim terms as understood by a [person of ordinary skill in the art] for all claim terms” not expressly construed. Pet. 8. Petitioner provides the parties constructions for “impedance,” “worst-case,” and “best-case” from the related litigation in district court, and contends that the asserted challenges are satisfied under

either party's construction. *Id.* at 8–9. None of the disputes in this proceeding relate to the meaning of “impedance,” “worst-case,” or “best-case.”

The parties discuss the meaning of the term “dynamically adjusted/adjusting” in claims 1, 10, 15 and 20 and “dynamically varying” in claim. 5. Pet. 9–10; PO Resp. 37–45. Patent Owner argues that, in Patent Owner's litigation against Samsung in district court, the district court found that the dynamic limitation in patents related to the '164 patent should be given its “[p]lain-and-ordinary meaning, wherein the plain-and-ordinary meaning is ‘adjusting during operation based—at least in part—on information gained during operation.’” PO Resp. 38 (citing Ex. 2014, 2). Patent Owner further asserts that it advanced this construction to the district court in Patent Owner's litigation against Petitioner, that the district court in that case preliminarily determined that the dynamic limitation should be given its “[p]lain and ordinary meaning,” and that the district court “will likely issue an Order adopting the preliminary constructions.” *Id.* at 37 n.6, 38 (citing Ex. 2015, 2–3). The district court, as Patent Owner predicted, adopted Patent Owner's plain and ordinary meaning construction. Ex. 2025, 40, 47. Patent Owner contends that “to the extent the Board finds that it must interpret the claim terms, this interpretation reflects the plain meaning to one of ordinary skill, and is a proper way to read the ‘dynamically’ claim elements.” PO Resp. 38–39.

Petitioner “proposes this Board adopt Patent Owner's interpretation of the . . . dynamic limitations.” Pet. 9. In the Institution Decision, we noted that the parties appear to agree with this construction of the dynamic limitation proposed by Patent Owner and adopted by the district court, and applied that construction in our Decision. Inst. Dec. 12. Given that the

parties continue to agree on the construction of the dynamic limitation during the trial, we see no need to depart from the construction we adopted in our Institution Decision.

Patent Owner argues, as it did in the Preliminary Response, that Petitioner takes inconsistent positions in this IPR and in the related litigation regarding the claim interpretation of the dynamic limitations. PO Resp. 39–41. That is, Patent Owner argues that based on Petitioner’s disagreement in the related litigation with Patent Owner’s proposed construction, Petitioner has failed to meet the particularity requirements of 37 C.F.R. § 42.104(b)(3). *Id.*

In our Institution Decision, we disagreed with Patent Owner’s argument. *See* Inst. Dec. 12–13. Specifically, we determined that Patent Owner relied on a flawed understanding of the Board’s non-precedential decision in *Samsung Elecs. Am., Inc. v. Cobblestone Wireless LLC*, IPR2024-00319, Paper 16 at 13–23 (PTAB Jun. 24, 2024). *Id.* We explained that, in *Samsung*, the Board determined that Petitioner had failed to establish a reasonable likelihood of success because it offered and relied on a claim construction that it failed to support, disagreed with, and disparaged, and that this claim construction was not agreed upon by the patent owner or adopted by a district court. *Id.* (citing *Samsung*, Paper 16 at 13–23). Specifically, in *Samsung*, the petitioner argued and submitted testimony from its expert that its proffered construction was “expressly excluded” by the specification of the challenged patent and was “contrary to [the term’s] plain and ordinary meaning.” *Id.* at 13 (citing *Samsung*, Paper 16 at 14–15, 19–20). In reaching its decision in *Samsung*, we explained, the Board expressly “distinguish[ed] this case from situations where a petitioner relies on the ordinary meaning of a claim term, offers alternative

constructions of a claim term, or relies on a construction agreed upon by the parties in the proceeding at issue.” *Id.* (citing *Samsung*, Paper 16 at 21). Here, unlike in *Samsung*, Petitioner relies on the plain and ordinary meaning of the dynamic limitations, which was preliminarily and finally adopted by the district court in the related litigation. And, Patent Owner does not dispute that the dynamic limitations should be given their ordinary meaning in this proceeding. PO Resp. 38–41. We similarly found the facts in *Hologic, Inc. v. Enzo Life Sciences, Inc.*, IPR2018-00019, Paper 21 at 5–7 (PTAB Nov. 28, 2018), distinguishable from those presented here. Inst. Dec. 13; see *Hologic*, Paper 21 at 4 (stating, for example, that “[n]early every time [p]etitioner discusses its use in the [p]etition of [p]atent [o]wner’s proposed construction, [p]etitioner affirmatively disagrees with the construction it adopts”).

On November 3, 2025, the Director issued a precedential Decision in *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 at 3–5 (Director Nov. 3, 2025) (precedential), addressing situations where a petitioner takes different claim construction positions before the Board and a district court. In *Revvo*, the petitioner advanced its own proposed claim construction in a related district court litigation but adopted in the IPR a different proposed construction, which was advanced by the patent owner in the district court litigation. *Revvo* at 2. The Director acknowledged that “a petitioner is not necessarily precluded from arguing different claim construction positions before a district court and the Board,” but that if the petitioner does so, it “should explain sufficiently why the different positions are warranted.” *Id.* at 5. “For example,” the Director explained, “if a party advances a narrow construction in the district court and the district court declines to adopt the narrow construction, the party would have sufficient

reason for advancing the broader, court-adopted construction in a proceeding before the Board.” *Id.*

Here, as in the Director’s example, Petitioner advanced a narrower construction of the dynamic limitations before the district court, which the district court declined to adopt. Pet. 9; Ex. 2015; Ex. 2025, 31–47. Instead, the district court adopted a “plain-and-ordinary meaning” construction, which Patent Owner proposed. PO Resp. 38; PO Sur-reply 10 n.2; Ex. 2015; Ex. 2025, 31–47. In the Petition, Petitioner proposed applying the plain and ordinary meaning construction that had already been preliminarily adopted by the district court. *Compare* Pet. (filed May 1, 2024) *with* Ex. 2015 (preliminarily adopting plain and ordinary meaning construction on March 25, 2024). Applying *Revvo*, we find that Petitioner had a sufficient reason for advancing the broader, court-adopted construction in this IPR.

Thus, we give the dynamic limitation its plain-and-ordinary meaning, which is “adjusting during operation based—at least in part—on information gained during operation.”

The parties also address the meaning of the term “signal path.” Pet. 9–10; PO Resp. 41–45. In the related litigation, the parties disputed whether the “signal path” excludes the “digital signal processing” block, i.e., is limited only to analog components. Pet. 9. The district court preliminarily agreed with Patent Owner that “signal path” should be given its “plain and ordinary meaning” and should not be limited to analog components. Ex. 2015. After the Markman hearing, the district court maintained that the term “signal path” should be construed according to its plain and ordinary meaning, i.e., that “signal path” means the “path of the signal” and is not limited to analog signals. *See Theta IP, LLC v. Apple Inc.*,

Case No. 6:23-cv-00314-ADA, Dkt. No. 118, 11–14 (W.D. Tex.); Ex. 2025, 11–14 (cited at PO Sur-reply 10 n.2).

In our Institution Decision, we stated that we “will give the term ‘signal path’ its ‘plain and ordinary meaning’ and not limit it only to analog components, as the district court found and the parties agree.” Inst. Dec. 11. Given that the parties continue to agree on this point, we see no need to depart from the construction we adopted in our Institution Decision. Moreover, applying *Revvo*, we find that Petitioner had a sufficient reason for advancing the broader, court-adopted construction in this IPR for the same reasons as discussed above.

In this proceeding, the dispute between the parties concerns the application of this and the surrounding claim language (i.e., “in the receiver signal path,” “in the signal path”) to the disclosures in Behbahani. *See* PO Resp. 43–45. Therefore, we will provide further discussion in the context of the parties’ arguments regarding Behbahani below. However, we agree with Patent Owner’s plain reading of the claim language to the extent it requires adjusting an impedance and/or bias current of a circuit while it is in the signal path. *See Id.* at 50–51.

We determine that it is not necessary to provide an express interpretation of any other claim terms for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

C. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103 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.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness.² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result has weight in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b) (2020). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

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

² At this stage of the proceeding, Patent Owner has not presented objective evidence of non-obviousness.

D. Ground 1: Obviousness of Claims 1–20 Over Behbahani in View of Leete and Tan

Petitioner contends that claims 1–20 would have been obvious over Behbahani in view of Leete and Tan. Pet. 11, 18–73; Pet. Reply. Patent Owner disagrees. PO Resp. 45–69; PO Sur-reply.

1. Overview of Behbahani (Ex. 1004)

Behbahani is titled “Adaptive Analog IF Signal Processor for a Wide-Band CMOS Wireless Receiver” and generally describes a receiver that implements adaptive dynamic range (“DR”) in the IF section. Ex. 1004, 1205. Behbahani explains that:

Most wireless systems are designed for the worst case; that is, the dynamic range is specified for the desired signal at a minimum detectable level, accompanied by the largest anticipated interferers. In practice, the receiver only infrequently needs this high instant DR. DR is obtained at the expense of a disproportionate rise in power consumption: doubling the power consumed by a circuit lowers its noise floor by 3 dB with constant IP3, thus raising its spurious-free dynamic range (SFDR) by only 2 dB. An important idea here, which has also been noted elsewhere [4], is that providing no more than the required DR at any given time lowers the *average* power consumption.

Id.

Figure 2, reproduced below, shows a block diagram of the receiver.

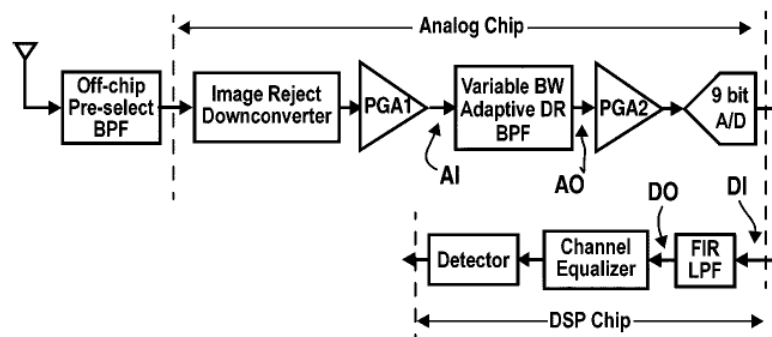


Fig. 2. Block diagram of complete WLAN receiver.

Ex. 1004, 1206. Figure 2 depicts a “Block diagram of [a] complete WLAN receiver,” and focuses on the IF section of the receiver, which follows image rejection, and includes a prefilter programmable gain amplifier (“PGA1”), Variable BW Adaptive DR Bandpass Filter (“BPF”), post-filter PGA (“PGA2”), and a continuously variable gain amplifier (“VGA”). *Id.* at 1205–06. Behbahani states that Figure 2 “is taken from [Tan]” and “[t]he front-end and image-reject downconversion sections of the RX are described in [Leete].” *Id.* Behbahani also states that “[t]he details of the BPF design are presented elsewhere,” and cites to Tan. *Id.* at 1210.

Figure 3 of Behbahani, which depicts three different scenarios for received signals, is reproduced below.

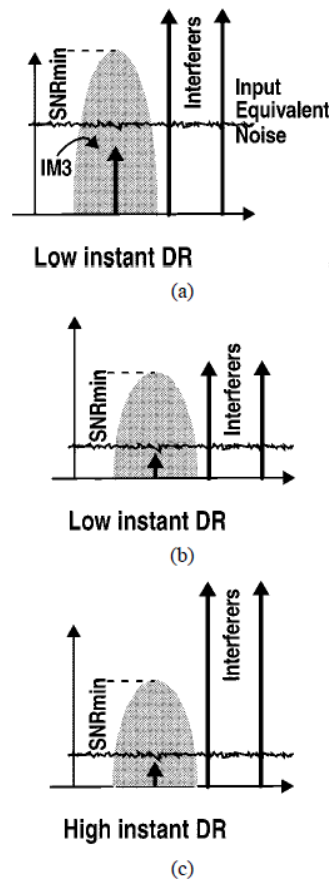


Fig. 3. Three different scenarios for received signals. (a) Strong desired signal. High noise can be tolerated. (b) Weak desired signal and weak interferers. Low linearity can be tolerated. (c) Weak desired signal and large interferers. Low noise and high linearity is required.

Ex. 1004, 1206. Figure 3 depicts three scenarios for received signals. *Id.* Figure 3(a) depicts a strong desired signal where high noise can be tolerated. *Id.* Figure 3(b) depicts a weak desired signal and weak interferers, where low linearity can be tolerated. *Id.* Figure 3(c) depicts a weak desired signal and large interferers where low noise and high linearity is required, and is the “worst-case.” *Id.*

Behbahani describes two types of adaptive DR, sliding and step, and states that the circuits comprising the receiver shown in Figure 2 use both types. Ex. 1004, 1206. “In sliding DR, the *instant* DR of the RX is constant but slides to best accommodate the input signal,” whereas in step DR, “the DR may be *stepped up* by substituting a scaled version of a nominal circuit.” *Id.*

Figure 4 of Behbahani, reproduced below, depicts an illustration of how to achieve slide and step DR.

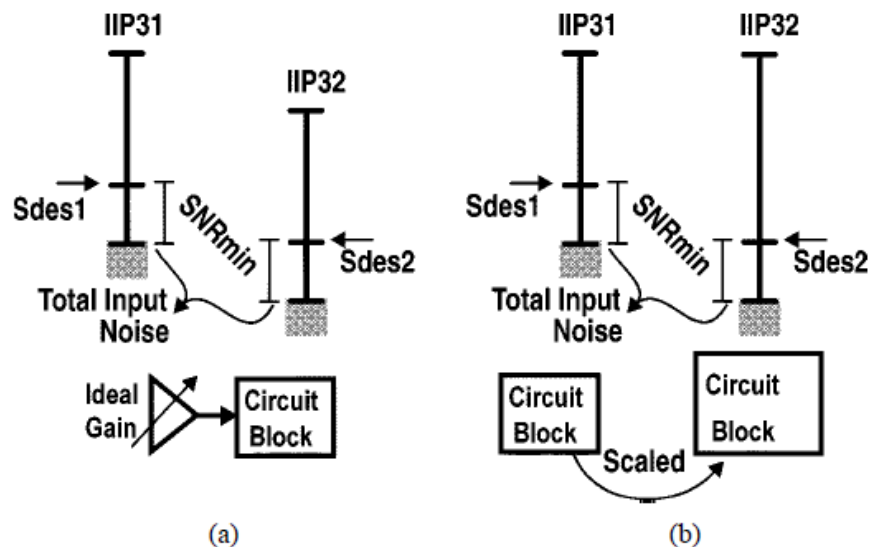


Fig. 4. An illustration of how to achieve: (a) slide DR with preamplification and (b) step DR by substitution of a scaled circuit block.

Ex. 1004, 1206. “Figure 4(a) shows how, by adding a gain stage in front of a noisy and nonlinear circuit block, input referred noise and IIP3 drop by the

gain of the amplifier” which “slides down the entire DR and enables detection of a weaker signal accompanied by weak interferers.” *Id.* Figure 4(b) shows scaling up all the transistors in a circuit and scaling down all resistors by the same factor, i.e., substituting a scaled version of a nominal circuit. *Id.* Behbahani states that Figure 4(b) results in lowering input mean square noise and raising bias current proportional to the scale factor, while IIP3 remains unchanged, allowing the scaled circuit to pass a weak desired signal accompanied by strong interferers. *Id.*

Behbahani explains that “[t]he on-chip filter is usually the bottleneck to achievable DR in a fully integrated RX.” Ex. 1004, 1207. In the scenario shown in Figure 4(b), “[t]wo filters are implemented with the same topology, but one, scaled up to consume 10x more power, offers 10x lower mean square noise but the same linearity.” *Id.* An algorithm, described below, senses which conditions are present and in the first two instances (shown in Figures 3(a) and 3(b)), employs a BPF dissipating low power. *Id.* In the instance shown in Figure 3(b), i.e., the worst-case scenario, “a high-power scaled filter is switched in raising total DR.” *Id.* In the algorithm, “[s]ignal power is sensed at four points along the IF strip (Fig. 2): input and output of the analog BPF and input and output of the digital channel select filter.” *Id.* “These measured signal levels indicate how much of the received signal is being rejected, respectively, by the analog filter and the digital filter.” *Id.* This process is further described as follows;

The signal at the output of the digital filter (point in Fig. 2) is only the desired channel, with possibly some possible IM3 from adjacent interferers. By comparing the signal level at the output of the analog BPF (A_O) and at the input of the A/D (D_I), the postfilter gain is measured. Then, by comparing the signal level at the input and the output of the digital filter (D_I and D_O), the relative strength of the out-of-channel signal that passes

through the analog filter is calculated. The signal level at A_I and A_O is a measure of the out-of-band interferers being rejected by the analog BPF. If the *desired* signal at the output of the analog BPF is strong, as measured by $\text{Power}_{D_O} - \text{Gain}_{\text{Post-analog-filter}}$, the scenario is as shown in Fig.3(a). If the total signal power is comparable at A_I and A_O , and at D_I and D_O , the condition is like Fig. 3(a) or (b). In both cases, the required instant DR is low. If the signal levels are significantly different at either of the above pairs of nodes (A_I and A_O and D_I and D_O) and there is a weak signal at D_O , the condition must be the one shown in Fig. 3(c).

Id.

2. Overview of Leete (Ex. 1005)

Leete is titled “A 2.4-GHz Low IF Receiver for Wideband WLAN in 0.6 μm CMOS – Architecture and Front-End,” and generally describes the “2.4-GHz front-end and the first downconversion section of a fully integrated low-IF receiver.” Ex. 1005, 1908.

Figure 1, reproduced below, shows a block diagram of the dual-conversion low-IF receiver.

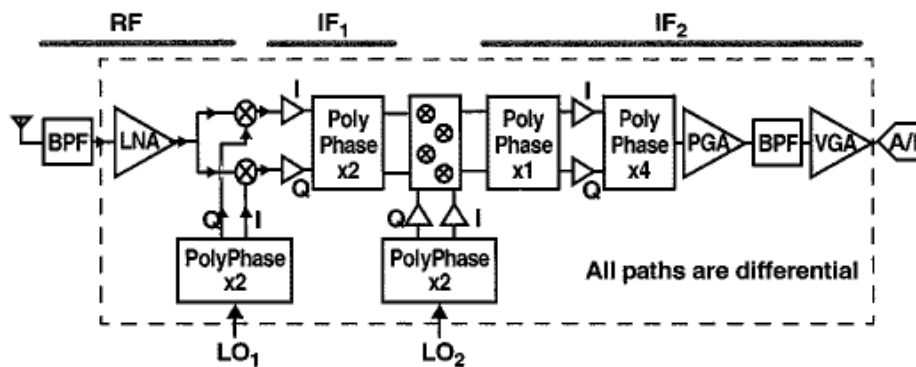


Fig. 1. Receiver block diagram.

Ex. 1005, 1909. Figure 1 shows a receiver block diagram with RF front-end comprising a low noise amplifier (LNA) and an RF quadrature mixer, which downconverts the RF signal to the first IF (IF1). *Id.* at 1908–09.

3. *Overview of Tan (Ex. 1006)*

Tan is titled “A Broad-Band Tunable CMOS Channel-Select Filter for a Low-IF Wireless Receiver,” and generally describes “a broad-band bandpass filter (BPF) designed as a channel-select filter for wireless applications” that “is implemented as a low-pass filter (LPF) in series with a high-pass filter (HPF) for lower power consumption compared to true BPF.” Ex. 1006, 476. Tan’s Figure 1, which shows a block diagram of a receiver, is similar to Behbahani’s Figure 2, reproduced above. *Id.* at 477. Tan describes the “Variable BW BPF” block. *Id.* at 476–88.

Figure 16, reproduced below, depicts a chip microphotograph of variable-gain BPF.

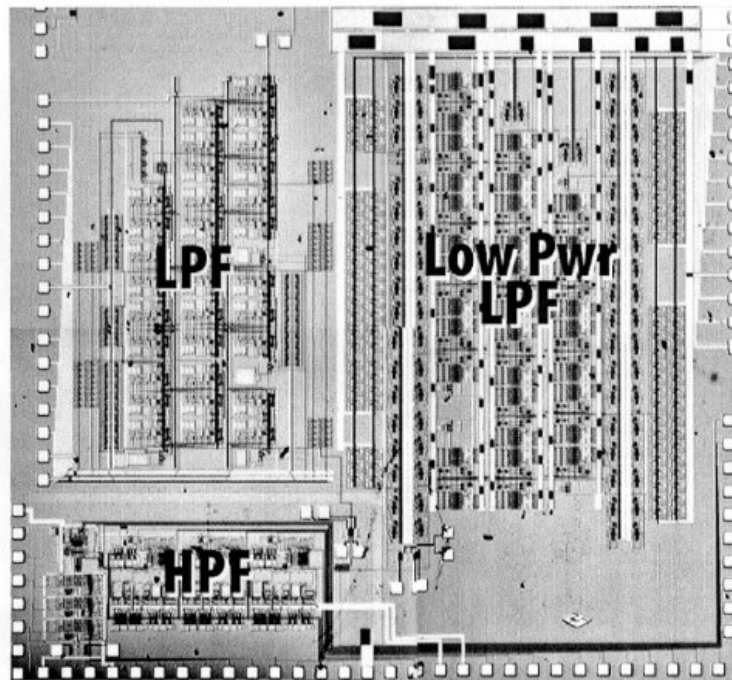


Fig. 16. Chip microphotograph.

Ex. 1006, 486. Figure 16 depicts a chip microphotograph of variable-gain BPF, including LPF, HPF, and Low Pwr LPF. *Id.*

4. *Analysis of Independent Claim 1*

- a) *[1(Pre)]*: “1. A system for power dissipation reduction in a battery powered portable wireless communication device, the system comprising:”

Petitioner argues that, to the extent the preamble is limiting, Behbahani discloses it. Pet. 18. Petitioner asserts that “Behbahani’s focus is saving power in a wireless device, teaching that its wireless receiver implements an ‘adaptive dynamic range’ method to save power by decreasing the dynamic range when conditions are better than worst case.” *Id.* at 19 (citing Ex. 1004, 1205). According to Petitioner, one of ordinary skill “would have understood that the reference fairly conveys a wireless transceiver intended for a battery-operated wireless communication device and would have been motivated to implement the described receiver in such a device.” *Id.* (citing Ex. 1003 ¶¶ 49–59). Petitioner further contends that one of ordinary skill “would have understood that Behbahani’s method for lowering the average power consumption in the receiver results in power dissipation reduction, and a corresponding reduction in a drain on battery life of the battery powered portable wireless device.” *Id.* at 21–22 (citing Ex. 1003 ¶ 59).

Patent Owner does not present arguments addressing Petitioner’s showing as to the preamble. *See* PO Resp. 45–71.

After having considered the full trial record, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Behbahani and Leete teaches the preamble of claim 1, for the reasons set forth by Petitioner.³

³ Because we are persuaded that Petitioner has shown that Behbahani teaches the subject matter recited in the preamble, we need not decide

- b) [1(a)]: “a battery powered portable wireless communication device, the wireless communication device comprising: a battery configured to supply power for the battery powered portable wireless communication device;”

Petitioner argues that, as discussed above with respect to the preamble, one of ordinary skill “would have understood that Behbahani’s receiver fairly conveys a wireless receiver intended for a battery-operated transceiver (i.e., wireless communication device), and would have been motivated to implement the described receiver in such a device.” Pet. 22 (citing Ex. 1003 ¶ 61). “Further,” Petitioner contends, one of ordinary skill “would have understood and found obvious that ‘a battery configured to supply power’ would be required for such a battery-operated transceiver-equipped portable wireless communication device.” *Id.*

Patent Owner does not present arguments addressing Petitioner’s showing as to limitation [1(a)]. *See* PO Resp. 45–71.

After having considered the full trial record, we find that Petitioner has proven, by a preponderance of the evidence, that Behbahani teaches limitation [1(a)].

- c) [1(b)]: “a wireless receiver configured to receive a wireless signal, wherein the wireless signal has a desired signal and an interferer signal,”

Petitioner argues that “Behbahani’s wireless receiver receives a wireless signal, as claimed.” Pet. 23 (citing Ex. 1004, 1207). “Indeed,” Petitioner asserts, “the whole point of an RF *receiver* is to receive RF signals.” *Id.* (citing Ex. 1003 ¶ 62). “Further,” according to Petitioner,

whether the preamble is limiting for purposes of this Decision. Neither party has presented arguments that the preamble is limiting.

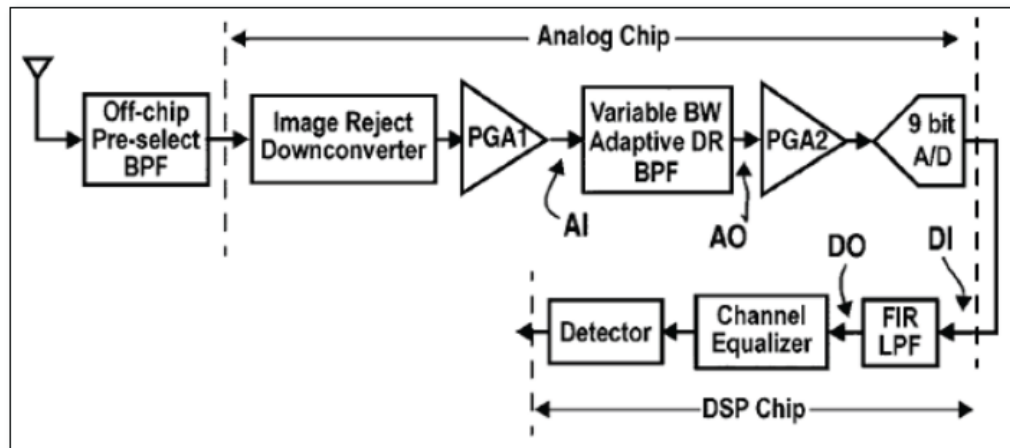
“Behbahani teaches that this received signal includes a desired signal component and interferer signals,” and “Behbahani’s adjustable dynamic range concepts turn critically on the absolute and relative strengths of received desired and interferer signals.” *Id.* (citing Ex. 1004, 1205). Additionally, Petitioner contends that Figures 3(a) and 3(b) of Behbahani “depict better than worst-case conditions in which ‘receiver dynamic range may be modest’ and the gain-based sliding DR approach is sufficient,” and Behbahani’s Figure 3(c) “depicts worst-case conditions (i.e., low desired signal and high interferers), requiring the system to expand the dynamic range by switching in the high-power filter.” *Id.* at 23–24 (citing Ex. 1004, 1206, Figs. 3(a)–3(c)).

Patent Owner does not present arguments addressing Petitioner’s showing as to limitation [1(b)]. *See* PO Resp. 45–71.

After having considered the full trial record, we find that Petitioner has proven, by a preponderance of the evidence, that Behbahani teaches limitation [1(b)].

d) [1(c)]: “the wireless receiver having a plurality of circuits that includes circuits in a receiver signal path”

Petitioner argues that “Behbahani in view of Leete teaches a wireless receiver comprising a plurality of circuits on the receiver signal path, including an amplifier, filter, and mixer.” Pet. 24. Petitioner points to Behbahani’s Figure 2, reproduced below, as describing the “complete WLAN receiver” circuitry.



Behbahani's Figure 2 showing the "complete WLAN receiver" circuitry.
Pet. 25 (citing Ex. 1004, 1206).

Petitioner argues that Behbahani cites Leete for the details of the Image Reject Downconverter in Figure 2, including a low noise amplifier (LNA) and RF quadrature mixer. *Id.* at 25–26 (citing Ex. 1004, 1205; Ex. 1005, 1908, Fig. 1). According to Petitioner, one of ordinary skill would have been motivated to combine Behbahani and Leete because Behbahani specifically cites Leete as describing "[t]he front-end and image-reject downconversion sections of the [receiver]." *Id.* at 25 (citing Ex. 1004, 1205) (alterations in original). Thus, Petitioner contends, the Behbahani-Leete combination produces a receiver circuit with an "LNA->mixer->filter topology." *Id.* at 27–28 (citing Ex. 1003 ¶¶ 74–75). Petitioner further argues that Behbahani's bandpass filter (BPF) is a filter. *Id.* at 31 (citing Ex. 1004, 1210, 1216).

Patent Owner does not present arguments addressing Petitioner's showing as to limitation [1(c)]. *See* PO Resp. 45–71.

After having considered the full trial record, we find that Petitioner has proven, by a preponderance of the evidence, that the combination of Behbahani and Leete teaches limitation [1(c)].

- e) [1(d)]: “the plurality of circuits designed to operate under a worst-case operating condition where the corresponding power drain from the battery is a maximum, thereby consuming maximum power from the battery; and”

Petitioner argues that “Behbahani teaches a wireless receiver circuitry that is designed to function under a range of operating conditions—from a worst-case operating condition to a best-case operating condition, as well as conditions that fall in between.” Pet. 32. More specifically, Petitioner asserts that “Behbahani teaches a wireless receiver that implements an ‘adaptive dynamic range’ method to save power by decreasing the dynamic range when conditions are better than worst case.” *Id.* (citing Ex. 1004, 1205).

Petitioner argues that “[t]wo separate adaptive techniques are combined to accomplish Behbahani’s goals—(1) step-based DR and (2) sliding DR.” Pet. 33 (citing Ex. 1004, 1206–07). “For Behbahani’s step-based adaptive DR,” Petitioner asserts, “the receiver switches/steps between two scaled filters,” such that “[a] ‘high-power filter’ is used during a range of worst-case conditions, and a separate ‘low-power filter’ is used when conditions improve sufficiently above worst-case.” *Id.* According to Petitioner, “[w]hen the low-power filter is utilized during better than worst-case conditions, Behbahani’s sliding DR technique uses a gain stage in advance of the low-power filter to slide a smaller DR up or down based on strengths of the received signals.” *Id.*

Petitioner argues that “Behbahani explains that the signal conditions in Fig. 3(c), depicting worst-case conditions (i.e., low desired signal and high interferers), require the system to expand the dynamic range by switching in the high-power filter at the expense of high-power consumption,” and that one of ordinary skill “would have understood that

Behbahani's receiver operates with a maximum power dissipation while using this high-power filter." Pet. 34–35 (citing Ex. 1004, 1205–06; Ex. 1003 ¶¶ 92–97). "Moreover," Petitioner asserts, "Behbahani explains that under the signal conditions in Figs. 3(a) and Fig. (b), depicting better than worst-case conditions, the 'receiver dynamic range may be modest' and the gain-based sliding DR approach is sufficient to save power." *Id.* at 35 (citing Ex. 1004, 1206). "Accordingly," Petitioner contends, "when the system transitions from worst-case conditions (e.g., Fig. 3(c)) to a strong desired signal (e.g., Fig. 3(a)), it saves power by switching from the high-power filter to low-power filter." *Id.* (citing Ex. 1003 ¶¶ 98–102). Petitioner further argues that, "[w]hen Behbahani's low-power filter is in use, sliding DR is used to adjust the relatively smaller dynamic range up or down to reflect current signal conditions." *Id.* (citing Ex. 1004, 1206).

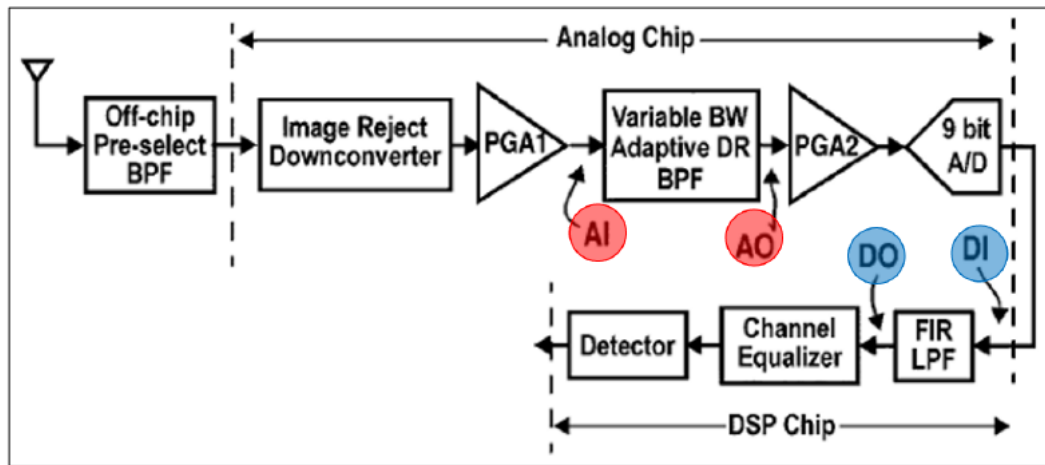
"Accordingly," Petitioner contends, one of ordinary skill "would have understood that Behbahani's *receiver* operates under at least a worst-case operating condition where the corresponding power drain from the battery is a maximum, consuming maximum power from the battery, as claimed." Pet. 36 (citing Ex. 1003 ¶ 97).

Patent Owner does not present arguments addressing Petitioner's showing as to limitation [1(d)]. *See* PO Resp. 45–71.

After having considered the full trial record, we find that Petitioner has proven, by a preponderance of the evidence, that Behbahani teaches limitation [1(d)].

f) [1(e)]: “a monitoring circuit associated with the battery powered portable communication wireless device configured to monitor the signal strength of the interferer signal,”

Petitioner argues that “Behbahani teaches monitoring circuits for determining not only interferer signal strengths but also desired signal strengths, by taking signal strength measurements at two nodes on the analog signal path— A_I and A_O —and at two nodes on the digital signal path— D_I and D_O ,” as shown in Petitioner’s annotated version of Behbahani’s Figure 2, reproduced below.



Petitioner’s annotated version of Behbahani’s Figure 2 showing signal strength measurements taken at nodes A_I and A_O on the analog signal path and nodes D_I and D_O on the digital signal path. Pet. 37 (citing Ex. 1004, Fig. 2)

Petitioner argues that “Behbahani teaches that the difference between signal levels measured at nodes ‘ A_I and A_O is a measure of the out-of-band *interferers* being rejected by the analog [filter].” Pet. 40 (citing Ex. 1004, 1207) (alteration in original). Petitioner asserts that “[t]he interferer signal power that remains after the *analog* filter is then calculated by comparing the difference between signal levels into and out of the *digital* filter.” *Id.* “From these two sets of measurements,” Petitioner explains, “Behbahani can determine the total interferer signal strength received on the signal path.” *Id.*

(citing Ex. 1003 ¶ 107). And, according to Petitioner, “Behbahani teaches that the difference between the signal strength measured at nodes A_I and A_O and the difference between the signal strength measured at nodes D_I and D_O are used in its adaptive DR process.” *Id.* at 41 (citing Ex. 1004, 1206, 1207).

Petitioner further argues that, “[a]lthough Behbahani does not expressly teach calculating an absolute interferer signal strength, it does calculate an absolute desired signal strength, and a [person of ordinary skill in the art] would have been motivated to similarly calculate an absolute value of the interferers.” Pet. 42 (citing Ex. 1003 ¶ 109). “Indeed,” Petitioner asserts, “the sliding DR process adjusts the PGA1 gain ‘to best accommodate the input signal conditions.’” *Id.* (citing Ex. 1004, 1206). According to Petitioner, “[a] precise calculation of the interferer signal strength would benefit the sliding DR process, allowing the system to more accurately adjust the smaller DR to best accommodate input signal conditions.” *Id.*

Additionally, Petitioner argues, “Behbahani uses these same analog and digital signal strength measurements to determine the absolute signal strength of a *desired signal*.” Pet. 42. “First,” Petitioner asserts, post-analog filter gain is calculated by comparing the signal strengths measured at nodes A_O and D_I .” *Id.* (citing Ex. 1004, 1207). “Next,” according to Petitioner, “by subtracting this gain from the signal strength at D_O , Behbahani determines the absolute strength of the desired signal. *Id.* (citing Ex. 1004, 1207; Ex. 1003 ¶ 110). Finally, Petitioner contends, Behbahani “teaches using this absolute desired signal strength in its adaptive DR process.” *Id.* (citing Ex. 1004, 1207).

Petitioner acknowledges that “Behbahani does not provide details about the specific circuit used to measure⁴ signal strength,” but argues that Tan provides this disclosure. Pet. 43. Petitioner argues that Tan is “expressly referenced by Behbahani and intended to be used in conjunction with Behbahani” and “provides an example of circuitry used to detect signals at various points in the low-pass filter signal path as a means of implementing a prefilter automatic gain control (AGC).” *Id.* (citing Ex. 1006, 481). “In this example,” according to Petitioner, “signal peaks are detected by current summing circuitry that is designed to ‘lower the input signal’ via gain control when peak values exceed a predefined limit.” *Id.* Petitioner contends that one of ordinary skill “would have been motivated to utilize Tan’s signal strength measurement circuitry to measure nodes A_I and A_O in Behbahani for a number of reasons,” including that: (1) “Behbahani and Tan describe different aspects of the same circuit,” (2) “using Tan’s signal strength measurement circuit in Behbahani” uses “a known technique to improve a similar device in the same way,” and (3) “signal strength measurement circuitry was well understood at the time” and one of ordinary skill “would have expected success in combining these teachings.” *Id.* at 43–44 (citing Ex. 1003 ¶¶ 112–115).

Patent Owner argues that Behbahani does not disclose any circuit for performing the functions in limitation [1(e)]. PO Resp. 65–66. According to Patent Owner, Petitioner has not supported its assertion that a person of ordinary skill in the art would have found it obvious to use a peak detector, as disclosed in Tan, “as a circuit for monitoring or determining signal

⁴ Limitation [1(e)] recites “moitor[ing]” the signal strength rather than measuring the signal strength, but the parties treat these terms equivalently across the cases in this family.

strength,” to perform the measurements from point A_I to A_O described in Behbahani. *Id.* at 66–67. Patent Owner argues that it “is not possible to measure the difference between two signal levels with peak detector(s)” and Petitioner has not explained how a person of ordinary skill in the art could accomplish the disclosed measurements with a peak detector circuit. *Id.* at 67. Patent Owner also argues that Behbahani does not expressly teach calculating an absolute interferer signal strength. *Id.* at 66.

We determine that Petitioner has established that the combination of Behbahani, Leete, and Tan teaches or suggests limitation 1(e). The only dispute is whether Petitioner has shown that the combination, i.e., Behbahani and Tan, teaches or suggests a “circuit” that performs the recited functionality, i.e., monitoring a signal strength.

Behbahani discloses determination of signal strength at points A_I and A_O and points D_I and D_O : “[s]ignal power is sensed at four points . . . input and output of the analog BPF and input and output of the digital channel select filter. These measured signal levels indicate how much of the received signal is being rejected, respectively, by the analog filter and the digital filter.” Ex. 1004, 1207; Ex. 1003 ¶¶ 105–107. A_I and A_O are shown on either side of the Variable Bandpass Filter Block in Behbahani’s Figure 2. Petitioner acknowledges that Behbahani does not explicitly disclose the details of a specific circuit for monitoring signal strength, and relies on Tan for this disclosure. Pet. 43.

Patent Owner does not dispute Behbahani’s teachings; Patent Owner instead argues that Petitioner does not provide any details of such a circuit and states that Dr. Abidi admitted circuits for this purpose were not included in his design or discussed in the *Behbahani* papers. PO Resp. 66; PO Sur-reply 21. Petitioner argues, and we agree, that the ’164 patent merely recites

a generic “circuit” and “does not describe any specific circuitry for measuring signal strength, depicting Signal Strength Indicator (‘SSI’) circuits as generic boxes.” Pet. Reply 24; *e.g.*, Ex. 1001, Figs. 4, 14, 6:58–59 (referring to “[s]ignal strength indicator circuits”); *see also* Ex. 1042 ¶ 14.

The absence of meaningful disclosure of the implementation details of the circuit in the ’164 patent suggests that the circuit implementation details Patent Owner argues about now would have been within the understanding of a person of ordinary skill in the art. That is, Patent Owner did not provide in its own specification “the type of detail [it] now argues is necessary in prior art references,” which permits a “finding that one skilled in the art would have known how to implement the features of the references and would have concluded that the reference disclosures would have been enabling.” *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994). When a patent specification does not “specifically describe[]” any “equipment or techniques to be used,” it may be deduced “that all of the equipment and technical knowledge required to perform the claimed method” is known to one of ordinary skill in the art. *In re Fox*, 471 F.2d 1405, 1407 (CCPA 1973); *see also Southwire Co. v. Cerro Wire LLC*, 870 F.3d 1306, 1312 (Fed. Cir. 2017) (without proof to the contrary, when there is no focus on a disputed claim limitation in the specification, the limitation is merely “an observed result of an old process”). To that end, Petitioner provides persuasive testimony from Dr. Abidi that signal strength measurement circuits were known in the art, and that a person of ordinary skill in the art would have understood how to implement a known technique for measuring signal strength, which is not disputed by Patent Owner. Ex. 1003 ¶¶ 113–115; Ex. 1042 ¶¶ 12–16; *see* Pet. Reply 24–25; Pet. 44. Accordingly, we

agree with Petitioner that Behbahani's disclosure at least suggests circuitry for performing such a monitoring of signal strength. *See* Pet. Reply 24 (citing Pet. 38–44; Ex. 1003 ¶¶ 107–115).

Petitioner further argues that Tan “provides an example of circuitry used to detect signals at various points in the low-pass filter signal path as a means of implementing a prefilter automatic gain control.” Pet. 43 (citing Ex. 1006, 481); Ex. 1003 ¶ 101. The example in Tan is a peak detector circuit. Pet. 43; Ex. 1003 ¶ 101; Ex. 1006, Fig. 8. Dr. Abidi testifies that a person of ordinary skill in the art would have been motivated to use Tan's signal strength measurement circuitry to measure nodes A_I and A_O , as well as to use comparable circuitry to measure nodes D_I and D_O . Ex. 1003 ¶¶ 112–115. In response to Patent Owner's argument that it is not possible to measure signal strength with Tan's peak detectors (PO Resp. 66–69), Dr. Abidi provides testimony explaining how Tan's peak detector circuit provides a measure of the signal strength, which we find persuasive, and is un rebutted by Patent Owner. Ex. 1042 ¶ 15.

Patent Owner also argues that Dr. Abidi's testimony is inherently unreliable as hindsight reasoning from an interested prior art author. Sur-reply 22. We do not find that Dr. Abidi's status as a co-author of Behbahani to be problematic in and of itself. However, we do not rely on Dr. Abidi's reply testimony regarding the intent of the authors⁵ and the authors' contemplation of using the Khorram signal strength measurement circuit for

⁵ Specifically, we do not rely on Dr. Abidi's statement that “[i]t was our intent” “to include the described functionality integrated on a single chip, including circuitry for measuring signal strength at A_I and A_O .” Ex. 1042 ¶ 13.

Behbahani's receiver.⁶ *See Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1041 (Fed. Cir. 2017) ("To the extent [a party] challenges the PTAB's factual findings ... the PTAB is permitted to weigh expert testimony and other record evidence and, in so doing, rely on certain portions of an expert's declaration while disregarding others."). Rather, our focus is on the teachings in Behbahani, and Dr. Abidi's testimony regarding the understanding of a person of ordinary skill in the art.

Patent Owner also argues that "the Director has required that all claim elements must be shown somewhere in the asserted prior art, rather than in assertions about common knowledge." PO Sur-reply 22–23 (referring to Memorandum, Enforcement and Non-Waiver of 37 C.F.R. § 42.104(B)(4) and Permissible Uses of General Knowledge in Inter Partes Reviews, July 31, 2025) ("Memorandum"). We note that this Memorandum "appl[ies] to any petition for IPR filed on or after September 1, 2025," which does not encompass this proceeding. *See* Memorandum 3. Nonetheless, as explained above, Petitioner is not relying on expert testimony to supply a missing claim limitation. Rather, Petitioner relies on the combination of Behbahani and Tan. As stated in the Memorandum, "[g]eneral knowledge may still be used in an IPR . . . to demonstrate the knowledge of a person having ordinary skill in the art." Memorandum 1.

We also are not persuaded by Patent Owner's argument that Behbahani does not expressly teach calculating an absolute interferer signal

⁶ Specifically, we do not rely on Dr. Abidi's testimony that "[i]ndeed, we were contemplating the Khorram signal strength measurement circuit for Behbahani's receiver, but we did not discuss this circuit because we considered signal strength measurement well settled as of the Behbahani papers and not worth distracting from the new and novel subject matter that was our focus." Ex. 1042 ¶ 16.

strength. PO Resp. 66. The claim language merely requires that the monitoring circuit “monitor the signal strength of the interferer signal,” and does not requiring monitoring of the absolute strength (rather than the relative strength) of the interferer signal. Ex. 1001, 13:19–22. Additionally, Petitioner has set forth sufficient argument and supporting evidence that Behbahani calculates a relative strength of the interferer signal and that calculating an absolute strength of the interferer signal would have been obvious to one of ordinary skill. Pet. 37–43; Ex. 1003 ¶¶ 103–110.

Therefore, we are satisfied that that Petitioner has sufficiently shown that a person of ordinary skill in the art would have been motivated to combine Behbahani and Tan to teach the recited “circuit” that monitors the signal strength of the interferer signal for the reasons stated by Petitioner. Accordingly, after considering the evidence and arguments of the complete record, we determine that Petitioner has shown, by a preponderance of the evidence, that Behbahani and Tan teach limitation 1(e).

g) [1(f)]: “*wherein a power dissipation control circuit in the wireless receiver causes a bias current to be dynamically adjusted in one or more of the circuits in the receiver signal path as the monitored signal strength of the interferer signal varies during operation when the operating condition is better than the worst-case operating condition, enabling a power dissipation reduction in the wireless receiver, providing a corresponding reduction in a power consumption from the battery of the battery powered portable wireless communication device.*”

The parties dispute whether the asserted prior art satisfies this limitation. Pet. 45–62; PO Resp. 49–65; Pet. Reply; PO Sur-reply. Independent claims 1, 5, 10, 15, and 20 recite dynamically adjusting the bias current in one of more of the circuits in the receiver signal path, or similar language. Dependent claims 2, 6, 7, 12, and 16 recite that the bias current is

dynamically adjusted at least in part by a change in an impedance in one or more of the plurality of circuits of the wireless receiver. As set forth below, the parties argue dynamically adjusting or varying the impedance and/or the bias current together, so we address both concurrently in our analysis of this limitation.

(1) Petitioner's Contentions

Petitioner argues that, “when Behbahani’s adaptive DR receiver (i.e., power dissipation control system) switches from its high-power filter to its low-power filter, it increases the ‘opposition to the flow of alternating current’ (i.e., impedance) in the analog signal path and results in a reduced current that carries the AC signal through a load (i.e., through the filter load).” Pet. 45. “This switch to a low-power filter,” Petitioner asserts, “reduces the DC bias current applied to the filter stage.” *Id.* at 45–46. Thus, according to Petitioner, “this dynamic adjustment occurs (1) ‘when the operating condition is better than the worst-case operating condition’ and (2) ‘as the monitored signal strength of the interferer signal varies during operation[.]’” *Id.* at 46. “For example,” Petitioner contends, “when the system detects that the strength of the interferer signal has decreased, resulting in conditions sufficiently better than the worst-case, Behbahani switches from its high-power to low-power filter.” *Id.*

More specifically, Petitioner argues that “Behbahani teaches a wireless receiver that implements an ‘adaptive dynamic range’ method to save power by decreasing the dynamic range when conditions are better than worst-case.” Pet. 52 (citing Ex. 1004, 1205). In Behbahani’s receiver, Petitioner asserts, “[a] step-based DR technique switches between two scaled filters, using ‘high-power filter’ only during worst-case conditions and a separate ‘low-power filter’ for conditions that are better than worst-

case.” *Id.* (citing Ex. 1004, 1206–07). Petitioner points to Behbahani’s Figure 4(b), reproduced below, to illustrate switching from the low-power filter to the high-power filter to expand the dynamic range when worst-case conditions occur.

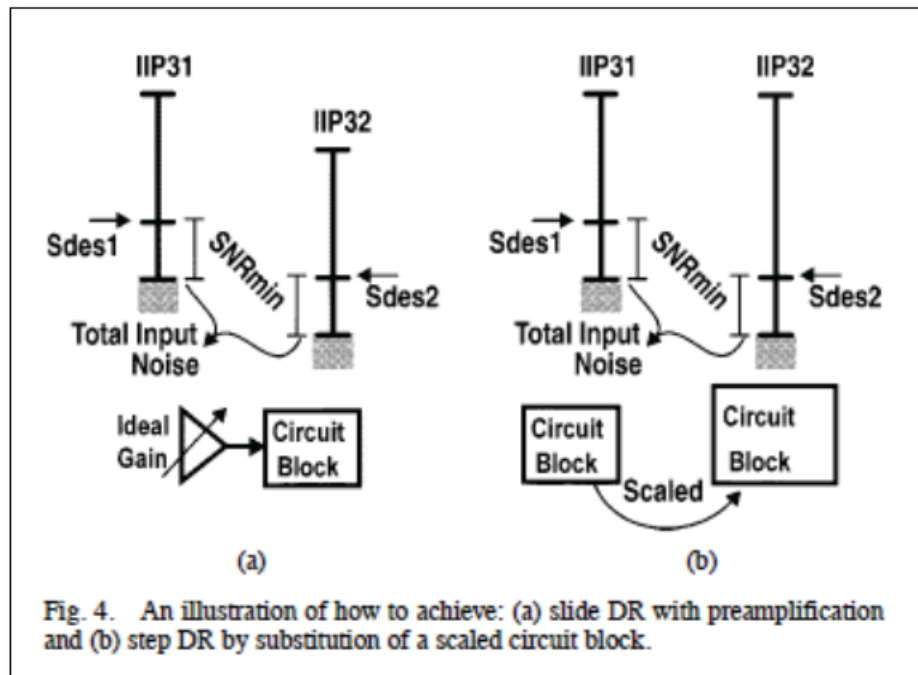


Figure 4 of Behbahani illustrating switching from a low-pass filter to the high-power filter to expand dynamic range. Pet. 52–53 (citing Ex. 1004, 1206).

According to Petitioner, one of ordinary skill “would understand that switching back—from the high-power filter to the low-power filter—when conditions improve is one means through which Behbahani’s system saves power during periods of better than worst-case conditions.” *Id.* at 53 (citing Ex. 1003 ¶¶ 131–134). “Indeed,” Petitioner contends, “Behbahani expressly teaches that the high-power filter is used *only* during the infrequent periods of worst-case conditions.” *Id.* (citing Ex. 1004, 1205, 1207; Ex. 1003 ¶¶ 131–134).

Petitioner further argues that Behbahani’s high-power filter “[s]cale[s] up all the transistors[,]’ while ‘scaling down all resistors by the same factor[,]’ which ‘raises bias current proportional to the scale factor[.]’” Pet. 54 (citing Ex. 1004, 1206) (emphasis omitted, alterations in original). Petitioner cites Tan to “provide additional details about the scaled filters discussed in Behbahani,” which “confirm that transitioning from the high-power to low-power filter increases signal path impedance, reducing drive AC drive current and DC bias current.” *Id.* at 54. According to Petitioner, one of ordinary skill would have been motivated to combine Behbahani and Tan because these references “describe different aspects of the same circuit,” and Behbahani specifically cites Tan to provide additional “details of the [filter] design.” *Id.* (citing Ex. 1004, 1210, 1216; Ex. 1003 ¶ 140) (alteration in original). Thus, Petitioner asserts, “Behbahani’s low-power filter has higher resistance (accompanying a lower transconductance), lower capacitance, and lower bias current than its high-power filter,” and one of ordinary skill would have understood that “switching from Behbahani’s high-power filter to its low-power filter changes (increases) an impedance, and changes (reduces) . . . the bias current of a component (*i.e.*, the filter) in the signal path.” *Id.* at 56–57 (citing Ex. 1003 ¶ 149).

Additionally, Petitioner argues that this understanding of Behbahani is confirmed by a January 2003 article published by Dr. Tsividis, the inventor of the ’164 patent, titled “Internally Varying Analog Circuits Minimize Power Dissipation.” Pet. 49 (citing Ex. 1011 (the “Tsividis article”), 70). According to Petitioner, the Tsividis article “concludes its discussion by pointing to Behbahani’s switched filter process as an exemplary means by which dynamic impedance scaling can be implemented.” *Id.* Specifically, Petitioner contends, the Tsividis article discloses that “‘impedance scaling’

by ‘lowering capacitances and transconductances allows one also to lower [the bias current], and thus the total power dissipation can be made small.’” *Id.* at 50 (citing Ex. 1011, 70). Petitioner further points to the Tsividis article’s statement that “[o]ne way to achieve the above scenario would be to use two filters, designed with different capacitance values, and place on or the other in services as required by [34], turning the other filter off,” and notes that reference [34] is the Behbahani reference relied on in the Petition. *Id.* at 51 (citing Ex. 1011, 70, 72).

Finally, Petitioner argues that Behbahani’s switches from a high-power filter to a low-power filter “based on a signal strength measurement comparison.” Pet. 57–60.

(2) Patent Owner’s Contentions

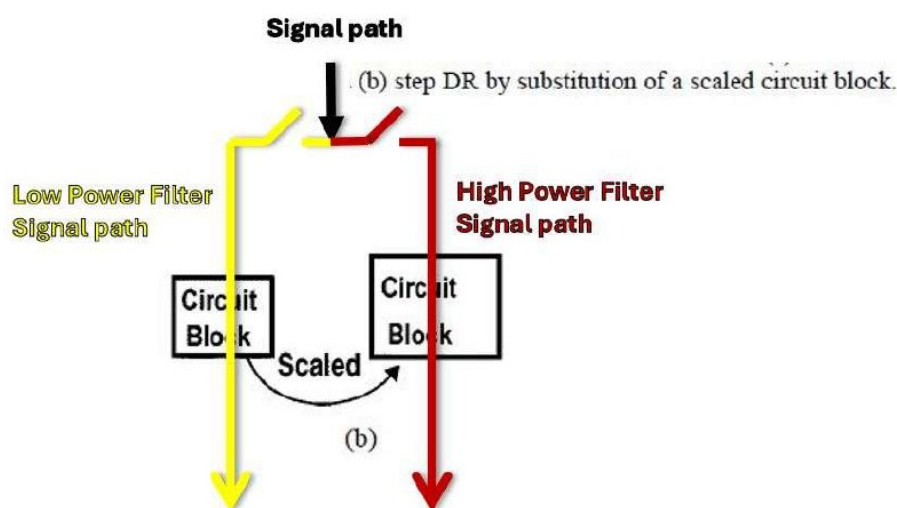
Patent Owner argues that Petitioner has failed to show that Behbahani, alone or in combination with Tan, “discloses or suggests to a [person of ordinary skill in the art] dynamically adjusting a bias current (or an impedance), of a circuit in the signal path—as taught and claimed in the ’164 patent.” PO Resp. 49.

Patent Owner argues that the plain language of the claims “does not comport with switching out one circuit for another, without changing a bias current or an impedance of either, by re-routing the signal path.” PO Resp. 50. Rather, Patent Owner asserts, “the plain claim language, read together and in context, makes clear that the claims are directed to dynamic changes of, *e.g.*, ‘an’ individual impedance and/or bias current of an individual circuit that is, and remains, ‘in the receiver signal path’ for the adjustment.” *Id.* According to Patent Owner, this “is not the overall DC bias or overall impedance of multiple components grouped together, but rather is ‘a bias current’ or ‘an impedance’ that is in or of a circuit—*e.g.*, ‘a filter’—and is

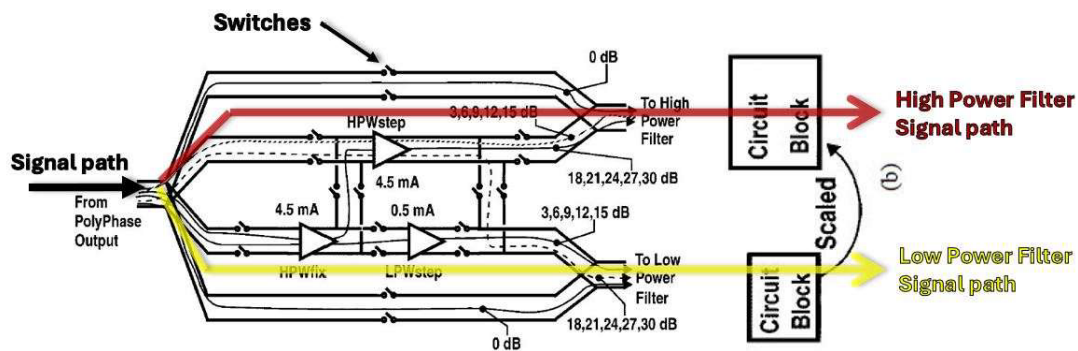
varied in operation.” *Id.* at 50–51 (citing Ex. 1001, 13:24–25, 16:20–22). Patent Owner further contends that “[t]he adjustment is done dynamically, that is, ‘during operation.’” *Id.* at 51.

Patent Owner argues that Behbahani’s “filter swap” does not teach this limitation because “[n]o bias current or impedance—of either filter—changes or is adjusted by that swap.” PO Resp. 52–53; *see also id.* at 53 (arguing that in Behbahani “one filter is taken completely out of operation to be replaced by another”). Patent Owner contends that Behbahani’s “filter swap” is a change effected by re-routing the signal path rather than varying something in the signal path. *Id.* at 52–53; *see also id.* at 53 (arguing that “the parameters of each filter are not changed”). Patent Owner argues that a person of ordinary skill in the art “would know that Behbahani’s ‘substitution’ of filter circuit blocks involves changing the signal path—to remove the first circuit block from the path, turning it off to save power, and instead turning on and sending the signal through the second circuit block.” *Id.* at 55–56 (citing Ex. 2020 ¶ 58).

Patent Owner provides annotated Figure 4 of Behbahani, showing the filter swap:



PO Resp. 56. Patent Owner's annotated Figure 4 adds a black arrow pointing downward indicating "signal path," with two branches below, a yellow arrow indicating "Low Power Filter Signal path" on the left and a red arrow indicating "High Power Filter Signal path" on the right. Patent Owner also provides annotated Figure 9 of Behbahani, showing the circuitry for the filter swap:



Id. at 56–57. Patent Owner's annotated Figure 9 adds a black arrow on the left side indicating "signal path," with two branches coming out on the right side, a red arrow indicating "High Power Filter Signal path" on the top, and a yellow arrow indicating "Low Power Filter Signal path" on the bottom.

Patent Owner contends that "drawing a larger box" around the "band-pass filter functional block" does not "change the underlying circuits or their operation." PO Resp. 58. Patent Owner argues that "[a] change to the overall impedance of the receiver, or of a section of the receiver chain containing multiple circuit blocks—that results only from re-routing the signal path—is not dynamically changing 'an impedance,' of a circuit that is '*in* the signal path' as used in [the] claims." *Id.* at 59 (citing Ex. 2020 ¶¶ 75, 82, 83) (alteration in original). Patent Owner also provides annotated Figure

16 from Tan, showing the signal path, which will be discussed further below. *Id.* Patent Owner argues that “[s]witching operation from one static filter to another is a different, and inferior, approach—versus dynamically changing the components or structure of a single filter block in the signal path in operation.” *Id.* at 60 (citing Ex. 2020 ¶¶ 77–80; Ex. 1011, 70–71).

Patent Owner also argues that Petitioner improperly relies on the Tsividis article, which does not define the scope of the claims, and “completely misconstrues, and ignores contrary portions of” the Tsividis article. PO Resp. 60–61. According to Patent Owner, the Tsividis article “*teaches improvements on Behbahani’s approach—specifically . . . dynamic scaling of a **single filter’s structure via individual elements**.*” *Id.* at 61 (citing Ex. 1011, 70, 71; Ex. 2020 ¶¶ 66–70). Patent Owner contends that the Tsividis article “refers to *dynamic* impedance scaling only with reference to its own Figure 12—which shows a single RC circuit, adjusted via switching individual elements.” *Id.* (citing Ex. 1011, 71, Fig. 12). Patent Owner further argues that the Tsividis article teaches away from Behbahani’s approach and “towards ‘vary[ing] structure dynamically’ in a single filter and using ‘individual filter elements rather than entire filters.’” *Id.* at 62 (quoting Ex. 1011, 70, 71, Fig. 12; Ex. 2020 ¶¶ 66–74).

Patent Owner contends that, separately from the Tsividis article, which was published in January 2003, Professor Tsividis was developing techniques for dynamically varying circuit structure via adjusting internal components. PO Resp. 62. According to Patent Owner, this development resulted in provisional patent applications, and then the related ’330 patent, which issued on February 23, 2004. *Id.* at 62–63 (citing Ex. 1001, 2). Patent Owner argues that Behbahani, Tan, and the Tsividis article were cited in the ’330 patent. *Id.* at 63 (citing Ex. 1002, 12; Ex. 2019, 62).

(3) *Analysis*

There is no dispute as to what Behbahani teaches or how Behbahani operates. The parties agree that Behbahani teaches a variable bandpass filter that switches from a high-power filter to a low-power filter. *See, e.g.*, Pet. 13, 45–46; PO Resp. 3, 53. The dispute is whether Behbahani’s “filter swap” functionality dynamically adjusts the bias current in one or more of the circuits in the receiver signal path, as recited in independent claims 1, 5, 10, 15, and 20, and does so at least in part by a change in an impedance as recited in dependent claims 2, 6, 7, 12, and 16.

We agree with Petitioner that Patent Owner’s arguments rely on a narrower reading of the claim language than is supported by the record. *See* Pet. Reply 8–11; *see In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998) (“The invention disclosed . . . may be outstanding in its field, but the name of the game is the claim.”). Patent Owner argues that Behbahani’s approach is different from the approach claimed in the ’164 patent. *See, e.g.*, PO Resp. 1–13; PO Sur-reply 1–2, 5–7, 19–20. We determine that the *claim language* does not exclude Behbahani’s approach. Although Patent Owner argues that Dr. Larson “testified plainly and without rebuttal that a [person of ordinary skill in the art] would understand the challenged claims (and this distinction) this way,” we have reviewed Dr. Larson’s cited testimony, and disagree with Patent Owner’s assertions, as discussed further below. *See* PO Sur-reply 1 (citing Ex. 2020 ¶¶ 58, 62, 70, 71, 74–77, 85).

(a) Behbahani's Variable Bandpass Filter Block as "One or More of the Circuits in the Receiver Signal Path"

As discussed above, Petitioner relies on Behbahani's Variable Bandpass Filter Block to teach the recited "filter⁷," which is one of the recited "plurality of circuits." Pet. 24, 31 (limitation 1(c)).⁸ Patent Owner argues that the entire Variable Bandpass Filter Block, "containing multiple filters, is not a single circuit block." PO Sur-reply 3 (citing, *e.g.*, Ex. 2020 ¶¶ 46–48, 71, 74, 76, 77, 79, 80, 82, 83); *see also id.* at 4, 13 (citing, *e.g.*, Ex. 2020 ¶¶ 46–48, 71, 74–83).

Under Patent Owner's theory, the low-pass and high-pass filters within the Variable Bandpass Filter Block are separate circuits where no adjustment or change to the impedance or bias of those distinct circuits occurs (*i.e.*, they are static filters), whereas Petitioner contends that the Variable Bandpass Filter Block as a whole, which includes the low-pass and high-pass filters, teaches the "component" and adjustments or changes to the

⁷ Claim 1 recites only "the wireless receiver having a plurality of circuits that includes circuits in a receiver signal path," but claims 5 and 20 require that "the wireless receiver comprising a plurality of circuits including a signal path comprising ***at least an amplifier, a filter, and a mixer.***" Ex. 1001, Claims 1, 5, 20 (emphasis added); *see* Pet. 24.

⁸ We disagree with Patent Owner's arguments in the Sur-reply that Petitioner's reliance on the Variable Bandpass Filter block is a new theory raised in the Reply. *See* PO Sur-reply 3, 11–12. Patent Owner's argument that the "Petition never identified the entire bandpass as the claimed 'circuit' or 'component'" is incorrect. *Id.* As Patent Owner acknowledges (PO Resp. 50), certain claims recite a "plurality of circuits [comprising/including] . . . a filter." In the arguments for limitation 1(c), the Petition states that Behbahani's "Variable BW Adaptive DR BPF satisfies the claimed 'filter'," which identifies the entire filter block as teaching one of the recited "plurality of circuits." Pet. 31; *see also* Ex. 1003 ¶ 85 (same).

impedance and/or bias of the Variable Bandpass Filter Block as a whole occurs.

Patent Owner’s arguments generally fail to address why Behbahani’s Variable Bandpass Filter Block does not teach the recited “plurality of circuits [comprising/including] . . . a filter,” and instead focus on why the low-pass and high-pass filter circuits do not teach the limitation, which is not Petitioner’s position. As stated above, we agree with Patent Owner’s plain reading of the claim language – i.e., that it “requires adjusting the bias, in or of a circuit.” *See* PO Resp. 49. However, Patent Owner’s reading of the claim does not persuasively address why the Variable Bandpass Filter Block does not teach the recited “circuit.”

We have reviewed Dr. Larson’s cited testimony and disagree with Patent Owner that he provided “a well-supported opinion . . . as to why a [person of ordinary skill in the art] would not understand the entire bandpass box to be a single ‘circuit,’ or to reflect variation in ‘an impedance’ or ‘a bias’ in the claims.” Sur-reply 4 (citing Ex. 2020 ¶¶ 46–48, 71, 74–83).

Dr. Larson testifies that the ’330 patent (which has the same specification as the ’164 patent) “teach[es] these adjustments [that dynamically change operating parameters] as changes effected in a *single circuit block*.” Ex. 2020 ¶ 46 (citing, e.g., Ex. 1001, Figs. 8A, 9A, 8:20–25, 8:36–39, 9:36–59, 10:1–18 (emphasis added)). Dr. Larson does not provide further explanation as to what he means by a “single circuit block,” but relies on Figures 8A and 9A, which show a “function block,” and other disclosures referring to a “function block.” *See id.* There is no dispute that the recited “circuit” in the receiver signal path is referring to these “function blocks.” *See* Tr. 22:20–23:4. The ’164 patent states that Figure 8A, which includes function block 820, is “an embodiment of the present invention”

that describes a “possible power saving technique[.]” Ex. 1001, 3:38–40, 8:28–30. Similarly, Figure 9A, which includes function block 920, “illustrate[s] one of the possible power saving techniques.” *Id.* at 3:41–42. The ’164 patent describes that “[f]unctional block 820 . . . may be a *filter*, mixer, amplifier, or *other circuit or circuits* in a wireless transceiver or other electronic circuits or system.” *Id.* at 8:30–33 (emphasis added). Based on these disclosures, we are not convinced that Function Block 820 or 920 cannot include multiple filters in a Variable Bandpass Filter Block, or that Behbahani’s Variable Bandpass Filter Block does not teach the recited “circuit.”

Dr. Larson also relies on Figure 6 of the ’164 patent to conclude that “[t]he patents refer to adjustments in or to a single circuit.” Ex. 2020 ¶ 46; *see also id.* ¶ 47; PO Resp. 52. However, Figure 6 is described as “*an example of how a circuit’s impedances may be scaled to reduce drive currents.*” Ex. 1001, 3:32–33, 7:52–53 (emphasis added). Claims are not limited to specific embodiments described in the specification. *E.g.*, *SuperGuide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875 (Fed Cir. 2004) (stating that “a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment”). We find persuasive Petitioner’s arguments that drivers 612 and 622 in Figure 6 may not be the same, and, therefore, the figure does not support “adjusting individual resistors or capacitors *to the exclusion* of more comprehensive changes within a function block.” Pet. Reply 9–11.

Patent Owner argues that the claims require adjustment of parameters within a “single circuit,” a “single function block,” or an “individual circuit,” but does not explain why Behbahani’s Variable Bandpass Filter

Block does not teach a “single circuit,” “single function block,” or “individual circuit.” *E.g.*, PO Resp. 49–51, 55, 60; PO Sur-reply 11–12. Rather, Patent Owner’s arguments are generally directed to the low-power and high-power filters in the Variable Bandpass Filter Block, which does not effectively rebut Petitioner’s arguments. *E.g.*, PO Resp. 55–56. Although Patent Owner refers to Dr. Larson’s testimony “about why the bandpass would not be understood as a single circuit, component, or impedance in the signal path,” (PO Sur-reply 12) it is not entirely clear what testimony Patent Owner is referring to. Dr. Larson testifies that “the teachings and challenged claim language of the Tsividis Patents would be understood by a person of ordinary skill in the art to be referring to impedance and bias current adjustments made dynamically for a single function block, such as a filter—in other words, adjustments to an impedance or a bias current in or for a particular circuit.” Ex. 2020 ¶ 77. But this, too, does not explain why Behbahani’s Variable Bandpass Filter Block does not teach the recited “circuit,” or why the Variable Bandpass Filter Block is not a single function block. Therefore, we are persuaded that Petitioner has shown that Behbahani’s Variable Bandpass Filter Block teaches the recited “circuit.”

(b) Changing internal components or structure

Patent Owner and Dr. Larson also argue limitations not recited in the claims relating to the change, adjustment, or variance in the one or more plurality of circuits. For example, Patent Owner’s argument that Behbahani’s switching from one filter to another is different from “dynamically *changing the components or structure* of a single filter block in operation” is not commensurate with the claim language, which more broadly recites “caus[ing] a bias current to be dynamically adjusted in one or

more of the circuits in the receiver signal path.” *See* PO Resp. 60 (emphasis added); *see also id.* at 53, 62.

Similarly, Dr. Larson’s testimony that “a person of ordinary skill in the art would readily understand this claim language to be referring to dynamic adjustments made to a parameter (e.g., ‘an impedance’ or ‘a bias current’ or gain) of a circuit ‘in the signal path,’ *via the internal components or structure of one circuit block*” is also not commensurate with the claim language, which does not recite adjustments made “via the internal components or structure of one circuit block.” *See* Ex. 2020 ¶ 48 (emphasis added). Dr. Larson provides similar unpersuasive testimony in paragraph 70 (stating that “dynamic impedance scaling” “a single circuit by *varying its internal structure*—was different from, and a potential improvement upon, the hard switch between two completely separate filters as disclosed in Behbahani”) and paragraph 72 (comparing “adjusting *the internal structure or components of a single filter* or other circuit block,” as compared to Behbahani’s “swap of a completely different filter circuit block into the signal path”). *Id.* ¶¶ 70, 74 (emphasis added).

The parties both rely on the Tsivdis article—Petitioner to support that Behbahani’s approach is captured by the scope of the claims, and Patent Owner to argue the opposite. Pet. 49–52; PO Resp. 60–64. We agree with Patent Owner that the Tsivdis article is extrinsic evidence and is “*not* a determiner of the scope” of the claims. PO Resp. 60; Sur-reply 18. Nonetheless, we address the parties’ arguments regarding the Tsivdis article.

The Tsivdis article “review[s] several recently proposed techniques” to “allow the internal attributes of the circuit to vary.” Ex. 1011, 63. As one example, Tsivdis article describes techniques for “dynamic impedance

scaling,” including Behbahani’s technique of “us[ing] two filters, designed with different capacitance values, and place one or the other in service as required [34], turning the other filter off.”⁹ *Id.* at 70. However, the Tsividis article explains that this approach “causes transients at the output” so “the result may be loss of data.” *Id.* The Tsividis article proposes an approach shown in Figure 11 to prevent the output transients. *Id.* The Tsividis article also proposes an approach for “dynamic impedance scaling” shown in Figure 12, described as “switching individual filter elements rather than entire filters.” *Id.*

The Tsividis article also describes a technique for “dynamic structure variation,” i.e. “to dynamically vary the very structure of the circuit (e.g., change the architecture of a filter dynamically)”. Ex. 1011, 71. The Tsividis article states:

A straightforward way to accomplish this is to use two or more filters with different structures and make sure that output transients are avoided using the technique in Figure 11. ***It may also be possible to use a single filter and vary its structure dynamically, using techniques related to the ones discussed. This approach has not been investigated to any extent yet.***

Id. at 71–72 (emphasis added).

Dr. Larson testifies that the approach shown in Figure 12 of the Tsividis article is an example of what is claimed in the ’164 patent, whereas the approach shown in Figure 11 is similar to the approach in Behbahani, which swaps the filters. Ex. 2020 ¶¶ 67, 71. That is, Patent Owner argues that Figure 12 shows dynamically varying a filter’s internal structure. *Id.* ¶¶ 69, 70. As discussed above, the claims do not recite varying the structure

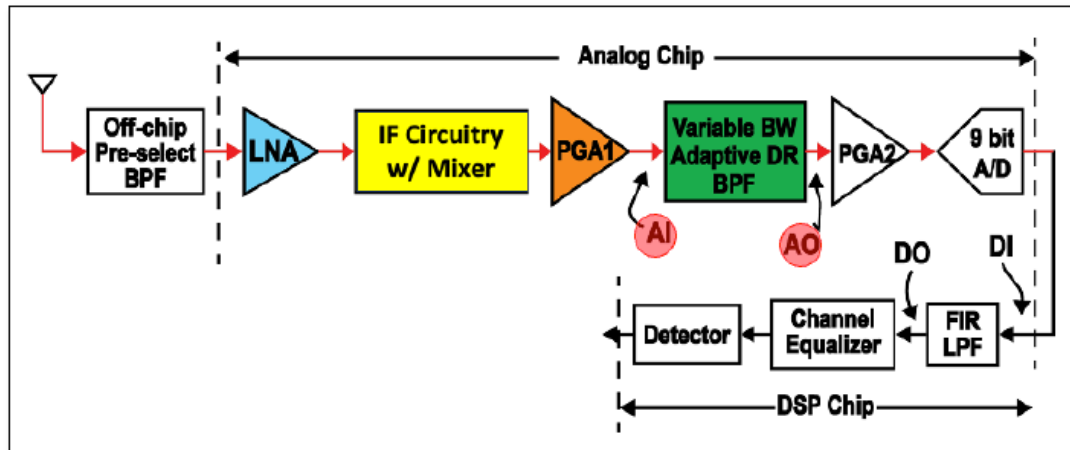
⁹ [34] referenced in this statement is the Behbahani reference.

of a circuit. Nonetheless, we are persuaded by Petitioner’s arguments that Figure 12 does not show dynamically varying the structure of the circuit. *See* Pet. Reply 22–23. Further, the Tsividis article states that the approach of varying the structure of a *single filter* dynamically “has not been investigated to any extent yet,” which also tends to support that this is not shown in Figure 12. Ex. 1011, 72. Finally, we note that even if the disclosure of Figure 12 is captured by the claim language, this does not mean that Behbahani’s approach is excluded. *E.g.*, Pet. Reply 16. As shown above, Figure 11 is referenced in the section of the Tsividis article titled “dynamic structure variation,” but Figure 12 is not – it is referenced in the “dynamic impedance scaling” section. Dr. Larson testifies that Figure 11 is similar to Behbahani’s approach, and that approach *is* mentioned in the “dynamic structure variation” section of the Tsividis article, which implies that Behbahani’s approach supports the “dynamic structure variation” that Patent Owner contends is recited in the claims of the ’164 patent. Moreover, as discussed above, our focus is on the language of the claims, which are broader than Patent Owner’s arguments. Finally, we do not agree with Patent Owner’s argument that the Tsividis article teaches away from Behbahani’s approach for the reasons set forth by Petitioner. *See* Pet. Reply 18–22.

(c) In the Receiver Signal Path

We are persuaded that Petitioner has shown that Behbahani’s Variable Bandpass Filter Block is in the receiver signal path, and also persuaded that Petitioner has shown that the bias current and impedance is varied.

Petitioner provides an annotated version of Behbahani’s Figure 2 as modified by Leete, showing the receiver signal path in red:



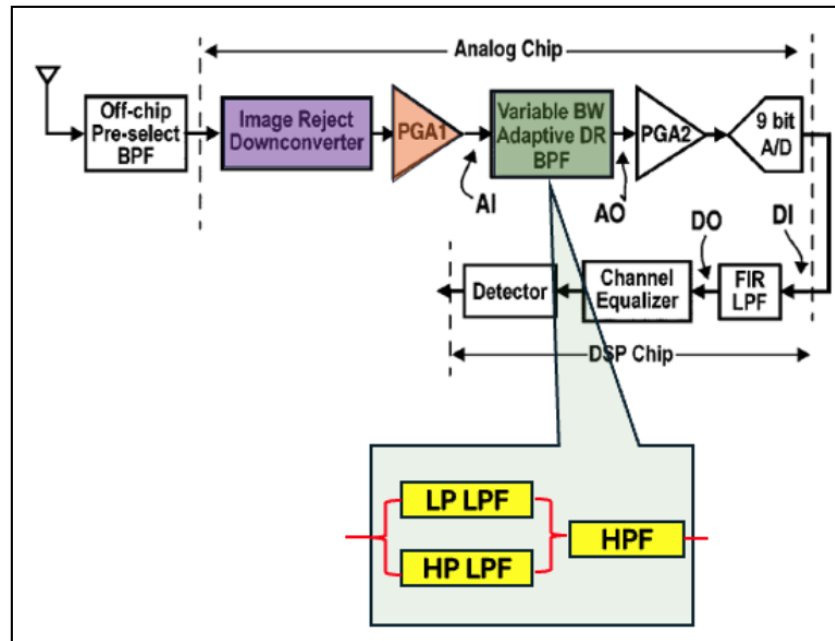
Pet. 29; *see also id.* at 39–40 (limitation 1(e), same, describing nodes A_I and A_O on the analog signal path, and nodes D_I and D_O on the digital signal path); *e.g.*, Ex. 1003 ¶ 106. Petitioner’s annotated Figure 2 of Behbahani replaces the “Image Reject Downconverter” box with the LNA and other IF circuitry, including the mixer stage, as shown in Leete’s Figure 1, and highlights red arrows showing the receiver signal path from left to right, and nodes A_I and A_O on the analog signal path on either side of the Variable Bandpass Filter Block. Pet. 29. As shown, the receiver signal path goes in the left side of the Variable Bandpass Filter Block and out on the right side.

We are not persuaded that “substitution” of filter circuit blocks (*i.e.*, switching between filters) involves changing the signal path, as Patent Owner argues. PO Resp. 55–56; PO Sur-reply 9, 13; *see* Ex. 2020 ¶ 58. Rather, as shown in Petitioner’s annotated Figure 2, the signal path goes into one side of the Variable Bandpass Filter Block and out the other side. This is the signal path. We are not persuaded that different routing *within* the Variable Bandpass Filter Block “changes” or “re-routes” the signal path.

Patent Owner’s annotated Figures 4 and 9 do not show the receiver signal path out of Variable Bandpass Filter Block, but rather show only the signal path in (in black) and the path inside the Variable Bandpass Filter

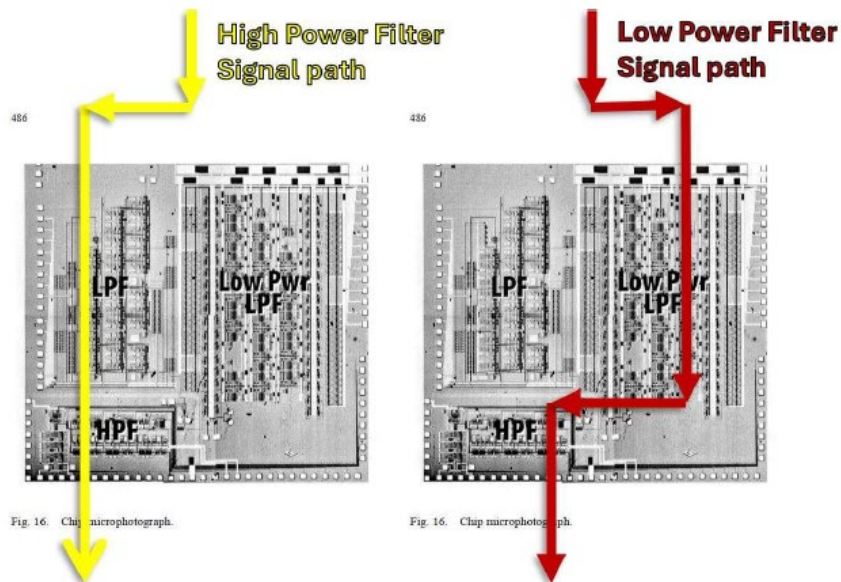
Block. *See* PO Resp. 55–57. The signal path is not “re-routed” or “changed,” as Patent Owner argues – it just chooses which filter to put into operation and follows that signal path. To that end, many of Patent Owner’s arguments regarding “re-routing” or “changing” the signal path incorrectly assume that the low power filter and high power filter are the recited “circuit,” which is not Petitioner’s position, and are therefore not persuasive. Similarly, Dr. Larson’s testimony largely makes the same assumption, so is not persuasive. *E.g.*, Ex. 2020 ¶¶ 67, 75, 76.

We find persuasive Dr. Abidi’s testimony that the signal enters the variable BPF block, traverses one of the two LPF branches, and then passes through the HPF. *See* Pet. Reply 6–7 (citing Ex. 1042 ¶¶ 4–6). This is shown in Petitioner’s annotated Figure 2 of Behbahani:



Id. at 7, 14; Ex. 1042 ¶ 5. Petitioner’s annotated Figure 2 shows a blow out of the Variable Bandpass Filter Block, with signal path in red going into alternating branches of either LP LPF or HP LPF, and outputting into HPF.

This is consistent with Patent Owner's annotated Figure 16 of Tan, reproduced below.



PO Resp. 59. Patent Owner provides two annotations of Tan's Figure 16. On the left, Patent Owner highlights in yellow the "High Power Filter Signal path" which goes through LPF and then through HPF. On the right, Patent Owner highlights in red the "Low Power Filter Signal Path" which goes through Low Pwr LPF and then through HPF. In other words, Patent Owner's annotated Figure 16 also reflects that the signal ultimately flows through the same HPF within and out of the overall Variable Bandpass Filter block. *See* PO Resp. 58; Ex. 2020 ¶ 82; Ex. 1042 ¶ 6; *see also, e.g.*, Ex. 2020 ¶ 67 (annotated Figure 11 of Ex. 1011); Pet. Reply 7–8. We fail to see why this disclosure is not "in the receiver signal path."

We also determine that Petitioner has established that Behbahani's switching between the high-power filter and low-power filter increases the impedance and reduces the DC bias current in the Variable Bandpass Filter Block. *See* Pet. 47, 52–57 (citing, *e.g.*, Ex. 1003 ¶¶ 131–134). Dr. Abidi provides persuasive testimony explaining why a person of ordinary skill in

the art “would have understood consistent with the ’164 Patent and Dr. Tsividis’s 2003 paper, that Tan’s teachings confirm switching from Behbahani’s high-power filter to its low-power filter increases signal path impedance and reduces the bias current of a component (i.e., the filter) in the signal path.” Ex. 1003 ¶ 149 (emphasis added); *see id.* ¶¶ 141–148; Pet. 52–57.

Patent Owner argues that “no portion of the entire bandpass changes impedance or bias ‘while it is in the signal path.’” PO Sur-reply 13 (citing Ex. 2020 ¶¶ 81–83); *see also id.* at 14 (citing Ex. 2020 ¶¶ 73–80). Similarly, Patent Owner also contends that, even drawing a larger box (i.e., including Behbahani’s Variable Bandpass Filter), “does not change the underlying circuits or their operation” because Behbahani’s Variable Bandpass Filter Block “does not have any individual filter circuit impedance ‘in the receiver signal path’ that changes dynamically during operation.” PO Resp. 58–59 (citing Ex. 2020 ¶ 82); *see also* Ex. 2020 ¶¶ 83–85. However, these arguments improperly focus on the low-power filter and high-power filters individually, which is not consistent with Petitioner’s contentions. Additionally, Patent Owner’s argument, and Dr. Larson’s supporting testimony, is based on the underlying theory that the receiver signal path is re-routed or changed, and we disagree with that argument, as discussed above.

Patent Owner also argues that Dr. Abidi’s testimony in paragraph 149 only repeats the cursory assertion that Behbahani’s filter swap would meet the elements requiring adjusting “the bias current of a component (i.e., the filter) in the signal path.” PO Resp. 53–54 (citing Ex. 1003 ¶ 149). We do not find this argument persuasive. As quoted previously, Dr. Abidi testifies that “Tan’s teachings confirm switching from Behbahani’s high-power filter

to its low-power filter *increases signal path impedance and reduces the bias current of a component (i.e., the filter) in the signal path.*” Ex. 1003 ¶ 149. Dr. Abidi identifies that the increase in signal path impedance and reduction of the bias current is of a component—i.e., the Variable Bandpass Filter Block.

(d) Conclusion for Limitation 1(f)

As discussed above, limitation 1(f) does not specify any particular structure or manner for varying the impedance or bias in the circuit. We determine that, under the plain and ordinary meaning of the claim language, nothing precludes varying the bias current and impedance in a circuit (i.e., a variable bandpass filter) by swapping out a high-pass or low-pass filter in a variable bandpass filter, as taught by Behbahani. Accordingly, we find that the combination of Behbahani, Leete, and Tan teaches dynamically adjusting the bias current in one of more of the circuits in the receiver signal path (or similar language) as recited in independent claims 1, 5, 10, 15, and 20. We also find that this combination teaches that the bias current is dynamically adjusted at least in part by a change in an impedance in one or more of the plurality of circuits of the wireless receiver, as recited in dependent claims 2, 6, 7, 12, and 16.

(4) Previous IPRs

Patent Owner argues that Petitioner’s contentions as to Behbahani are similar to those rejected at the institution stage in IPR2023-00694. PO Resp. 30–33. We disagree. In IPR2023-00694, Lenovo and Motorola challenged claims in the related ’330 patent, primarily based on the Rauhala reference.

Id.; Ex. 2007 (institution decision).¹⁰ There, the Board determined that Petitioner had not sufficiently shown that the impedance of a component *in the signal path* was changed¹¹ because Petitioner relied upon a change in resistance in a control circuit 72 that was outside of the signal path through linear unit 71 (i.e., the mixer). IPR2023-00694, Paper 10 at 19–20. On rehearing, the Board reiterated that Rauhala identified control circuit 72 separately from mixer 71, and Figures 1, 2, and 7 show the mixer’s input and output, which is separate from the control circuit. IPR2023-00694, Paper 14 at 6–11; Ex. 2008.¹² For example, the Board relied on the following

¹⁰ Exhibit 2007, which is purportedly the decision denying institution in IPR2023-00694, lacks the headers and footers, including page numbers, of the paper filed in the docket. We cite to the page numbers as reflected in Paper 10 of IPR2023-00694.

¹¹ The claim language at issue in the ’330 patent is “dynamically changing an impedance of a component in the signal path.”

¹² Exhibit 2008, which is purportedly the decision denying rehearing in IPR2023-00694, lacks the headers and footers, including page numbers, of the paper filed in the docket. We cite to the page numbers as reflected in Paper 14 of IPR2023-00694.

annotated diagram of Rauhala's Figure 7:

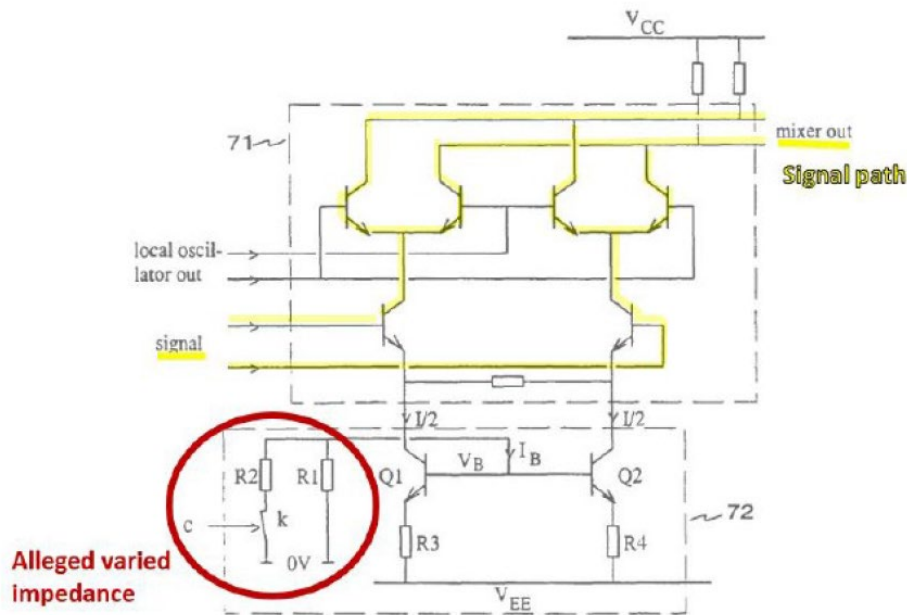


Fig. 7

IPR2023-00694, Paper 14 at 9. Annotated Figure 7 shows a dotted line box around mixer 71 with yellow highlighting showing the signal path, and below it, a dotted line box around control circuit 72 with a red circle around a portion of the circuitry stating “Alleged varied impedance.”

As shown, in that proceeding, both the petitioner's contentions and Rauhala's circuitry is different than Petitioner's contentions here and the disclosure in Behbahani, where Petitioner relies on the Variable Bandpass Filter Block.

h) Conclusion for Claim 1

Based on the full trial record, we find that Petitioner has shown by a preponderance of the evidence that independent claim 1 would have been obvious over the combination of Behbahani, Leete, and Tan.

5. Independent Claims 5, 10, and 15

Independent claims 5, 10, and 15 are similar to claim 1 in many respects, and include language similar to claim 1 requiring dynamically varying or adjusting a bias current to reduce the power dissipation of one or more of the plurality of circuits in the receiver signal path. Ex. 1001, 13:59–65, 14:32–36, 14:63–65. Patent Owner does not present separate argument as to these claims. PO Resp. 45–71. We determine that these claims would have been obvious over the combination of Behbahani, Leete, and Tam for the same reasons set forth in Section II.D.4 for claim 1.

Based on the full trial record, we find that Petitioner has shown by a preponderance of the evidence that independent claims 5, 10, and 15 would have been obvious over the combination of Behbahani, Leete, and Tan.

6. Independent Claim 20

Independent claim 20 is similar to claim 1, but also requires that “the wireless transceiver is configured to compare the strength of the desired signal relative to the strength of the interferer signal. Ex. 1001, 16:16–18.

Petitioner argues that Behbahani “expressly teaches comparing the desired and interferer signal strengths.” Pet. 40. That is, Petitioner argues that as in the ’164 patent, in Behbahani “[t]he interferer signal power that remains after the *analog* filter is then calculated by comparing the difference between signal levels into and out of the *digital* filter.” *Id.* (citing Ex. 1004, 1207). Petitioner contends that “[f]rom these two sets of measurements, Behbahani can determine the total interferer signal strength received on the signal path.” *Id.* (citing Ex. 1003 ¶ 107). Petitioner additionally relies on Figure 3 of Behbahani, which “describes three different desired and interferer signal scenarios, each of which turns on determining the relative

desired and interferer signal strengths.” *Id.* at 41 (citing Ex. 1004, Fig. 3; Ex. 1003 ¶ 108).

Patent Owner argues that Petitioner has failed to show “comparing” the alleged determined desired signal with an alleged determined interferer signal. PO Resp. 68–69. Without this required “comparison,” Patent Owner argues that all subsequent limitations that require actions that “responds to a change in” or is “based on” that comparison also fail. *Id.*

We agree with Patent Owner that Petitioner has not shown that Behbahani teaches “compar[ing] the strength of the desired signal relative to the strength of the interferer signal,” as recited in claim 20. *See* PO Resp. 68–69; PO Sur-reply 23–24. Although Petitioner argues that Behbahani “expressly teaches comparing the desired and interferer signal strengths,” Petitioner does not cite to sufficient evidence in support of this statement. Pet. 40–43.

In its argument, Petitioner points to a comparison of cumulative signal strengths in Figure 4 of the ’164 patent. Pet. 33–34; Pet. Reply 23. Figure 4 of the ’164 patent is reproduced below:

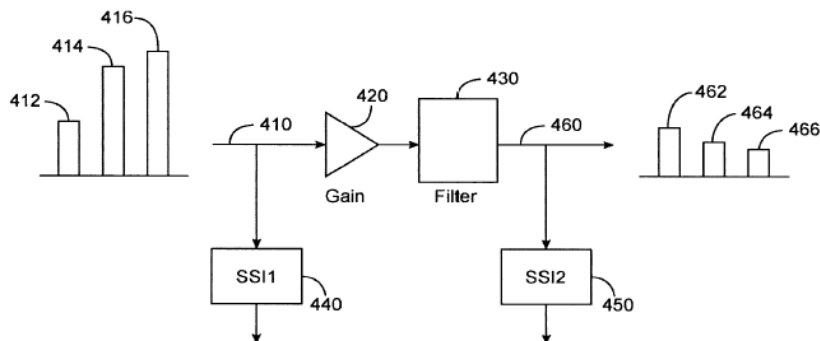


FIG. 4

Figure 4 shows, among other things, signal strength indicator circuits 440 and 450 connected to input line 410 and output line 460, on either side of gain element 420 and filter 430. Ex. 1001, 6:55–59. The input signal on input line 410 is shown as desired signal 412 and interferers 464 and 466. *Id.* at 6:63–64. Figure 4 is further described as follows.

The signal strength indicators 440 and 450 do not provide information as to the relative sizes of the desired and interfering signals. Rather, a cumulative signal level is provided at their outputs. For example, *the first signal strength indicator 440 outputs a level corresponding to the sum of desired signal 412 and interfering signals 414 and 416*, while *the second signal strength indicator 450 provides a signal level corresponding to the sum of desired signal 462 and interfering signals 464 and 466*. In this specific example, the gain of the gain and filter circuit combinations is shown as approximately one, while the interfering signals 414 and 416 signal levels are reduced.

A comparison of the signal levels provided by the signal strength indicators 440 and 450 indicates that much of the combined received signal on line 410 has been filtered.

Accordingly, it may be deduced that large interfering signals present at the input are being filtered by the filter 430. From this information, as will be shown in greater detail below, the bias, impedance, and gain of the gain stage 420 and filter 430 combination may be optimized to reduce power dissipation.

Id. at 6:64–7:16 (emphasis added). In other words, Figure 4 shows a comparison of a *sum of the desired and interferer signals output from the strength indicator circuits*, not a comparison of the strength of the desired signal and the strength of the interferer signal, as required by the claim language. The '164 patent describes Figure 4 as “an embodiment,” and claims are not limited to specific embodiments described in the specification. *See Phillips*, 415 F.3d at 1323. Petitioner even admits that

Figure 4 “compar[es] a *cumulative* strength signal at a first node to a *cumulative* signal strength at a second node.” Pet. 37 (emphasis added).

In the Reply, Petitioner argues that Patent Owner “ignores the substance of the mapping” in arguing that Petitioner focused solely on the measurements of the signal strength. Pet. Reply 23. But we agree with Patent Owner that Petitioner’s contentions do not sufficiently or clearly explain how Behbahani teaches comparing the strength of the desired signal relative to the strength of the interferer signal. Rather, Petitioner focuses on the determination or measurement of the signal strength, as well as arguments relating to *how* the signal strength is measured. *E.g., id.* at 23–27. Even if Behbahani teaches the same process for determining signal strengths as described in the ’164 patent, this does not inform whether Behbahani teaches “compar[ing] the strength of the desired signal relative to the strength of the interferer signal,” as recited in claim 20. *See* Ex. 1001, 16:16–18.

Accordingly, for the foregoing reasons we determine that Petitioner has *not* proven by a preponderance of the evidence that the claim 20 would have been obvious over the combination of Behbahani, Leete, and Tan.

7. Dependent Claims 2–4, 6–9, 11–14, and 16–19

Petitioner presents argument that dependent claims 2–4, 6–9, 11–14, and 16–19 are unpatentable over the prior art. Pet. 62–66, 68–72. Patent Owner does not present argument directed specifically at these dependent claims. PO Resp.; PO Sur-reply. Based on the full trial record, we find that Petitioner has shown by a preponderance of the evidence that dependent claims 2–4, 6–9, 11–14, and 16–19 would have been obvious over the combination of Behbahani, Leete, and Tan, for the reasons set forth by Petitioner.

III. PATENT OWNER’S ARGUMENT THAT THE PROCEEDING SHOULD BE DE-INSTITUTED AND DISMISSED

Patent Owner also argues that this *inter partes* review proceeding should not have been instituted because it is “an admitted follow-on challenge, to long-settled (indeed now expired) foundational patents—using art that was put before the Examiner for consideration decades ago.” PO Sur-reply 8; *see id.* at 24–27. Patent Owner argues that “[d]e-institution and dismissal of these proceedings would serve justice and fairness, [Patent Owner’s] settled expectations in long-standing patent rights, and Office policies and efficiency.” *Id.* at 9; *see id.* at 25–26. Patent Owner’s arguments essentially reassert the arguments made in the Preliminary Response that *inter partes* review should be discretionarily denied under 35 U.S.C. § 314(a) and 35 U.S.C. § 325(d). In the Institution Decision, we were not persuaded by these arguments. Inst. Dec. 15–22.

Patent Owner argues that in *Ecto World, LLC v. RAI Strategic Holdings, Inc.*, IPR2024-01280, Paper 13 (PTAB May 19, 2025) (§ A precedential) supports denial under 35 U.S.C. § 325(d). Sur-reply 26. However, *Ecto World* was designated precedential on May 19, 2025, and our Standard Operating Procedure 2 provides that “[a] precedential decision is binding Board authority in **subsequent matters** involving similar facts or issues.” SOP2, 7 (emphasis added). Therefore, re-evaluation under *Ecto World* does not appear to be appropriate under the circumstances here.

Patent Owner also argues that proceedings can be properly dismissed post-institution in the Director’s discretion. PO Sur-reply 26. In support, Patent Owner cites to *Hulu LLV v. Piranha Media Distribution, LLC*, IPR2024-01252, Paper 17, at 3 (PTAB April 17, 2025). *Id.* However, in *Hulu*, the patent owner timely sought Director Review after the institution

decision, and upon Director Review, the institution decision was vacated and denied. IPR2024-01252, Papers 16, 19, 27. By contrast, here, Patent Owner raised this issue for the first time in the Sur-reply (filed August 5, 2025, nearly three months after *Ecto World* was designated precedential), approximately three weeks prior to oral argument. Patent Owner also did not file a motion to terminate the proceeding.

Although we recognize that “that the Board has the inherent authority to reconsider institution decisions (beyond the regulatory time for a patentee’s entitlement to seek reconsideration),” *Sling TV, L.L.C. v. Realtime Adaptive Streaming LLC*, 840 F. App’x 598, 598–99 (Fed. Cir. 2021), we decline to do so at this late stage in the proceeding.

IV. PATENT OWNER’S MOTION TO STRIKE

Patent Owner moves to strike the Supplemental Declaration of Dr. Abidi (Exhibit 1042) and portions of the Reply that discuss Exhibit 1042. Motion 1. We deny Patent Owner’s motion for the reasons set forth below.

Patent Owner argues that Petitioner improperly attempts to gap-fill new testimonial evidence via the Reply Declaration in two ways. Motion 2–8. First, Patent Owner argues that, the Petition identified the high- and low-power low-pass filter portions of Behbahani as the components being dynamically adjusted, but the Reply identifies the whole Variable BW Adaptive DR BPF (hereafter also referred to as “Variable Bandpass Filter Block”). *Id.* at 3–6 (citing, *e.g.*, Ex. 1042 ¶¶ 4–6; Pet. Reply 6–8).

We agree with Petitioner that Petitioner’s reliance on Behbahani’s Variable Bandpass Filter Block is not a new theory raised in the Reply. *See* Opp. Mot. 3–6. Patent Owner’s argument that the Petition “did not identify the filter block as ‘the component’ at issue” is incorrect. *See* Motion 4

(emphasis omitted). For example, in the arguments for element [1(f)], the Petition pointed to Behbahani's "Variable BW Adaptive DR BPF as the filter (that switches from high power to lower power filtering) and is one of the claimed "plurality of circuits." Pet. 27–28 (annotating Behbahani's Variable BW Adaptive DR BPF as the claimed filter "component[] of a receiver" in the signal path), 31 ("Behbahani's Variable BW Adaptive DR BPF satisfies the claimed 'filter.'"), 57–58 (identifying the Variable BW Adaptive DR BPF as the circuit in the signal path between points AI and AO); Opp. Mot. 3–4 (identifying identification of the Variable Bandpass Filter Block in the Petition). Patent Owner's argument that the Variable Bandpass Filter Block was not cited for these limitations (Motion 3–4) is not persuasive, given the above statements in the Petition. Moreover, we understand Petitioner's statement at pages 57 that "switching from Behbahani's high-power filter to its low-power filter changes . . . a component (i.e., the filter)," refers to a change in the entire filter, i.e., Variable Bandpass Filter Block. Accordingly, Patent Owner's arguments are not persuasive.

Second, Patent Owner argues that Petitioner also improperly provides new, unsupported testimony from Dr. Abidi for the signal strength limitations, e.g., limitations 1(a) and 7(a). Motion 6 (citing Ex. 1042 ¶¶ 12–16). Patent Owner contends the new testimony includes self-serving and unsupported testimony about what the Behbahani reference intended to convey to a person of ordinary skill in the art. *Id.* at 6–7 (citing Ex. 1042 ¶¶ 12–13). Patent Owner also argues that Dr. Abidi's Reply Declaration is improper because it offers new testimony about what a person of ordinary skill in the art would understand from Behbahani, which is new evidence not found or discussed in the Petition. *Id.* at 7. Patent Owner, therefore, argues

that this testimony and related arguments should be stricken or otherwise excluded. *Id.* at 8 (citing Ex. 1042 ¶¶ 12–16; Pet. Reply 23–27).

Pursuant to 37 C.F.R. § 42.23(b), a reply “may only respond to arguments raised in the corresponding . . . patent owner response.” We agree with Petitioner, for the reasons stated in the Opposition, that the arguments in the Reply and Reply declaration testimony are responsive to arguments raised in the Patent Owner Response. *See* Opp. Mot. 7–12 (explaining the positions taken in the Petition, Patent Owner’s arguments in Response, and the arguments presented in Reply); *see Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1008–09 (Fed. Cir. 2023). Petitioner does not provide a new theory of unpatentability; rather, Petitioner responds and elaborates on the theory presented in the Petition to explain why Patent Owner’s arguments are incorrect. *E.g., Chamberlain Grp., Inc. v. One World Techs., Inc.*, 944 F.3d 919, 925 (Fed. Cir. 2019) (“Parties are not barred from elaborating on their arguments on issues previously raised.”); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1081–82 (Fed. Cir. 2015) (reasoning that rebuttal evidence should be responsive such that it is offered “to explain, repel, counteract, or disprove the evidence of the adverse party”). “[T]he introduction of new evidence in the course of the trial is to be expected in [IPR] trial proceedings” and permissible “as long as the opposing party is given notice of the evidence and an opportunity to respond to it.” *Genzyme Therapeutic Prods. Ltd. P’ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1366 (Fed. Cir. 2016).

We also note that our Consolidated Trial Practice Guide (“CTPG”) states that

In most cases, the Board is capable of identifying new issues or belatedly presented evidence when weighing the evidence at the

close of trial, and disregarding any new issues or belatedly presented evidence that exceeds the proper scope of reply or sur-reply. As such, striking the entirety or a portion of a party's brief is an exceptional remedy that the Board expects will be granted rarely.

CTPG at 80, 84 Fed. Reg. 64,280 (Nov. 21, 2019). We follow that guidance here.

Further, Patent Owner argues that Dr. Abidi's testimony as a co-author of Behbahani is "self-serving and unsupported." Motion 6–7. The fact that Dr. Abidi is a co-author of Behbahani, as well as Petitioner's expert, is not, in and of itself, sufficient to discredit Dr. Abidi's testimony. The CTPG provides that "[t]he Board has broad discretion to assign weight to be accorded expert testimony." CTPG 35. We are capable of discerning from the testimony and the evidence presented whether Dr. Abidi's testimony should be entitled to any weight, either as a whole or with regard to specific issues. We will weigh the testimony on an issue-by-issue basis as appropriate. Moreover, to the extent that Patent Owner has pointed out the inadequacies of Dr. Abidi's testimony, we are also capable of noting those inadequacies and weighing that testimony accordingly.

For the foregoing reasons, Patent Owner's motion to strike is denied.

For the foregoing reasons, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1–7, 9–13, 16, 23, 25, 26, 27, 29 of the '330 patent are unpatentable.¹³

¹³ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue

In summary:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–20	103	Behbahani, Leete, Tan	1–19	20
Overall Outcome			1–19	20

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–19 of the '164 patent have been shown to be unpatentable; and

FURTHER ORDERED that claim 20 of the '164 patent has not been shown to be unpatentable; and

FURTHER ORDERED that Patent Owner's Motion to Strike (Paper 23) is *denied*; and

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

application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

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