

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

PARKERVISION, INC.,
Appellant

v.

**KATHERINE K. VIDAL, UNDER SECRETARY OF
COMMERCE FOR INTELLECTUAL PROPERTY
AND DIRECTOR OF THE UNITED STATES
PATENT AND TRADEMARK OFFICE,**
Intervenor

2022-1548

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. IPR2020-
01265.

Decided: December 15, 2023

JASON SCOTT CHARKOW, Daignault Iyer LLP, Vienna,
VA, argued for appellant. Also represented by RONALD
MARC DAIGNAULT, CHANDRAN IYER, RICHARD JUANG.

MICHAEL S. FORMAN, Office of the Solicitor, United
States Patent and Trademark Office, Alexandria, VA, ar-
gued for intervenor. Also represented by BENJAMIN T.
HICKMAN, FARHEENA YASMEEN RASHEED.

Before PROST, WALLACH, and CHEN, *Circuit Judges*.

CHEN, *Circuit Judge*.

Intel Corporation petitioned the Patent Trial and Appeal Board (Board) for *inter partes* review (IPR) of independent claim 3 of U.S. Patent No. 7,110,444 ('444 patent), owned by ParkerVision, Inc. The Board determined that claim 3 is unpatentable as obvious, and ParkerVision appeals. Because the Board correctly construed the term “storage element” and did not procedurally err in how it treated certain arguments raised by the parties and because substantial evidence supports the challenged factual findings underpinning the obviousness determination, we *affirm*.

BACKGROUND

I. The '444 Patent

The '444 patent relates to wireless local area networks (WLANs) that use frequency translation technology. '444 patent col. 1 ll. 58–61. By way of example, in a two-device wireless communication network using frequency translation, a first device receives a low-frequency baseband signal—e.g., an audible signal including voice information—and up-converts this baseband signal to a high-frequency electromagnetic (EM) signal before wirelessly transmitting the EM signal to a second device. When the second device receives the high-frequency EM signal, the second device down-converts the EM signal back to a low-frequency baseband signal (e.g., to be emitted as an audible signal). According to the '444 patent, using frequency translation can provide advantages including “lower power consumption, longer battery life, fewer parts, lower cost, less tuning, and more effective signal transmission and reception.” *Id.* col. 2 ll. 31–36.

The '444 patent describes—and claim 3 is directed to—apparatuses for down-converting EM signals. *See, e.g., id.*

col. 9 l. 27–col. 13 l. 31. Figure 67A (reproduced below) illustrates an example of a receiver (3906) that includes two down-converter modules (4002A, 4002B). *Id.* col. 34 ll. 17–20, 25–27. Each down-converter module (4002A, 4002B) includes a corresponding controlled switch (6702A, 6702B) and storage module (6704A, 6704B). *Id.* col. 34 ll. 18–22, 25–29. The storage modules (6704A, 6704B) are capacitors (6706A, 6706B). *Id.* col. 34 ll. 22–23, 29–30. The '444 patent explains that U.S. Patent No. 6,061,551 ('551 patent)—which the parties agree is incorporated by reference—further describes down-conversion utilizing down-converter modules. *Id.* col. 9 ll. 30–38, col. 34 ll. 54–58.

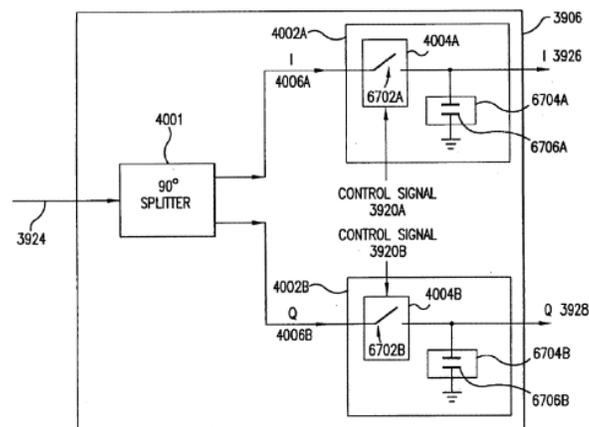


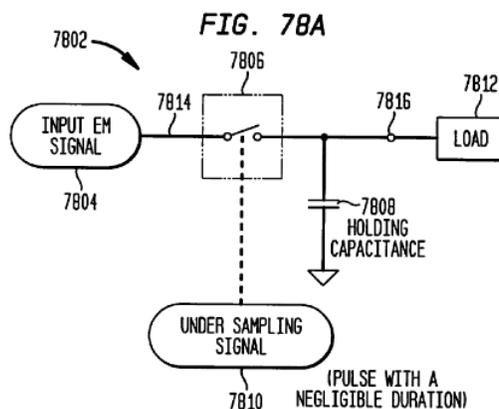
FIG.67A

'444 patent fig. 67A

A principal dispute in this appeal centers on two types of down-conversion systems described in the incorporated '551 patent: under-sampling systems and energy transfer systems. '551 patent col. 1 ll. 29–30, col. 2 ll. 53–56, col. 21 ll. 4–7.

In an under-sampling system (7802) as shown in Figure 78A (reproduced below), an under-sampling signal (7810) having a negligible pulse width (e.g., 1 to 10 picoseconds for an input signal of 900 MHz) is used to control a switching module (7806). *Id.* col. 63 ll. 40–49. A

holding capacitance (7808) (e.g., in the range of 1 picofarad) substantially charges the voltage of an input EM signal (7804) during pulses of the under-sampling signal (7810). *Id.* col. 63 ll. 53–59. According to the '551 patent, when a load (7812) is a high impedance load,¹ the holding capacitance (7808) does not significantly discharge between the pulses of the under-sampling signal (7810) such that, during a pulse, the holding capacitance (7808) tends to “hold” a voltage at the terminal (7816) until the next pulse. *Id.* col. 64 ll. 21–26.

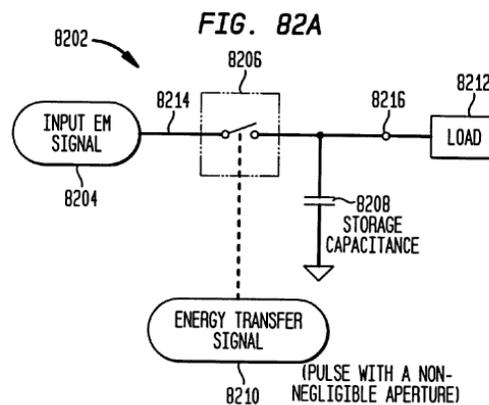


'551 patent fig. 78A

In an energy transfer system (8202) as shown in Figure 82A (reproduced below), an energy transfer signal (8210) having a non-negligible pulse width (e.g., approximately 550 picoseconds for an input signal of 900 MHz) is used to control a switching module (8206). *Id.* col. 67 ll. 1–14. A storage capacitance (8208) (e.g., in the range of 18 picofarads) stores energy transferred from an input EM signal (8204) “without substantial concern for

¹ The '551 patent describes that “[a] high impedance load is one that is relatively insignificant to an output drive impedance of the system for a given output frequency.” '551 patent col. 63 ll. 65–67.

accurately reproducing” a voltage of the input EM signal (8204). *Id.* col. 67 ll. 14–24. According to the ’551 patent, the energy transfer system (8202) transfers enough energy from the input EM signal (8204) so that the input EM signal (8204) can be down-converted even when the input EM signal (8204) is very small. *Id.* col. 67 ll. 26–30. The non-negligible amounts of the transferred energy permit the energy transfer system (8202) to effectively drive a low impedance load.² *Id.* col. 67 ll. 37–42.



’551 patent fig. 82A

In the incorporated ’551 patent, the parties identify one paragraph as critical to the meaning of “storage element.” The critical paragraph describes storage modules, storage capacitances, holding modules, and holding capacitances and reads:

FIG. 82A illustrates an exemplary energy transfer system 8202 for down-converting an input EM signal 8204. The energy transfer

² The ’551 patent describes that “[a] low impedance load is one that is relatively significant” to an output drive impedance of the system for a given output frequency. ’551 patent col. 67 ll. 34–37.

system 8202 includes a switching module 8206 and a storage module illustrated as a storage capacitance 8208. The terms storage module and storage capacitance, as used herein, are distinguishable from the terms holding module and holding capacitance, respectively. Holding modules and holding capacitances, as used above, identify systems that store negligible amounts of energy from an under-sampled input EM signal with the intent of “holding” a voltage value. Storage modules and storage capacitances, on the other hand, refer to systems that store non-negligible amounts of energy from an input EM signal.

Id. col. 66 ll. 55–67.

The sole claim on appeal is independent claim 3, which relates to a wireless modem apparatus for down-converting an input signal. Claim 3 recites:

3. A wireless modem apparatus, comprising:

a receiver for frequency down-converting an input signal including,

a first frequency down-conversion module to down-convert the input signal, wherein said first frequency down-conversion module down-converts said input signal according to a first control signal and outputs a first down-converted signal;

a second frequency down-conversion module to down-convert said input signal, wherein said second frequency down-conversion module down-converts said input signal according to a second control signal and outputs a second down-converted signal;
and

a subtractor module that subtracts said second down-converted signal from said first down-converted signal and outputs a down-converted signal; wherein said first and said second frequency down-conversion modules each comprise a switch and a *storage element*.

'444 patent at claim 3 (emphasis added). The italicized term “storage element” is the focus of this appeal.

II. Procedural History

Intel filed a petition for IPR of claims 1, 3, and 5 of the '444 patent. *Intel Corp. v. ParkerVision, Inc.*, No. IPR2020-01265, 2022 WL 212407, at *1 (P.T.A.B. Jan. 21, 2022) (*Board Decision*). After institution but before issuance of the final written decision, ParkerVision disclaimed claims 1 and 5. *Id.* The final written decision determined claim 3 to be unpatentable under 35 U.S.C. § 103(a) over Tayloe³ and TI Datasheet⁴. *Id.* at *2 nn.4–5, *31.

To reach this determination, the Board construed the term “storage element” as meaning “an element of a system that stores non-negligible amounts of energy from an input EM signal,” which tracks the description of a storage module in the above-mentioned critical paragraph from the '551 patent. *Id.* at *14. At institution, the Board did not construe any claim terms, as no party had yet raised a claim construction issue. *Id.* at *5. ParkerVision's patent owner response, however, pointed for the first time to the incorporated '551 patent and proposed that the term “storage element” should be construed as “an element of an *energy transfer system* that stores non-negligible amounts of energy from an input electromagnetic signal.” *Id.* at *6,

³ U.S. Patent No. 6,230,000.

⁴ SN74CBT3253 Dual 1-of-4 FET Multiplexer/De-multiplexer (rev. ed. May 1998).

*13 (emphasis added). The patent owner response then contended that Tayloe’s capacitors are not “storage elements” because they are not part of an energy transfer system. *Id.* at *20. Intel’s reply countered that ParkerVision had misread the ’551 patent, which, in Intel’s view, did not restrict a “storage element” to an element of an energy transfer system. *Id.* at *9–10. The Board concluded that Intel had the better reading. *Id.* at *13–14. Acknowledging that the U.S. District Court for the Western District of Texas in cases involving the ’444 patent and related patents had adopted claim constructions inconsistent with Intel’s proposed construction,⁵ the Board explained that it understood the final sentence of the critical paragraph in the ’551 patent to be lexicographic. *Id.* at *12, *14–15.

The final written decision also granted Intel’s motion to exclude certain arguments first raised in ParkerVision’s sur-reply. *Id.* at *28, *30. ParkerVision’s sur-reply argued that (1) Tayloe’s capacitors only hold a negligible amount of energy from an input EM signal and (2) the term “non-negligible” from the proposed constructions indicates that the “amounts of energy” are measured relative to an amount of energy available from the input EM signal. *Id.* at *22–23, *27. The Board determined that these arguments should be excluded because they “proceed[ed] in a new direction” compared to ParkerVision’s patent owner response, which exclusively focused on Tayloe’s lack of an energy transfer system. *Id.* at *27–28.

The Board further determined claim 3 to be unpatentable as obvious over Tayloe and TI Datasheet. *Id.* at *23–

⁵ See *ParkerVision, Inc. v. Intel Corp.*, Nos. 6:20-cv-108-ADA, 6:20-cv-562-ADA (W.D. Tex.); *ParkerVision, Inc. v. Hisense Co.*, Nos. 6:20-cv-870-ADA, 6:21-cv-562-ADA (W.D. Tex.); *ParkerVision, Inc. v. TCL Indus. Holdings Co.*, No. 6:20-cv-945-ADA (W.D. Tex.); *ParkerVision, Inc. v. LG Elecs. Inc.*, No. 6:21-cv-520-ADA (W.D. Tex.).

24, *26. Intel’s reply argued that Tayloe teaches the claimed “storage element” under either proposed construction, relying on teachings pertaining to the size of Tayloe’s capacitors, teachings on how Tayloe’s capacitors integrate an input signal, and expert testimony on the structure and operation of Tayloe’s capacitors. *Id.* at *22–23. Considering these arguments and ParkerVision’s non-excluded arguments, the Board agreed with Intel and found that Tayloe teaches a “storage element.” *Id.* at *23.

ParkerVision appeals the Board’s final written decision. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

ParkerVision challenges (1) the Board’s construction of the term “storage element” in claim 3, (2) the Board’s consideration of Intel’s reply analysis of Tayloe and the Board’s exclusion of ParkerVision’s sur-reply arguments that Tayloe fails to teach the claimed “storage element,” and (3) the Board’s finding that Tayloe teaches the claimed “storage element.” We address each challenge in turn.

I.

A.

“We review claim construction de novo and review any subsidiary factual findings based on extrinsic evidence for substantial evidence.” *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1378 (Fed. Cir. 2022). A patentee can displace plain and ordinary meaning of a claim term when it acts as its own lexicographer or disavows the full scope of the claim term. *Id.* “To act as its own lexicographer, a patentee must clearly set forth a definition of the disputed claim term other than its plain and ordinary meaning and must clearly express an intent to redefine the term.” *Id.* (internal quotation marks omitted).

B.

In the critical paragraph in the '551 patent incorporated into the '444 patent, ParkerVision acted as its own lexicographer to define the term “storage element.” The critical paragraph recites:

[1.] FIG. 82A illustrates an exemplary energy transfer system 8202 for down-converting an input EM signal 8204. [2.] The energy transfer system 8202 includes a switching module 8206 and a storage module illustrated as a storage capacitance 8208. [3.] The terms storage module and storage capacitance, as used herein, are distinguishable from the terms holding module and holding capacitance, respectively. [4.] Holding modules and holding capacitances, as used above, identify systems that store negligible amounts of energy from an under-sampled input EM signal with the intent of “holding” a voltage value. [5.] *Storage modules and storage capacitances, on the other hand, refer to systems that store non-negligible amounts of energy from an input EM signal.*

'551 patent col. 66 ll. 55–67 (emphasis added) (numbering added).

The critical paragraph clearly expresses an intent to define the term “storage element” in sentence 5. Sentence 3 uses the phrase “as used herein” to indicate that the descriptions in sentences 4 and 5 that follow are applicable to the '551 patent as a whole rather than to a specific embodiment. ParkerVision concedes as much. Appellant’s Reply Br. 2 (“[Sentence 3] includes the phrase ‘as used herein,’ which refers to the use of these terms (which are contained throughout the figures and specification) in general, not to a specific embodiment.” (emphasis removed)). In sentence 5, the phrase “refer to” links the terms “storage

module” and “storage capacitance” to the clause “systems that store non-negligible amounts of energy from an input EM signal.”⁶ The patentee’s use of the phrases “as used herein” and “refer to” conveys an intent for sentence 5 to be definitional. *See Kyocera*, 22 F.4th at 1378 (finding lexicography where the patentee used the phrase “also sometimes referred to herein as”).

Sentences 1 and 2 further confirm the definitional intent reflected in sentence 5. Sentences 1 and 2 describe a specific embodiment in the ’551 patent and consequently do not indicate any intent to provide globally applicable definitions. *See Augme Techs., Inc. v. Yahoo! Inc.*, 755 F.3d 1326, 1339 (Fed. Cir. 2014) (finding no lexicography where characterization of a claim term was “expressly qualified . . . as being exemplary”). Sentence 1 describes an “*exemplary* energy transfer system” of Figure 82A, and sentence 2 attaches a reference numeral to the “storage capacitance” to specify that this “storage capacitance” is referring to a specific element in Figure 82A. ’551 patent col. 66 ll. 55–59 (emphasis added). Critically, this paragraph of the ’551 patent then shifts to generally defining the terms “storage module” and “storage capacitance” in sentences 3 through 5—declining to use reference numerals, referring to “storage module” and “storage capacitance” as “terms,” and referring to the patent document as a whole with the phrase “as used herein.” *See Trustees of Columbia Univ. in City of New York v. Symantec Corp.*, 811 F.3d 1359, 1365 (Fed. Cir. 2016) (finding that statements in the specification were “not simply descriptions of the preferred embodiment” but, rather, were definitional); *Edwards Lifesciences LLC v. Cook Inc.*, 582 F.3d 1322, 1334 (Fed. Cir. 2009) (finding a description to be definitional in part

⁶ The parties agree that the term “storage module” used in the critical paragraph is synonymous with “storage element.” Appellee’s Br. 3; *see* Appellant’s Br. 16.

because the “definition was not limited to the embodiment being discussed”). In sum, the Board’s construction of “storage element”—“an element of a system that stores non-negligible amounts of energy from an input EM signal”—correctly tracks the lexicography provided in sentence 5. *Board Decision*, 2022 WL 212407, at *16.

ParkerVision, for its part, argues sentence 5 “is comparative, not definitional.” Appellant’s Br. 59. But that this sentence is comparative does not prevent it from being definitional. Indeed, sentences 4 and 5 are both comparative and definitional, defining holding modules and storage modules with the purpose of comparing these elements with one another. Contrary to what ParkerVision asserts, sentence 5 being comparative does not exclude the possibility that it also is definitional.

We are also not persuaded that the specification, when read as a whole, restricts a “storage element” to an element of an energy transfer system, as ParkerVision contends. Appellant’s Br. 55–59. ParkerVision invites us to read into claim 3 an entire system (an energy transfer system) simply on the basis that claim 3 recites a single component (a storage element) that can be part of that system. Such a construction is required, according to ParkerVision, because the ’551 patent (1) provides examples in which storage modules are used in energy transfer systems and in which holding modules, by contrast, are used in under-sampling systems, *id.* at 56–58, and (2) favorably describes an energy transfer system’s ability to drive a low impedance load using a storage element, *id.* at 56 (citing ’551 patent col. 67 ll. 37–46). As ParkerVision sees it, with the two words “storage element,” the claim requires (1) the claimed “first frequency down-conversion module” and “second frequency down-conversion module” to be energy transfer systems with low impedance loads, and (2) the claimed “first control signal” and “second control signal” to be signals having sampling apertures specific to energy transfer systems. *See* Appellant’s Br. 62.

Nothing in the intrinsic evidence, however, demands such a particularized meaning of claim 3’s “wireless modem apparatus” based merely on its recitation of a “storage element.” True, the ’551 patent presents several embodiments of energy transfer systems that use the term “storage module.” See, e.g., ’551 patent col. 66 ll. 56–59, col. 97 ll. 59–61, col. 101 ll. 53–55. But these examples merely indicate that the term “storage element” encompasses storage elements that are part of energy transfer systems, not that this term by itself necessarily invokes an entire energy transfer system. See *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (“It is not enough for a patentee to simply disclose a single embodiment or use a word in the same manner in all embodiments, the patentee must clearly express an intent to redefine the term.” (internal quotation marks omitted)).

Nor do we find the analysis proffered in related district court litigations to be persuasive. We recognize that the magistrate judge’s claim construction order in *ParkerVision v. LG*⁷ and the special master’s report and recommendation in *ParkerVision v. Hisense* and *ParkerVision v. TCL*⁸ adopted ParkerVision’s proposed construction. For example, in *Hisense* and *TCL*, the special master, upon review of the ’551 patent specification, noted that “the key difference between a storage [element / module / device] and a holding [element / module / device] is that the former is used only in an energy transfer system while the latter is used only in a sample-and-hold system.” J.A. 5952 (brackets in original).

In our view, the magistrate judge and the special master’s analyses were unduly influenced by the energy transfer system embodiments in the ’551 patent. As discussed

⁷ *Parkervision, Inc v. LG Elecs., Inc.*, No. 6:21-CV-00520-ADA, 2022 WL 2240465 (W.D. Tex. June 21, 2022).

⁸ J.A. 5922–54.

above, we consider these embodiments to be exemplary and do not find them to be a basis for defining the term “storage element” or limiting the term “storage element” to an element of an energy transfer system. The analysis in these district court proceedings does not alter our conclusion that the Board arrived at the correct construction for the term “storage element.”

We hold that the Board correctly adopted the construction that a “storage element” is “an element of a system that stores non-negligible amounts of energy from an input EM signal.”

II.

ParkerVision further contends that the Board erred in relying on certain arguments in Intel’s reply and in striking certain arguments in ParkerVision’s sur-reply. Appellant’s Br. 64–76. We disagree.

A.

We have held that IPR proceedings are formal adjudications that must satisfy the relevant procedural requirements of the Administrative Procedure Act (APA). *Dell Inc. v. Acceleron, LLC*, 818 F.3d 1293, 1301 (Fed. Cir. 2016). Under these requirements, the Board must:

“timely inform[]” the patent owner of “the matters of fact and law asserted,” 5 U.S.C. § 554(b)(3), must provide “all interested parties opportunity for the submission and consideration of facts [and] arguments . . . [and] hearing and decision on notice,” *id.* § 554(c), and must allow “a party . . . to submit rebuttal evidence . . . as may be required for a full and true disclosure of the facts,” *id.* § 556(d).

Id. (alterations and omissions in original). “Pursuant to these provisions, the Board may not change theories mid-stream without giving the parties reasonable notice of its change.” *Fanduel, Inc. v. Interactive Games LLC*, 966 F.3d

1334, 1339 (Fed. Cir. 2020) (quoting *Hamilton Beach Brands, Inc. v. f'real Foods, LLC*, 908 F.3d 1328, 1338 (Fed. Cir. 2018)). We review de novo the Board's compliance with the formal adjudication requirements of the APA. *Id.*

The APA also requires that we set aside any agency action that is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A); *Parus Holdings, Inc. v. Google LLC*, 70 F.4th 1365, 1370 (Fed. Cir. 2023). Rules promulgated by the United States Patent and Trademark Office (USPTO) dictate that a proper "reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, patent owner response, or decision on institution." 37 C.F.R. § 42.23(b). A proper "sur-reply may only respond to arguments raised in the corresponding reply and may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness." *Id.* We review for an abuse of discretion the Board's determination that a party violated these rules. *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). "An abuse of discretion is found if the decision: (1) is clearly unreasonable, arbitrary, or fanciful; (2) is based on an erroneous conclusion of law; (3) rests on clearly erroneous fact finding; or (4) involves a record that contains no evidence on which the Board could rationally base its decision." *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1380 (Fed. Cir. 2023) (quoting *Ericsson Inc. v. Intell. Ventures I LLC*, 901 F.3d 1374, 1379 (Fed. Cir. 2018)).

B.

ParkerVision challenges the Board's reliance on arguments allegedly first raised in Intel's reply that Tayloe teaches capacitors that store non-negligible amounts of energy from an input EM signal. Appellant's Br. 64–66. ParkerVision appears to suggest that the Board deprived ParkerVision of its procedural rights under the APA and

failed to comply with the USPTO's rule that a reply "may only respond to arguments raised in the . . . patent owner response . . ." Appellant's Br. 64–65 (quoting 37 C.F.R. § 42.23(b)). We find neither reason persuasive.

The Board permissibly relied on Intel's reply arguments as to how Tayloe teaches the claimed "storage element." Because the Board's institution decision did not contain an express claim construction, the APA required the Board to give Intel "adequate notice and an opportunity to respond under the new construction" first proposed in ParkerVision's patent owner response. *Axonics*, 75 F.4th at 1383.

Our decision in *Axonics* is instructive. There, like here, neither the petitioner nor the patent owner expressly proposed a pre-institution construction of any claim terms, and the Board's institution decision did not expressly construe any terms. *Id.* at 1378. Post-institution, the patent owner response proposed a construction of a claim limitation, which the final written decision ultimately adopted. *Id.* at 1378–79. The petitioner's reply contended that its relied-upon prior art taught the disputed limitation, even under the patent owner's newly-proposed construction, but the Board refused to consider that argument because the petition had not included such an argument. *Id.* at 1379. We vacated the Board's decision, "hold[ing] that where a patent owner in an IPR first proposes a claim construction in a patent owner response, a petitioner must be given the opportunity in its reply to argue and present evidence of anticipation or obviousness under the new construction, at least where it relies on the same embodiments for each invalidity ground as were relied on in the petition." *Id.* at 1384.

As the petitioner's reply did in *Axonics*, Intel's reply appropriately responded to ParkerVision's new claim construction by explaining how Tayloe discloses a "storage element" even under that proposed construction.

ParkerVision’s patent owner response, for example, asserted that “storage element” includes a particular storage requirement by proposing the term means “an element of an energy transfer system that *stores non-negligible amounts of energy from an input electromagnetic signal.*” J.A. 726 (emphasis added). The Board was obligated under *Axonics* to afford Intel the opportunity to respond to this construction and, in particular, to the new storage requirement that emerged in ParkerVision’s response.

Furthermore, in essentially adopting Intel’s “storage element” construction from its reply over ParkerVision’s competing construction, the Board did not “change theories midstream without giving the parties reasonable notice of its change.” *Fanduel*, 966 F.3d at 1339 (quoting *Hamilton Beach Brands*, 908 F.3d at 1338). Once ParkerVision introduced a claim construction argument into the proceeding through its patent owner response, Intel was entitled in its reply to respond to that argument and explain why that construction should not be adopted. And we see nothing wrong with Intel providing in that reply its own interpretation of the same intrinsic evidence ParkerVision had relied on to present what it believed to be a claim construction that more accurately corresponded to the definition contained in the specification. *See Board Decision*, 2022 WL 212407, at *10. Intel was not barred at that point from presenting its own competing construction. Importantly, in keeping with APA requirements, ParkerVision was given an opportunity in a sur-reply to respond to Intel’s proposed construction. *Id.* And though not dispositive, we note that, consistent with the facts of *Axonics*, Intel relied on the same capacitors in Tayloe that it relied on in its petition, i.e., capacitors 72, 76. *Compare* J.A. 829–31, 837–38, *with* J.A. 564–67. Intel did not “rely on new prior art” or even “new embodiments from the prior art references that were relied on in the petition,” and instead “relied on the same embodiments as it relied on in the petition.” *Axonics*, 75 F.4th at 1383–84.

In sum, we find that the Board did not violate ParkerVision's APA procedural rights. Under the APA and *Axonics*, the Board was required to permit Intel to respond to the new claim construction. *Axonics*, 75 F.4th at 1383. And the Board, in considering Intel's reply arguments, did not deprive the patent owner of notice and an opportunity to respond. *Fanduel*, 966 F.3d at 1339–40.

Finally, we do not believe the Board, in considering Intel's reply arguments, failed to comply with its regulation specifying that a “reply may only respond to arguments raised in the . . . patent owner response” 37 C.F.R. § 42.23(b). Intel's reply arguments, as discussed above, responded to a proposed construction that originated in ParkerVision's patent owner response. We therefore are not persuaded the Board abused its discretion.

C.

ParkerVision further argues that the Board erred in excluding its sur-reply arguments pertaining to the amount of energy stored in Tayloe's capacitors. Appellant's Br. 66–72. In ParkerVision's estimation, its sur-reply properly responded to arguments raised in Intel's reply. *Id.* at 67–71. We find that the Board did not abuse its discretion in excluding parts of ParkerVision's sur-reply.

As described above, ParkerVision's patent owner response proposed the construction of “storage element” requiring the “storage element” (1) to be an element of an energy transfer system *and* (2) to store non-negligible amounts of energy from an input EM signal. J.A. 769. Then, ParkerVision argued Tayloe's capacitors “are not ‘storage elements’ because the capacitors of Tayloe are not elements of ‘an energy transfer system.’” *Id.* at 797. The patent owner response made no mention of whether Tayloe's capacitors store non-negligible amounts of energy. In its petitioner's reply, Intel proposed the claim construction that served as the basis of the Board's claim construction that we adopt in this opinion and then argued that Tayloe

teaches storing non-negligible amounts of energy because its capacitors (1) are larger than the '551 patent's capacitor and (2) integrate the input EM signal. J.A. 829–31 (citing J.A. 4769–74 ¶¶ 6–14 (Reply Declaration)).

In its sur-reply, ParkerVision continued to press its own claim construction and reiterated that Tayloe does not describe an energy transfer system. J.A. 871–77, 888–89. ParkerVision then separately asserted that Tayloe's capacitors allegedly only store a negligible amount of energy because the phrase “non-negligible amounts of energy” must be measured relative to the available energy of the input EM signal. *Id.* at 877–88 (introducing numerous new attorney calculations demonstrating that Tayloe's capacitors store only negligible amounts of energy). The Board excluded this latter set of arguments because they proceeded in a “new direction” relative to ParkerVision's patent owner's response, which had solely attacked Tayloe for lacking an energy transfer system. *Board Decision*, 2022 WL 212407, at *26–28 (citing *Patent Trial and Appeal Board Consolidated Trial Practice Guide* (Nov. 2019), available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf>, at 74 (*Trial Practice Guide*)).

Under the circumstances, we do not believe the Board abused its discretion. ParkerVision's patent owner response contended that a “storage element” must store non-negligible amounts of energy but failed to argue that Tayloe's capacitors did not meet that requirement, instead choosing to focus on just the energy transfer system issue. The Board thus reasonably understood ParkerVision's excluded sur-reply arguments as offering a new theory of patentability that ParkerVision should have included with its other attacks on Tayloe in its patent owner response, rather than waiting to raise it in a sur-reply. *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1383 (Fed. Cir. 2023) (“We have held that in some circumstances the Board acts within its discretion when declining to consider . . . a

new theory of patentability raised by patent owner in sur-reply.”).

ParkerVision further argues that its sur-reply arguments were proper because they addressed allegedly new arguments in Intel’s reply. Appellant’s Br. 70. But as the Board explained:

[I]f [ParkerVision] believed [Intel’s] Reply raised an issue that was inappropriate for a reply brief or that [ParkerVision] needed a greater opportunity to respond beyond that provided by our Rules (e.g., to include new argument and evidence in its Sur-reply), it was incumbent upon [ParkerVision] to contact [the Board] and request authorization for an exception to the Rules. [ParkerVision] did not do so. [ParkerVision] did not request that its Sur-reply be permitted to include arguments and evidence that would otherwise be impermissible in a sur-reply.

Board Decision, 2022 WL 212407, at *28 (emphasis omitted); see *Axonics*, 75 F.4th at 1384 (criticizing the patent owner for its failure to seek leave to submit an expert declaration in its sur-reply). ParkerVision failed to partake in available procedural mechanisms, and it cannot now fault the Board for this failure.

For these reasons, we do not believe the Board abused its discretion in excluding ParkerVision’s sur-reply arguments.

III.

Finally, ParkerVision challenges the Board’s finding that Tayloe teaches elements that store non-negligible amounts of energy. Appellant’s Br. 72–76.

“We review the Board’s ultimate obviousness determination de novo and underlying factual findings for substantial evidence.” *Facebook, Inc. v. Windy City Innovations*,

LLC, 973 F.3d 1321, 1339 (Fed. Cir. 2020). Factual determinations reviewed for substantial evidence include “the scope and content of the prior art, differences between the prior art and the claims at issue, the level of ordinary skill in the pertinent art, the motivations to modify or combine prior art, and any objective indicia of non-obviousness.” *Corning v. Fast Felt Corp.*, 873 F.3d 896, 902 (Fed. Cir. 2017).

Substantial evidence supports the Board’s finding that Tayloe discloses the claimed “storage element.” The Board relied on the following evidence: (1) teachings from Tayloe that its capacitors integrate the input signal and charge to the average level of the input signal, *Board Decision*, 2022 WL 212407, at *23; (2) expert testimony that the accumulation of energy from such integration matches the ’551 patent’s description of a storage module’s operation, *id.*; (3) expert testimony that “the amount of energy stored in one of Tayloe’s capacitors 72–78 is . . . 0.6 [microjoules]” and that this amount would be a “significant amount of energy in the context of a down-conversion system such as that disclosed in Tayloe,” *id.* (omission in original); and (4) expert testimony comparing the capacitance of Tayloe’s capacitors with the capacitance of the ’551 patent’s storage module and concluding that Tayloe’s capacitors are “tens of thousands of times larger,” *id.* (emphasis omitted). This is substantial evidence.

We do not find ParkerVision’s arguments to the contrary persuasive. First, ParkerVision argues that Tayloe’s discussion of integrating an input signal does not teach using “energy or energy sampling.” Appellant’s Br. 75–76. This, however, is another flawed attempt to read an energy transfer requirement into the phrase “storage element.” As discussed above, claim 3 does not have any such requirement.

Second, ParkerVision contends that the size of Tayloe’s capacitors do not establish whether Tayloe’s capacitors

“*actually* store a non-negligible amount of energy[.]” Appellant’s Br. 74–75. But the Board did not rely on the capacitor size alone. Rather, the Board considered capacitor size in combination with Tayloe’s teachings regarding the voltage value of the input signal and additional expert testimony that the capacitor size was significant. *Board Decision*, 2022 WL 212407, at *23.

Finally, ParkerVision argues that the storage calculations performed by Intel’s expert only provide the maximum amount of energy that Tayloe’s capacitors can store, not what is actually stored. Appellant’s Br. 76. But ParkerVision’s only support for this argument is the attorney calculations in its sur-reply that the Board excluded. Indeed, each of the points ParkerVision raises on appeal against the Board’s obviousness findings consists of attorney argument that fails to undermine the evidence from Tayloe and from Intel’s expert. *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017) (“Attorney argument is not evidence.”).

For these reasons, we find that substantial evidence supports the Board’s conclusion that Tayloe teaches the claimed “storage element.”

CONCLUSION

We have considered ParkerVision’s remaining arguments and do not find them persuasive. The Board’s decision is *affirmed*.

AFFIRMED