

[REDACTED]

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TEXAS INSTRUMENTS INC.
and NXP USA, INC.,
Petitioners,

v.

PARKERVISION, INC.
Patent Owner.

IPR2024-00935¹
Patent 7,865,177 B2

Before MICHAEL R. ZECHER, BART A. GERSTENBLITH, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

GERSTENBLITH, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Challenged Claim Unpatentable
35 U.S.C. § 318(a)
Denying Petitioner's Motion to Exclude and
Dismissing in Part and Denying in Part
Patent Owner's Motion to Exclude
37 C.F.R. § 42.64(c)

¹ NXP USA, Inc., who filed a petition in IPR2024-01066, is joined as petitioner in this proceeding.

I. INTRODUCTION

A. Background

Texas Instruments Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting institution of *inter partes* review (“IPR”) of claim 14 (“the Challenged Claim”) of U.S. Patent No. 7,865,177 B2 (Ex. 1001, “the ’177 patent”). ParkerVision, Inc. (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”). Applying the standard set forth in 35 U.S.C. § 314(a), we instituted an IPR as to claim 14 on all grounds set forth in the Petition. Paper 9 (“Inst. Dec.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 19,² “PO Resp.”), Petitioner filed a Reply (Paper 33,³ “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 44,⁴ “PO Sur-reply”).⁵ Additionally, Patent Owner filed a Motion to Exclude Evidence (Paper 48,⁶ “PO MTE”), Petitioner filed an Opposition to Patent Owner’s Motion (Paper 53,⁷ “Pet. Opp.”), and Patent Owner filed a Reply in support of its

² A public version of Patent Owner’s Response is of record as Paper 21.

³ A public version of Petitioner’s Reply is of record as Paper 60.

⁴ A public version of Patent Owner’s Sur-reply is of record as Paper 45.

⁵ As reflected in Paper 70, we granted in part and dismissed in part Patent Owner’s Motions to Seal, granted Petitioner’s Motions to Seal, and Granted Patent Owner’s Motion for Entry of a Protective Order.

⁶ A public version of Patent Owner’s Motion is of record as Paper 76.

⁷ Petitioner timely filed its Opposition as Paper 49 without including the confidential header required by the Protective Order and then refiled the Opposition as Paper 53, including the header. To avoid confusion (because the Opposition includes information subject to the Protective Order) and for clarity of the record, we exercise our authority under 37 C.F.R. § 42.7(a) to expunge Paper 49. A public version of Petitioner’s Opposition is of record as Paper 74.

Motion (Paper 56,⁸ “PO MTE Reply”). Petitioner also filed a Motion to Exclude Evidence (Paper 52,⁹ “Pet. MTE”), Patent Owner filed an Opposition to Petitioner’s Motion (Paper 50,¹⁰ “PO Opp.”), and Petitioner filed a Reply in support of its Motion (Paper 58,¹¹ “Pet. MTE Reply”). An oral hearing was held on September 10, 2025, and the transcript is of record. Paper 71¹² (“Tr.”).

We have jurisdiction pursuant to 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of the Challenged Claim. Petitioner bears the burden of proving unpatentability of the Challenged Claim. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2021). Having reviewed the arguments and the supporting evidence, we determine that Petitioner has shown, by a preponderance of the evidence, that claim 14 of the ’177 patent is unpatentable. Additionally, for the reasons explained

⁸ A public version of Patent Owner’s Reply is of record as Paper 78.

⁹ Petitioner timely filed its Motion as Paper 47 without including the confidential header required by the Protective Order and then refiled the Motion as Paper 52, including the header. To avoid confusion (because the Motion includes information subject to the Protective Order) and for clarity of the record, we exercise our authority under 37 C.F.R. § 42.7(a) to expunge Paper 47. A public version of Petitioner’s Motion is of record as Paper 73.

¹⁰ A public version of Patent Owner’s Opposition is of record as Paper 77.

¹¹ A public version of Petitioner’s Reply in support of its Motion is of record as Paper 75.

¹² A public version of the transcript is of record as Paper 79.

below, we *deny* Petitioner’s Motion to Exclude, and we *dismiss in part and deny in part* Patent Owner’s Motion to Exclude.

B. Related Proceedings

Petitioner identifies the following litigation involving the ’177 patent: *ParkerVision, Inc. v. Texas Instruments Inc.*, No. 6:23-cv-00384 (W.D. Tex.) (“Texas Litigation”); *ParkerVision, Inc. v. NXP Semiconductors NV*, No. 6:23-cv-00389 (W.D. Tex.); *ParkerVision, Inc. v. Realtek Semiconductor Corp.*, 6:23-cv-00374 (W.D. Tex.); *ParkerVision, Inc. v. MediaTek, Inc.*, No. 6:23-cv-00375 (W.D. Tex.); *ParkerVision, Inc. v. Qualcomm Inc.*, No. 22-1755 (Fed. Cir.); and *ParkerVision, Inc. v. Qualcomm Inc.*, No. 6:14-cv-00687 (M.D. Fla.) (“Florida Litigation”). Pet. 83–84. Patent Owner identifies its cases pending in the U.S. District Court for the Western District of Texas against Texas Instruments, Inc.; Realtek Semiconductor Corp.; and MediaTek, Inc. Paper 7 (Patent Owner’s Updated Mandatory Notices), 1–2.

Additionally, in response to an Order (Paper 80) requiring the parties to indicate the relevancy of several decisions in related cases identified by Patent Owner, Patent Owner filed an Identification of Decisions in Related Matters (Paper 81), which identifies eight decisions from the six cases listed above.

C. Real Parties in Interest

Petitioner Texas Instruments Inc. identifies itself as a real party in interest. Pet. 83. Petitioner NXP USA, Inc. identifies itself, NXP Semiconductors N.V., NXP B.V., and Freescale Semiconductors Holdings V, Inc. as real parties in interest. IPR2024-01066, Paper 2

(Petition), 84. Patent Owner identifies ParkerVision, Inc. as a real party in interest. Paper 7, 1.

D. The Asserted Grounds of Unpatentability and Declaration Evidence

Petitioner challenges the patentability of claim 14 of the '177 patent on the following three grounds (Pet. 1):

Claim(s) Challenged	35 U.S.C. § ¹³	Reference(s)/Basis
14	103(a)	Tayloe, ¹⁴ TI Datasheet ¹⁵
14	103(a)	Razavi ¹⁶
14	103(a)	Razavi, Uzunoglu ¹⁷

Petitioner supports its challenge with a (first) Declaration of Dr. Ian Galton (Ex. 1003), a Declaration of June Ann Munford (Ex. 1014), a Declaration of Rickea McLeod (Ex. 1015), a Declaration of Maureen M. Honeycutt (Ex. 1018), a Second Declaration of Dr. Ian Galton (Ex. 1066), a

¹³ The Leahy-Smith America Invents Act (“AIA”) includes revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Although Petitioner contests whether the '177 patent is entitled to its full priority claim (*see* Pet. 1), the '177 patent was filed before March 16, 2013 (*see, e.g.*, Ex. 1001, code (22)), and, therefore, we apply the pre-AIA version of the statutory basis for unpatentability.

¹⁴ U.S. Patent No. 6,230,000 B1, issued May 8, 2001 (Ex. 1004, “Tayloe”).

¹⁵ Texas Instruments, *SN74CBT3253 Dual 1-of-4 FET Multiplexer/Demultiplexer*, 1–23 (2004) (Ex. 1005, “TI Datasheet”).

¹⁶ B. Razavi, *A 900-MHz CMOS Direct Conversion Receiver*, 1997 Symposium on VLSI Circuits Digest of Technical Papers, 113–14 (Ex. 1017, “Razavi”).

¹⁷ V. Uzunoglu & M.H. White, *The Synchronous Oscillator: A Synchronization and Tracking Network*, IEEE Journal of Solid-State Circuits, Vol. SC-20, No. 6, 1214–26 (Dec. 1985) (Ex. 1026, “Uzunoglu”).

Supplemental¹⁸ Declaration of Dr. James Dickens (Ex. 1067), and a Second Declaration of June Munford (Ex. 1069). Patent Owner supports its arguments with a Declaration of David Sorrells (Ex. 2016), a Declaration of Dr. David Ricketts (Ex. 2024), and a Declaration of Taylor Lepore (Ex. 2039). Additionally, Petitioner filed deposition transcripts of Dr. Ricketts (Ex. 1065 (taken June 13, 2025))¹⁹ and Mr. Sorrells (Ex. 1068 (taken May 23, 2025)),²⁰ and Patent Owner filed deposition transcripts of Dr. Galton (Exs. 2034 (taken Mar. 12, 2025), 2040 (CORRECTED) (taken July 16, 2025))²¹ and Dr. Dickens (Ex. 2041 (CORRECTED) (taken July 18, 2025)).²²

¹⁸ Although titled as a “Supplemental Declaration,” Exhibit 1067 is the only declaration provided by Dr. Dickens.

¹⁹ A public version of the deposition transcript of Dr. David Ricketts also is of record as Exhibit 1065.

²⁰ A public version of the deposition transcript of Mr. Sorrells also is of record as Exhibit 1068.

²¹ Exhibit 2040 was first filed on July 31, 2025, and a “corrected” version was filed on August 1, 2025. To clarify the record, we exercise our authority under 37 C.F.R. § 42.7(a) and expunge the originally filed Exhibit 2040 that was replaced with the corrected version.

²² Exhibit 2041 was first filed on July 31, 2025, and a “corrected” version was filed on August 1, 2025. To clarify the record, we exercise our authority under 37 C.F.R. § 42.7(a) and expunge the originally filed Exhibit 2041 that was replaced with the corrected version. A public version of the deposition transcript of Dr. James Dickens also is of record as Exhibit 2041.

E. The '177 Patent

The '177 patent is directed to “methods, systems, and apparatuses, and combinations and sub-combinations thereof, for down-converting an electromagnetic (EM) signal.” Ex. 1001, code (57). As pertains to the Challenged Claim, the '177 patent is directed to “a method for down-converting an electromagnetic signal” using first and second matched filtering/correlating modules to obtain first and second down-converted signals, and combining the first and second down-converted signals to output a first channel down-converted signal. *See id.* at 194:59–195:7. Figure 148 is reproduced below:

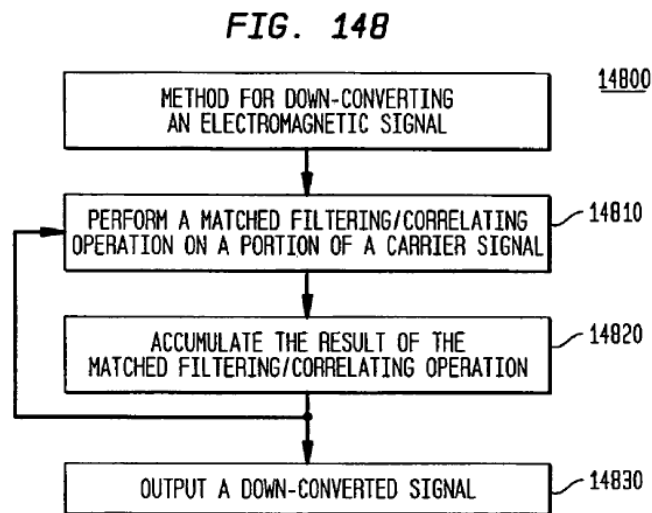


Figure 148 “illustrates a method for down-converting an electromagnetic signal . . . using a matched filtering/correlating operation.” Ex. 1001, 10:42–44; *see id.* at 131:14–16 (referring to Figure 148 as “example method 14800”).

Describing method 14800, the '177 patent explains that, at step 14810, a “matched filtering/correlating operation is performed on a portion of the carrier signal.” Ex. 1001, 131:17–18. “[T]he result of the

matched filtering/correlating operation in step 14810 is accumulated, preferably in an energy storage device” in step 14820. *Id.* at 131:38–40. “Steps 14810 and 14820 are repeated for additional half cycles of the carrier signal.” *Id.* at 131:43–44. Then, “[i]n step 14830, a down-converted signal is output.” *Id.* at 131:50–51.

Figure 149 is reproduced below:

FIG. 149

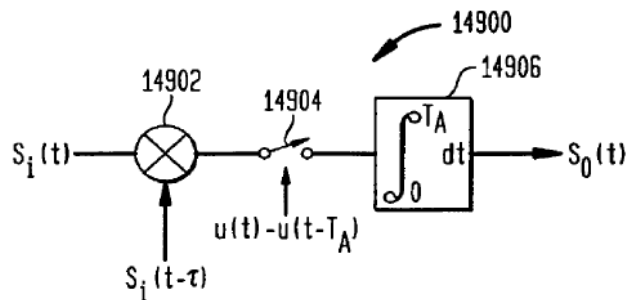


Figure 149 “illustrates a matched filtering/correlating processor.” Ex. 1001, 10:45–46. The ’177 patent explains that Figure 149 illustrates “gated matched filtering/correlating system 14900, which can be used to implement method 14800.” *Id.* at 131:53–55. The ’177 patent provides that,

in an embodiment, an impulse response of matched filtering/correlating system 14900 is identical to the modulated carrier signal, $S_i(t)$, to be processed. As can be seen in FIG. 149, system 14900 comprises a multiplying module 14902, a switching module 14904, and an integrating module 14906.

Id. at 131:55–60.

F. Illustrative Claim

Claim 14, the sole claim challenged in this proceeding, is reproduced below with Petitioner's bracketing added for reference:

14. [14P] A method for down-converting an electromagnetic signal, comprising:

[14.1] receiving an input signal at a first matched filtering/correlating module;

[14.2] down converting said input signal at said first matched filtering/correlating module according to a first control signal and outputting a first down-converted signal;

[14.3] receiving said input signal at a second matched filtering/correlating module;

[14.4] down-converting said input signal at said second matched filtering/correlating module according to a second control signal and outputting a second down-converted signal; and

[14.5] combining said second down-converted signal and said first down-converted signal to output a first channel down-converted signal.

Ex. 1001, 194:58–195:7; *see* Pet. vi (indicating Petitioner's bracketing).

II. ANALYSIS

A. Legal Standards – Obviousness

The U.S. Supreme Court set forth the framework for applying the statutory language of 35 U.S.C. § 103 in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966):

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial

success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

The Supreme Court explained in *KSR International Co. v. Teleflex Inc.* that

[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit.

550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” (alteration in original))).

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016). “[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

B. Level of Ordinary Skill in the Art

Petitioner, supported by Dr. Galton’s testimony, proposes that a person of ordinary skill in the art at the time of the invention would have had

“at least a bachelor’s degree in electrical engineering or a related subject and two or more years of experience in the field of electromagnetic (EM) circuit design.” Pet. 3 (citing Ex. 1003 ¶¶ 33–35). Petitioner further proposes that “[l]ess work experience may be compensated by a higher level of education, such as a master’s degree.” *Id.*

Patent Owner did not take a position in the Preliminary Response as to the level of ordinary skill in the art. *See generally* Prelim. Resp. And, at the preliminary stage, we adopted Petitioner’s uncontested, proposed level of ordinary skill in the art, which we found consistent with the level of ordinary skill in the art reflected by the ’177 patent and the prior art of record. Inst. Dec. 9 (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978)).

In its Response, Patent Owner contends that one of ordinary skill in the art “would have

- (a) a Bachelor of Science degree in electrical or computer engineering (or a related academic field), and at least two (2) additional years of work experience in the design and development of radio frequency [(RF)] circuits and/or systems,
- or (b) at least five (5) years of work experience and training in the design and development of radio frequency circuits and/or systems.

PO Resp. 2 (citing Ex. 2024 ¶ 30). Neither Patent Owner nor Dr. Ricketts explains why their proposal differs from that proposed by Petitioner. In its Reply, Petitioner does not specifically respond to Patent Owner’s definition of the level of ordinary skill in the art. *See generally* Pet. Reply.

Patent Owner’s option (a) is substantially the same as Petitioner’s proposal—both require a bachelor’s degree in the same or a related subject

and two additional years of related work experience. Patent Owner's option (b) adds an additional option based on work experience in lieu of a formal degree. Neither party contends that the differences in proposals affect the outcome of this proceeding, and we do not find that they do. Nonetheless, on the full record before us, we find that our identification of the level of ordinary skill in art in the Institution Decision as well as Patent Owner's option (b) are supported by the prior art of record, the '177 patent, and the opinions of Drs. Galton and Ricketts. Accordingly, we modify our preliminary finding to include option (b) from Patent Owner's proposal. Thus, we find that one of ordinary skill in the art would have at least a bachelor's degree in electrical engineering or a related subject and two or more years of experience in the field of electromagnetic (EM) circuit design, or at least five years of work experience and training in the design and development of EM²³ circuits and/or systems. We also find that less work experience may be compensated by a higher level of education, such as a master's degree.²⁴

C. Claim Construction

In this IPR, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b) (2020). The claim

²³ We use EM here instead of "radio frequency" for consistency with the experience noted previously, but our analysis herein would not change whether the experience were in EM circuits and/or systems or RF circuits and/or systems.

²⁴ The level of ordinary skill in the art is the same as that which we adopt in the Final Written Decision in related case IPR2024-00936.

construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims, as would have been understood by one of ordinary skill in the art at the time of the invention. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc). In construing claims in accordance with their ordinary and customary meaning, we take into account the specification and prosecution history. *Phillips*, 415 F.3d at 1315–17.

If the specification “reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess[,] . . . the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316 (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). Another exception to the general rule that claims are given their ordinary and customary meaning is “when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Uship Intellectual Props., LLC v. United States*, 714 F.3d 1311, 1313 (Fed. Cir. 2013) (quoting *Thorner v. Sony Computer Entm’t Am., LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)).

Additionally, only terms that are in controversy need to be construed, and these need be construed only to the extent necessary to resolve the controversy. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner presents one claim term for construction—“matched filtering/correlating module.” Pet. 6–13. We address it below.

The term “matched filtering/correlating module” is first recited in Element 14.1 (“receiving an input signal at a first *matched filtering/correlating module*” (emphasis added)). Ex. 1001, 194:61–62. As Petitioner explains, outside of the claims, the Specification of the ’177 patent does not use the term “matched filtering/correlating module.” Pet. 10. Petitioner asserts that Patent Owner advanced a particular construction of “matched filtering/correlating module” in the Texas Litigation between the parties.²⁵ *Id.* at 7–10. Petitioner explains that the construction advanced by Patent Owner in the Texas Litigation is the same as the construction adopted by the court in the Florida Litigation. *Id.* at 8 (citing Ex. 1037 (Claim Construction Order), 24). Although the final decision in that case was appealed to the U.S. Court of Appeals for the Federal Circuit, the Federal Circuit’s decision does not address the construction of this term. *See generally ParkerVision, Inc. v. Qualcomm Inc.*, 116 F.4th 1345 (Fed. Cir. 2024).

In contrast to that construction, Petitioner asserts “matched filtering/correlating module” “does not require a construction beyond its

²⁵ The construction of “matched filtering/correlating module” proposed by Patent Owner in the Western District of Texas Litigation is: “linear time-variant circuitry that samples a modulated RF (radio frequency) carrier signal at an aliasing rate using a switch with an independent control input driven by a control signal with a non-negligible, periodic aperture, such that the samples, having non-negligible available energy, are accumulated and transferred to a load while the switch is closed and discharged through the load while the switch is open, thereby transferring available real power from the modulated RF carrier signal to the load and producing a down-converted signal with enhanced signal-to-noise ratio.” Ex. 1010, 11–12. Citations are to the native page numbers of the underlying document filed as Exhibit 1010.

plain-and-ordinary meaning in light of the specification.” Pet. 10 (citing Ex. 1003 ¶¶ 18–32). Petitioner, however, does not specifically set forth the plain and ordinary meaning. *See id.* at 10–13. Rather, in that section of the Petition, Petitioner asserts the Specification of the ’177 patent describes the “matched filtering/correlating process” and provides example embodiments thereof. *Id.* Petitioner concludes its discussion by criticizing two aspects of Patent Owner’s construction as unsupported by the Specification. *See id.* at 13 (discussing Patent Owner’s omission of “correlating the input signal with the carrier frequency” and Patent Owner’s inclusion of language pertaining to discharging through a load). In particular, Petitioner explains that, in none of the three embodiments of a matched filtering/correlating module identified previously (i.e., in related litigation) by Patent Owner, does the Specification describe or illustrate discharging through a load. *Id.* (citing Ex. 1001, Figs. 148, 151, 153). Additionally, Petitioner contends that Figures 148 and 151 of the ’177 patent “illustrate and describe an integration module 14906 and 15104, respectively” and Figure 153 of the ’177 patent “illustrates and describes a capacitor.” *Id.* (citing Ex. 1001, 131:14–132:14, 133:22–40, 134:31–56; Ex. 1003 ¶¶ 18–32). Thus, Petitioner asserts that the ’177 patent “models the circuit with a load, but such . . . load is not described as part of the matched filtering/correlating module.” *Id.* (citing Ex. 1001, 147:36–148:24). Dr. Galton, Petitioner’s expert, sets forth what he presents as “an appropriate claim construction” for the term, but his

construction relies on the plain and ordinary meaning, without actually setting forth that meaning.²⁶

Rather than putting its eggs in one basket, Petitioner asserts that “claim 14 is unpatentable under either the Patent Owner’s construction or the plain-and-ordinary meaning,” and provides an analysis of claim 14 and the prior art under each construction. Pet. 7; *see, e.g., id.* at 25–36 (discussing element 14.1 under Patent Owner’s construction), 36–40 (discussing element 14.1 under what Petitioner contends is the plain and ordinary meaning).

Patent Owner did not take a position on claim construction in the Preliminary Response (*see generally* Prelim. Resp.) and, on the preliminary record at that time, we determined that we did not need to construe the term expressly because we found that Petitioner established a reasonable likelihood of showing that claim 14 would have been obvious to one of ordinary skill in the art under each potential construction presented by Petitioner, and because there was no controversy as to the meaning of the term at that point in the proceeding. Inst. Dec. 13 (citing *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)))).

²⁶ Dr. Galton opines that “an appropriate claim construction” is “[a] device with one or more features which are similar to those of a Matched-filter/Correlator *in the plain-and-ordinary meaning of the term*, wherein one of the similar features is that the aperture window is periodically non-zero with a phase that is synchronous with the carrier of the received signal.” Ex. 1003 ¶ 32 (emphasis added).

In its Response, Patent Owner asserts a construction different than that which it asserted in the related Texas Litigation between the parties. Specifically, Patent Owner contends that one of ordinary skill in the art would have understood that “matched filtering/correlating module” in the context of the ’177 patent means “circuitry that samples an input signal at an aliasing rate using a switch such that energy of the input signal is integrated and transferred to a load to form a down-converted signal.” PO Resp. 67 (citing Ex. 2024 ¶ 196). Patent Owner also asserts that this meaning is “also the plain and ordinary meaning of ‘matched filter/correlator.’” *Id.* (citing Ex. 2024 ¶ 197). And Patent Owner contends that “[s]ampling refers to reducing a continuous-time signal to a discrete-time signal.” *Id.* (citing Ex. 2030; PO Resp. §§ III.B.11, V.B.; Ex. 2024 ¶ 198).

In setting forth its position, Patent Owner contends the following: (1) “[t]he matched filtering/correlating module is part of an energy transfer system” (PO Resp. 57 (citing Ex. 2024 ¶ 174)); (2) “a matched filtering/correlating module includes a switch for sampling an input signal at an aliasing rate and that energy of the input signal is integrated” (*id.* at 62 (citing Ex. 2024 ¶ 185)); (3) “in order for a matched filter/correlator to function as a matched filter/correlator, it must produce an enhanced signal-to-noise ratio (SNR)” (*id.* (citing Ex. 2024 ¶ 186)); and (4) “a matched filtering/correlating module of the ’177 patent includes transferring energy to a load” (*id.* at 63 (citing Ex. 2024 ¶ 188)).

Additionally, Patent Owner contends that Petitioner’s expert, Dr. Galton, agreed that a matched filtering/correlating module samples an input signal at an aliasing rate. *See* PO Resp. 64 (citing Ex. 2034, 55:4–7). Additionally, Patent Owner points to Dr. Galton’s testimony directed to

Taylor and Razavi, contending that the circuitry identified by Dr. Galton as a matched filtering/correlating module includes a switch, capacitor, and load (resistor). *Id.* at 64–66. Thus, Patent Owner contends “the experts agree that ‘matched filtering/correlating module’ must include at least a switch, integrator (capacitor), and load (resistor), must sample an input signal at an aliasing rate, and must integrate energy of the input signal.” *Id.* at 67. Patent Owner further notes that “a load must be associated with the module of the ’177 patent in order to produce an enhanced SNR (an aspect of a matched filter) of a receiver.” *Id.* (citing Ex. 2024 ¶ 195).²⁷

In Reply, Petitioner contends that Patent Owner’s construction “improperly shoehorns in multiple limitations not in the plain meaning of the phrase, including the concept of transferring to a load.” Pet. Reply 25. Petitioner provides a thorough discussion as to its view that transferring to a load is not within the plain meaning of “matched filtering/correlating module. *See id.* at 25–35. Petitioner contends that the ’177 patent “does not require that down-converting using a matched filtering/correlating module involve[s] transferring to a load.” *Id.* at 25 (citing Ex. 1042, 25–37; Ex. 2006, 2). Petitioner points to Figures 152 and 173 of the ’177 patent, asserting that they do not indicate the presence of a load or transferring to a load. *Id.* at 26–27. Additionally, Petitioner points to equations in the ’177 patent that Petitioner contends describe charge accumulation for Figure 173, but do not depend on the load. *Id.* at 28. Petitioner contrasts the

²⁷ Patent Owner notes that the U.S. District Court for the Middle District of Florida also construed “matched filtering/correlating module” with “additional details,” and that Patent Owner believes “this construction also captures the meaning of ‘matched filtering/correlating module.’” PO Resp. 67–68 (citing Ex. 2007, 24; Ex. 2024 ¶¶ 199–200).

description of Figure 173 with the Specification's description of Figure 175A, which Petitioner contends shows "adding" a load resistor to the resistor/capacitor (RC) processor of Figure 173. *Id.* at 29. Further, Petitioner asserts that the Specification describes transferring energy from the input signal to the capacitor based on a non-negligible aperture window, which is different than transferring to a load. *Id.* at 31 (citing Ex. 1001, 29:15–37, Fig. 46C; Ex. 1066 ¶¶ 15–17).

Additionally, Petitioner contends that the '177 patent makes clear that it is the duration of the aperture pulses (and not the aliasing rate or the load) that distinguishes "under-sampling" from "energy transfer," even though the Specification uses the term "aliasing" for both "under-sampling" and "transferring energy." Pet. Reply 31–32 (citing Ex. 1001, 73:5–12, 73:54–65, Figs. 45A, 67B). Petitioner asserts that it is clear from the Specification that "the transfer of energy to achieve down-conversion is from the EM signal to the capacitor, and not from the EM signal to the load resistor," and that "during the non-negligible aperture period, when the switch is closed ('ON'), energy is transferred from the EM signal to the capacitor for storage." *Id.* at 33 (citing Ex. 1066 ¶¶ 15–21, 55, 60, 92–97). Petitioner further contends that, although a "benefit of the energy transfer system is the ability to drive low-impedance loads, "energy transfer is achieved independent of the load." *Id.* at 33–34 (citing Ex. 1001, 74:5–6, 7:16–18; Ex. 1066 ¶¶ 15–18, 5–26).

Further, Petitioner contends that Patent Owner mischaracterizes Dr. Galton's testimony. Pet. Reply 35. Petitioner asserts each embodiment of the '177 patent has "two features" in common—"synchrony and sampling at an 'aliasing rate.'" *Id.* (citing Ex. 1066 ¶¶ 29–31). Petitioner contends

that, although “[i]t is true that the embodiments also integrate/accumulate energy from the input signal,” “this is a function of the embodiments, not a feature of them.” *Id.* (citing Ex. 1066 ¶¶ 29–31).

In its Sur-reply, Patent Owner maintains that the meaning of “matched filtering/correlation module” “should include that energy is ‘transferred to a load to form a down-converted signal.’” PO Sur-reply 26–27. Patent Owner contends that it is not the accumulation of charge that produces a down-converted signal “but rather the *output* of that accumulation” and “[o]utput necessarily requires discharge.” *Id.* at 31. Patent Owner contends that Dr. Galton admits that charging and discharging indicates the presence of a load. *Id.* at 27 (citing Ex. 2040, 12:10–22).

Additionally, Patent Owner contends that Petitioner’s reply argument—that a load is not required by the plain and ordinary meaning of “matched filtering/correlating module”—is inconsistent with the Petition because, in the annotated versions of Tayloe’s and Razavi’s circuits, Petitioner and Dr. Galton included a resistor (load) from each reference in their identification of a matched filtering/correlating module. PO Sur-reply 27–29. Patent Owner contends that the annotations are consistent with its proposed construction that includes a load. *Id.* at 29.

Further, Patent Owner asserts that “[t]he claimed ‘matched filtering/correlating module’ only works to down-convert if it includes a load. Without a load, energy cannot be transferred to form a down-converted signal.” PO Sur-reply 30. Patent Owner contends that Petitioner and Dr. Galton fail to recognize that the ’177 patent “progressively builds on concepts—from high-level figures/discussions to increasingly detailed figures/discussions/implementations,” and that Petitioner’s focus on the

higher-level figures omits key disclosures. *Id.* at 30–31. Patent Owner points to several alleged deficiencies in Petitioner’s argument. *Id.* at 31–35.

First, Patent Owner contends that “Petitioner cites figures showing an integrator (e.g., capacitor) charges and accumulates/integrates energy,” “[b]ut Petitioner conveniently ignores what happens next (i.e., discharge)—suggesting that ‘the result of accumulating is a down-converted signal.’” PO Sur-reply 31 (quoting Pet. Reply 26). But Patent Owner argues that Petitioner’s annotation to Figure 152 of the ’177 patent undermines its argument because “Petitioner implicitly concedes that it is not the accumulation itself that produces the down-converted signal, but rather the *output* of that accumulation. *Output* necessarily requires discharge.” *Id.* (citing Pet. Reply 27). Patent Owner asserts that the ’177 patent confirms this point by stating that the accumulated charge is “*used to form*” the down-converted signal. *Id.* (quoting Ex. 1001, 130:28–31). According to Patent Owner, “[f]or this to occur, the integrator/capacitor discharges the accumulated/integrated energy to a load.” *Id.* (citing Ex. 1001, 147:35–149:19).

Second, Patent Owner asserts that, even though Figures 65 and 68G of the ’177 patent do not show transferring to a load, Figure 83E of the ’177 patent shows the down-converted signal that corresponds to Figures 65 and 68G and Dr. Galton acknowledged that Figure 83E shows charging and discharging of a capacitor, and the discharge indicates the presence of a load. PO Sur-reply 32 (citing Ex. 2040, 12:10–22). Patent Owner contends that the omission of a load from Figures 65/68G is “immaterial” because a person of ordinary skill in the art “understands that a load is used.” *Id.*

(citing Ex. 2024 ¶¶ 186–188); *see also id.* at 32–33 (asserting that Figures 65/68G also are tied to Figure 82A, which shows a load).

Third, Patent Owner contends that Petitioner’s reliance on Figure 173 of the ’177 patent is misplaced because the capacitor in Figure 173 accumulates the energy and then discharges that energy and the discharge happens “with the presence of a load” so whether that load is shown or not “is irrelevant.” PO Sur-reply 33. Patent Owner asserts that the formulas Petitioner points to are also not dispositive because they “describe only accumulation” and not “what is required to form the down-converted signal (discharge to a load).” *Id.* at 33–34.

Fourth, Patent Owner contests Petitioner’s reliance on Figure 175A of the ’177 patent, asserting that it is not an alternative embodiment of the matched filtering/correlating modules shown in other figures but rather “simply introduces a discussion of how a load . . . affects discharging behavior of the capacitor.” PO Sur-reply 34 (citing Ex. 1001, 147:39–148:16).

Fifth, Patent Owner contends that the portions of the Specification to which Petitioner cites to support its argument that a load is not required for energy transfer ignore other portions of the Specification repeatedly mentioning that, in energy transfer, the down-converted signal is formed by discharging energy from a capacitor to a load. PO Sur-reply 34–35 (citing Pet. Reply 31–33; PO Resp. 18–22; Ex. 1001, Figs. 50E, 51E, 52E, 83E, 80:62–81:5, 82:6–16, 83:47–57).

Lastly, Patent Owner asserts that whether some energy transfer is undertaken without a load is inapposite because the issue is whether, in an

energy transfer system, “a *down-converted signal* can be achieved *without* a load” and Patent Owner contends that “it cannot.” PO Sur-reply 35.

Before we discuss our analysis of the parties’ positions, we recognize that two district courts have construed “matched filtering/correlating module.” In the Florida Litigation involving Patent Owner and Qualcomm (not Petitioner), the district court construed “matched filtering/correlating module” to mean

linear time-variant circuitry that samples a modulated RF (radio frequency) carrier signal at an aliasing rate using a switch with an independent control input driven by a control signal with a non-negligible, periodic aperture, such that the samples, having non-negligible available energy, are accumulated and transferred to a load while the switch is closed and discharged through the load while the switch is open, thereby transferring available real power from the modulated RF carrier signal to the load and producing a downconverted signal with enhanced signal-to-noise power ratio.

Ex. 1037, 24. And in three cases in the Western District of Texas (two of which involved Petitioners), the district court adopted the Special Master’s Report and Recommendation Regarding Claim Construction (*see, e.g.*, Ex. 2049²⁸), which determined that “matched filtering/correlating module” should be construed “according to its plain-and-ordinary meaning wherein the module samples an input signal at an aliasing rate” (*see, e.g.*, Ex. 1042,

²⁸ *ParkerVision, Inc. v. Texas Instruments, Inc.*, No. 6:23-cv-00384 (W.D. Tex.).

37²⁹). *See* Paper 81 (Patent Owner’s Identification of Decisions in Related Matters), 3–4.

We make several observations regarding these related cases. First, neither Petitioner nor Patent Owner proposes a construction for “matched filtering/correlating module” is that is the same as the construction adopted by either of the district courts. As explained above, Petitioner proposes that the term be construed according to its plain and ordinary meaning (Pet. 10) and Patent Owner proposes that the term be construed to mean “circuitry that samples an input signal at an aliasing rate using a switch such that energy of the input signal is integrated and transferred to a load to form a down-converted signal” (PO Resp. 67). Patent Owner’s proposal has similarities to the construction adopted by the district court in the Florida Litigation, whereas Petitioner’s proposal is more aligned with the construction adopted by the Western District of Texas.

Second, the claim construction arguments and evidence presented before the two district courts are different than the arguments presented by the parties here. For example, in both the Florida and Texas Litigations, each defendant (Qualcomm and Texas Instruments) argued that the finite time integrating characterization and the RC processing characterization described in the Specification are not embodiments of the claimed “matched filtering/correlating module,” at least because the Specification distinguishes those characterizations as compared to the matched filtering/correlating characterization. In each decision, however, the Middle District of Florida

²⁹ Patent Owner refiled the Special Master’s Report and Recommendation as Exhibit 2048. We cite to Exhibit 1042 since it is the first-filed version of the same document.

and Western District of Texas district courts determined that all three characterizations are embodiments of a “matched filtering/correlating module.” *See, e.g.*, Ex. 1037, 18 (determining that “Figures 151 and 153 are additional embodiments of matched filtering/correlating module”); Ex. 1042, 36 (determining that “all three embodiments are within the scope of this term”). Figures 151 and 153 of the ’177 patent illustrate examples of the finite time integrating system and RC processing system, respectively. Ex. 1001, 133:22–23 (discussing Figure 151), 134:31–32 (discussing Figure 153). Here, Petitioner does not argue that the finite time integrating characterization and the RC processing characterization are not within the scope of a matched filtering/correlating module. *See* Pet. Reply 25 (noting, without contesting, that Patent Owner cites Figure 153 as an example of a matched filtering/correlating module). Because the record in this proceeding does not include argument as to these two characterizations, we do not address whether they should be considered embodiments of a matched filtering/correlating module. Accordingly, although we have reviewed the decisions of the Middle District of Florida and Western District of Texas district courts as thoroughly as the record before us allows and we consider them informative as to how other judicial bodies understood the term, we feel constrained by the arguments and evidence presented here to reach our determination regarding the construction of “matched filtering/correlating module” as recited in claim 14.

Turning to the arguments and evidence presented here, although there are many nuanced aspects of Patent Owner’s proposed construction of “matched filtering/correlating module,” a fundamental question before us is whether the plain and ordinary meaning of the term requires transferring

energy to a load to form a down-converted signal. This issue is fundamental to the dispute before us because, aside from Patent Owner’s arguments regarding whether Tayloe is prior art to the ’177 patent, Patent Owner’s sole argument directed to Tayloe is that Tayloe does not teach the recited “matched filtering/correlating module” because Tayloe does not transfer energy to a load. *See* PO Resp. 94–100; *see also* Pet. Reply 35–36 (noting that Patent Owner’s “rebuttal of obviousness in view of Tayloe/TI-Datasheet rests in its erroneous claim construction”); PO Sur-reply 35 (“Tayloe does not transfer energy to a load (i.e., to Tayloe’s differential amplifiers 50, 52) to form a down-converted signal.”).

Claim 14 recites “[a] method for down-converting an electromagnetic signal, comprising” *inter alia* “receiving an input signal at a first matched filtering/correlating module” and “down converting said input signal at said first matched filtering/correlating module according to a first control signal and outputting a first down-converted signal.” Ex. 1001, 194:59–65. Of note, claim 14 is a method claim. The steps of the method that involve a first matched filtering/correlating module recite “receiving an input signal” at the module, “down-converting” the input signal at the module, and “outputting a first down-converted signal.”³⁰ *Id.* As reflected, claim 14 does not expressly recite transferring energy to a load. And, neither party asserts that the Specification of the ’177 patent provides a lexicographic definition of “matched filtering/correlating module” or that disclaimer applies, and both parties acknowledge that the term is not recited in the Specification outside of the claims. Thus, we agree with the Texas Special

³⁰ Claim 14 also recites parallel steps pertaining to a second matched filtering/correlating module. *See* Ex. 1001, 194:66–195:4.

Master and district court that the term should be construed in accordance with its plain and ordinary meaning.

For the reasons set forth primarily in Petitioner’s Reply, which we adopt as our own because we find them persuasive and more fully supported on the complete record than the arguments presented by Patent Owner seeking to narrow the term with numerous additional, unrecited limitations, we do not agree with Patent Owner that the plain and ordinary meaning of “matched filtering/correlating module” requires transferring energy to a load. *See* Pet. Reply 25–35. In this regard, we find Dr. Galton’s testimony discussing the embodiments described in the ’177 patent informative because, as he explains, the figures reflect output of a down-converted signal without the presence of a load as a component of the module. *See, e.g.*, Ex. 1066 ¶¶ 5–6; *see also id.* ¶¶ 5–28 (discussing the ’177 patent). Additionally, there is nothing in the Specification of the ’177 patent that *requires* the meaning of a “matched filtering/correlating module” to include transferring energy to a load. *See* Pet. Reply 25–35 (discussing, in detail, the description in the Specification). In particular, and as pointed to by Dr. Galton, Figures 149 and 173 of the ’177 patent detail an example of a matched filtering/correlating operation that outputs a down-converted signal without transferring to a load. Ex. 1066 ¶¶ 6–14 (discussing the figures and the Specification’s description thereof); *see also id.* ¶ 15 (discussing Figures 65 and 68G of the ’177 patent that illustrate a down-converted signal without transfer to a load). And Dr. Galton’s explanation of how an integrator works in Figure 173 of the ’177 patent and, particularly, the description reflecting that the embodiment down-converts the input signal

even though the result of the integration is not transferred to a load is also informative. *See id.* ¶ 25.

Additionally, we disagree with Patent Owner's argument that the steps of claim 14 somehow require the matched filtering/correlating module to perform the additional function of transferring energy to a load. During the oral argument, in discussing the language of claim 14, Patent Owner's counsel stated:

[I]n order to output something from the integrator, which is part of the matched filtering/correlating module, you have to discharge it. That's the only way you could do it.

And the only way you could discharge it is having a load, and the only place that load can be is in the matched filtering/correlating module, because the very next thing says, after the output, you combine. There's no other circuit; there's nothing else left in the system to output it to. So, whenever that output is occurring, it has to be to a load because you can't output without a load, and that load, because the combining step happens immediately after the down-converting signal, that load has to be part of the matched filtering/correlating module.

Tr. 85:16–86:5. We disagree with the premise of Patent Owner's argument. The premise of Patent Owner's argument is that because claim 14 recites a particular step (outputting a first down-converted signal) and does not separately recite transferring energy to a load, that necessarily means that transferring energy to a load must be part of the *meaning* of a “matched filtering/correlating module.” Not so. Critically, claim 14 does not recite *where* the first down-converted signal is output to. As Petitioner persuasively shows, the '177 patent describes transferring energy from the input signal to the capacitor. *See* Pet. Reply 31–32. Further, even if a load were required to output the down-converted signal, that does not mean that

the plain and ordinary meaning of a matched filtering/correlating module necessarily requires inclusion of a transferring to a load. Rather, given the use of the transition phrase “comprising” in the preamble, there is nothing precluding other components described in the Specification from being part of a larger system or method that is not recited by the language of claim 14.³¹ Thus, we disagree that the plain and ordinary meaning of matched filtering/correlating module requires transferring energy to a load.³²

Another aspect of the construction of matched filtering/correlating module pertains to the Specification’s use of the phrase “the present invention.” The Special Master in the related Texas Litigation noted that, even though the plain and ordinary meaning applies, the plain and ordinary meaning should be “clarifie[d]” “by adding” “wherein the module samples an input signal at an aliasing rate” because of “how the specification of the ’177 Patent describes the ‘present invention.’” Ex. 2035, 40–41 (citing Ex. 1001, 26:23–25, 1:65–67). As noted above, Patent Owner’s construction includes the same phrase and, during the oral argument, Petitioner’s counsel indicated that, although the construction is slightly broader, he does not

³¹ See Tr. 26:8–16 (Petitioner’s counsel acknowledges that a component (e.g., a load) would need to be downstream of the capacitor to output the signal but asserts that component is not part of, or included in, the plain and ordinary meaning of matched filtering/correlating module.).

³² We also find the Special Master’s Report and Recommendation, which the district court adopted, in the related Texas litigation noteworthy in that (1) the Special Master walks through the Specification of the ’177 patent in detail and (2) rejects Patent Owner’s attempt to read numerous limitations into the meaning of “matched filtering/correlating module,” including the requirement of transferring to a load. See Ex. 2035, 31–41.

object to including the clarifying language added by the Texas district court. Tr. 18:15–16.

The precise language of the Specification relied on by the Texas district court states, “[c]ontrary to conventional wisdom, the present invention is a method and system for down-converting an electromagnetic (EM) signal by aliasing the EM signal.” Ex. 1001, 26:23–25. And the Specification states, “[t]he present invention also relates to under-sampling and to transferring energy at aliasing rates.” *Id.* at 1:65–67. Further, the Specification goes on to define the term “aliasing,” stating, “[t]he term aliasing, as used herein, refers to both down-converting an EM signal by under-sampling an EM signal at an aliasing rate and to down-converting an EM signal by transferring energy from the EM signal at the aliasing rate.” *Id.* at 26:40–45. As reflected by a comparison of the language from the Specification and the clarification added by the Western District of Texas district court, they are not the same. Nonetheless, because the parties do not dispute the clarification added, we maintain its application here and, therefore, construe “matched filtering/correlating module” according to its plain and ordinary meaning wherein the module samples an input signal at an aliasing rate. We also note that neither the plain and ordinary meaning nor the wherein clause requires transferring energy to a load.³³

D. Ground 1: Obviousness over Tayloe and TI Datasheet

Petitioner asserts that the combination of Tayloe and TI Datasheet would have rendered the subject matter of claim 14 obvious to one of

³³ We feel compelled to note that, although transferring energy to a load is not required by the language of claim 14 or the plain and ordinary meaning of “matched filtering/correlating module,” neither is it excluded.

ordinary skill in the art at the time of the invention. Pet. 14; *see id.* at 20–24 (discussing motivation to combine Tayloe and TI Datasheet and reasonable expectation of success), 24–54 (discussing the application of the prior art to the claim). Patent Owner contends that Tayloe is not prior art to claim 14 and, therefore, is not available for use as a reference upon which an obviousness challenge can be based. PO Resp. 94 (citing Ex. 2024 ¶ 280). Additionally, as noted above, Patent Owner asserts that Tayloe, whether alone or in combination with TI Datasheet, does not teach the “matched filtering/correlating module” recited in claim 14. *Id.* (citing Ex. 2024 ¶¶ 282–283).

We first address whether Tayloe is prior art to claim 14 and then we address whether Petitioner has established that the combination of Tayloe and TI Datasheet would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention.

1. Whether Tayloe is Prior Art to Claim 14 of the '177 Patent

The application that issued as Tayloe was filed on October 15, 1998, and issued on May 8, 2001. Ex. 1004, codes (22), (45). Petitioner contends that Tayloe is prior art under pre-AIA 35 U.S.C. § 102(e). Pet. 2. The '177 patent was filed on January 7, 2009, and states that it is related to a series of earlier patent applications, the earliest of which was U.S. Patent Application No. 09/176,022, filed on October 21, 1998 (now U.S. Patent No. 6,061,551 A). Ex. 1001, codes (22), (60). Patent Owner contends that “[c]laim 14 of the '177 patent was conceived at least as early as January 20, 1998[,] and diligently reduced to practice by no later than April 29, 1998.” PO Resp. 26 (citing Ex. 2024 ¶ 165).

The Federal Circuit has explained the following:

In considering whether or not a reference qualifies as prior art under pre-AIA 35 U.S.C. § 102(e), we must consider whether or not “the invention was described in . . . a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent.” A patent owner may antedate an asserted prior art patent by showing conception of the claimed invention prior to the critical date and either actual reduction to practice prior to the critical date or “reasonably continuous diligence” in reducing the invention to practice until its effective filing date.

Medtronic, Inc. v. Teleflex Innovations S.À.R.L., 68 F.4th 1298, 1302–03 (Fed. Cir. 2023) (alteration in original) (citing *ATI Techs. v. Iancu*, 920 F.3d 1362, 1369 (Fed. Cir. 2019); *Tyco Healthcare Grp. v. Ethicon Endo-Surgery, Inc.*, 774 F.3d 968, 975 (Fed. Cir. 2014)). Additionally, “[i]nventor declarations submitted to antedate a reference must be corroborated, and corroboration is governed by a ‘rule of reason’ standard.” *Id.* at 1303 (citing *Perfect Surgical Techs., Inc. v. Olympus Am., Inc.*, 841 F.3d 1004, 1007–09 (Fed. Cir. 2016)). “To establish actual reduction to practice before the critical date, it must have been shown that ‘(1) [the inventors] constructed an embodiment or performed a process that met all the limitations of the [claimed invention]; and (2) [the inventors] determined that the invention would work for its intended purpose.’” *Id.* (alterations in original) (quoting *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998)).

Additionally, in the specific context before us, “the petitioner bears the ultimate burden of persuasion on invalidity, which never shifts to the patent owner,” but “when a patent owner attempts to antedate an asserted prior art reference, the patent owner takes on a temporary burden of production.” *Medtronic*, 68 F.4th at 1303 (citing *Dynamic Drinkware*, 800

F.3d at 1378). But “[o]nce that burden is met, the burden shifts back to the petitioner.” *Id.* (citing *Dynamic Drinkware*, 800 F.3d at 1379).

As noted above, Patent Owner contends that “[c]laim 14 of the ’177 patent was conceived at least as early as January 20, 1998[,] and diligently reduced to practice by no later than April 29, 1998.” PO Resp. 26 (citing Ex. 2024 ¶ 165). Since Patent Owner’s alleged date of reduction to practice (April 29, 1998) is prior to Tayloe’s October 15, 1998, filing date, Patent Owner does not need to establish “reasonably continuous diligence in reducing the invention to practice” during the time period between April 29 and October 15, 1998. *Medtronic*, 68 F.4th at 1302–03. Thus, we assess the parties’ evidence and arguments to determine whether Patent Owner has shown that it “conce[ived] of the claimed invention prior to the critical date and . . . actual[ly] reduc[ed] [the invention] to practice prior to the critical date.” *Id.*

Patent Owner contends that the subject matter of claim 14 was conceived and reduced to practice as its “Eddie chip” and that the Eddie chip and circuit board practice each and every element of claim 14. PO Resp. 29 (citing Ex. 2015). Patent Owner relies on the testimony of Mr. Sorrells (Ex. 2016), who is one of the named inventors listed on the ’177 patent as well as Patent Owner’s current Senior Technical Strategist. *See id.* at 26–29; Ex. 2016 ¶ 2. Patent Owner points to the following testimony of Mr. Sorrells:

- A file named “[REDACTED]” shows the Eddie chip layout and was last modified on March 6, 1997. PO Resp. 26 (citing Ex. 2016 ¶¶ 7–10; Ex. 2012).

- The Eddie chip used [REDACTED]. *Id.* (citing Ex. 2016 ¶ 5).
- The Eddie chip implemented [REDACTED]. *Id.* at 26–27 (citing Ex. 2016 ¶ 5).
- A file named “[REDACTED]” is a schematic of a circuit board and was last modified on February 26, 1998. *Id.* at 27 (citing Ex. 2016 ¶¶ 13–16; Exs. 2011, 2013).
- “[REDACTED]” was Patent Owner’s Eddie chip layout and it was fabricated by TriQuint. *Id.* at 27 (citing Ex. 2016 ¶¶ 7, 8, 16–18; Ex. 2027).
- The Eddie chip layout shown in file “[REDACTED]” was mounted on the circuit board shown in file “[REDACTED]h” and tested/evaluated. *Id.* at 27–28 (citing Ex. 2016 ¶¶ 19–20).
- Patent Owner issued press releases related to testing and evaluation of the Eddie chip in December 1997 and March 1998. *Id.* at 28 (citing Exs. 2019, 2020).
- The Eddie chip mounted on the circuit board was provided to Boeing for testing and Boeing produced a report pursuant to an agreement. *Id.* (citing Ex. 2016 ¶¶ 21–25; Ex. 2010).
- Testing and pictures from the Boeing test are shown in Exhibit 2022. *Id.* (citing Ex. 2016 ¶¶ 21–25; Ex. 2010).
- The testing and evaluation showed that the combined Eddie chip and circuit board worked for its intended purpose of down-converting an RF signal. *Id.* (citing Ex. 2016 ¶¶ 21, 24).

- There is correspondence between the connections on the Eddie chip layout and the connections of the schematics on the circuit board. *Id.* (citing Ex. 2016 ¶ 26).
- Those working on the Eddie chip and circuit board worked continuously through the time it was tested/evaluated, as demonstrated by a list of files reflecting continuous work. *Id.* at 29 (citing Ex. 2016 ¶¶ 28–30; Ex. 2029).

Additionally, Patent Owner points to a claim chart, provided by Dr. Ricketts, allegedly demonstrating where each and every element of claim 14 is embodied in the Eddie chip and circuit board. PO Resp. 29–56 (citing Ex. 2015).

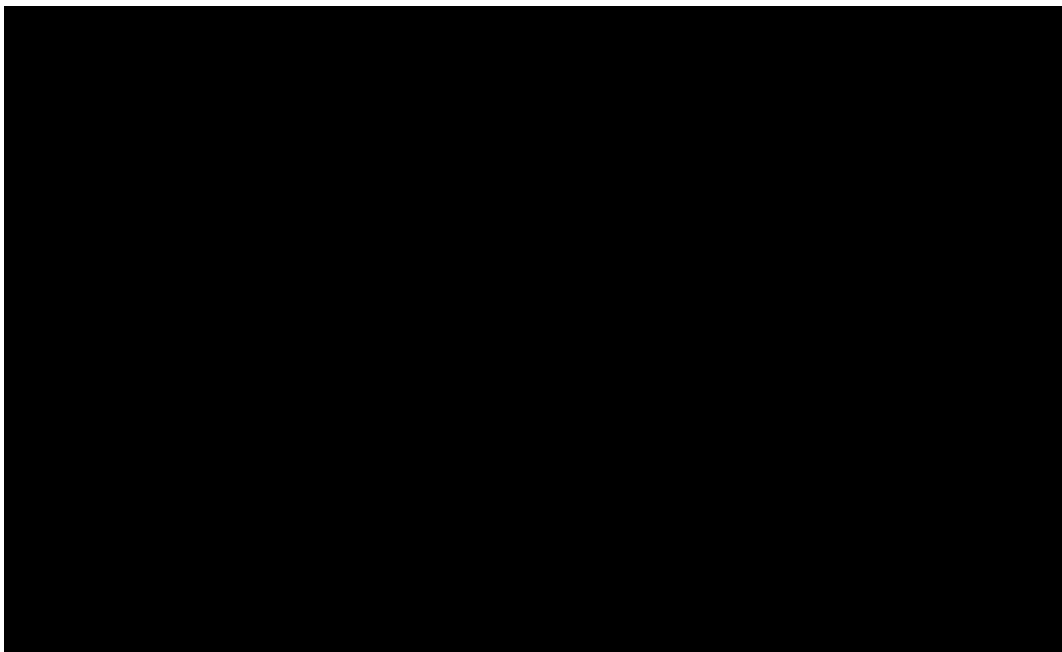
In its Reply, Petitioner contends that Patent Owner fails to show conception by January 20, 1998, and actual reduction to practice by Tayloe’s October 15, 1998, filing date (or April 29, 1998, Patent Owner’s asserted reduction-to-practice date). Pet. Reply 2. Petitioner asserts that Patent Owner “relies on circuit schematics, metadata, and the testing of the ‘Eddie’ chip. But even assuming that Eddie is relevant to claim 14 (it is not), the evidence surrounding Eddie and the proffered circuit schematics and testing is incomplete, uncorroborated, and does not demonstrate it could perform claim 14.” *Id.*

First, Petitioner notes that Patent Owner contends the circuit schematic of Exhibit 2012 is the Eddie integrated circuit (“IC”) layout, but “[t]he schematic itself is not labeled ‘Eddie.’” Pet. Reply 2–3 (citing PO Resp. 26). Petitioner points to a label on the schematic that states “[REDACTED]” noting that it does not mention “Eddie” or “[REDACTED].” *Id.* at 3. Petitioner asserts that Patent Owner “cites only inventor Sorrells’s

declaration to show that [Exhibit 2012] is the ‘Eddie’ chip referenced by other documents [Patent Owner] relies on, but fails to offer corroboration of Sorrells’s testimony.” *Id.* (citing PO Resp. 26–27). Petitioner argues that Patent Owner’s evidence “does not link the [Exhibit 2012] file name, ‘[REDACTED],’ to the Eddie chip or the Eddie chip’s date.” *Id.* Petitioner notes that Patent Owner points to Mr. Sorrells’s discussion of metadata for the [REDACTED] file, “but the metadata does not link the filename to its contents, to Eddie, or to claim 14,” and “[n]othing shows the relevance of other files in Sorrells[’] declaration ‘[REDACTED],’ and ‘[REDACTED].’” *Id.* Petitioner provides the following annotated versions of the screenshots (showing metadata) provided in paragraph 9 of Mr. Sorrells’ declaration, intended to show discrepancies between the file names and dates:



EX2016, ¶9 (annotated)



EX2016, ¶9 (annotated)

Id. at 4. Mr. Sorrells testified that the screenshots above are from the Relativity database. Ex. 2016 ¶ 9. Petitioner annotated the screenshots to indicate “different file name,” “no linkage to ‘Eddie’ & two different file names,” and “different timestamps” with arrows pointing to each. Pet. Reply 4.

Second, Petitioner contends that Patent Owner “asserts that an aliasing rate is *required* by claim 14 and required for the claimed matched filtering/correlating module to perform down-conversion,” but Patent Owner

“only points to inventor Sorrells’s declaration for evidence the Eddie chip implemented a [REDACTED].” Pet. Reply 4–5. Petitioner asserts that “[t]he Boeing Documents ([Exs 2010, 2020–2022]) do not mention a duty cycle. Without corroborating the [REDACTED], [Patent Owner] cannot show the aliasing rate or Eddie’s operation.” *Id.* at 5. Petitioner also contends that “the circuits do not show a matched filtering/correlating module at all” because “the circuits do not show a matched filtering/correlating operation performed on a portion of the carrier signal, where the correlation signal is synchronous with the received signal.” *Id.* (citing Pet. 4–5; Ex. 1003 ¶¶ 62–63).

Third, Petitioner contends that Patent Owner does not establish that the circuit schematic of Exhibit 2011 shows possession of the method recited by claim 14 because “the only evidence linking [Exhibit 2011] to ‘Eddie’ is uncorroborated inventor testimony.” Pet. Reply 5–6 (citing PO Resp. 26–27, 34 (citing Ex. 2016); Ex. 2016 ¶¶ 13–15). Additionally, Petitioner asserts that “no identifying features from the circuit schematic labeled [REDACTED] in EX2012, beyond its similar pins, appear on the [Exhibit 2011] schematic.” *Id.* at 6. And, Petitioner observes that “Eddie” does not appear anywhere in Exhibit 2011, including its filename. *Id.* at 6–7 (citing Ex. 2011).

Fourth, Petitioner contends that the file “[REDACTED]” “has a different date-stamp in [Exhibit] 2011 [REDACTED] than it does in [Patent Owner’s] listing of files showing diligence ([Ex.] 2029, showing [REDACTED]), calling into question the accuracy of its file-keeping and Sorrells[’] testimony.” Pet. Reply 7.

Fifth, Petitioner asserts that “[t]he Boeing Documents fail to corroborate Sorrells.” Pet. Reply 7. Specifically, Petitioner contends that “[t]he Boeing Documents do not show a schematic of the circuit that was tested or reference a filename. They only refer to the tested circuit as ‘Eddie.’” *Id.* (citing Ex. 2010, 5). Petitioner further asserts that, “even if the Eddie chip were successfully tested in April 1998, there is no evidence linking the proffered circuit schematics ([Ex. 2011], [Ex. 2012], etc.) to whatever specific Eddie chip was tested” and the “Boeing documents do not identify a [REDACTED].” *Id.* at 7–8.

Thus, Petitioner asserts that critical evidence Patent Owner relied on to show conception and actual reduction to practice “is incomplete, inconsistent, and shown solely through inventor testimony,” which is insufficient because, “under the rule of reason, the ‘evidence of corroboration must not depend solely on the inventor.’” Pet. Reply 8 (citing PO Resp. 26–29; *Apator Mitors ApS v. Kamstrup A/S*, 887 F.3d 1293, 1295 (Fed. Cir. 2018)).

Sixth, Petitioner asserts that Patent Owner’s evidence does not demonstrate performance of the method recited by claim 14. Pet. Reply 8–19. Petitioner contends that Patent Owner’s schematics fail to establish performance of at least six elements of claim 14.

The first allegedly missing element of claim 14 identified by Petitioner is a second control signal for down-converting the input signal at a second matched filtering/correlating module. Pet. Reply 8. Petitioner asserts claim 14 “requires two different control signals, one for each matched filtering/correlating module . . . but [Patent Owner’s] schematic shows that the switches are controlled by a single control signal.” *Id.*

Petitioner provides the following annotated version of a figure from Exhibit 1015:

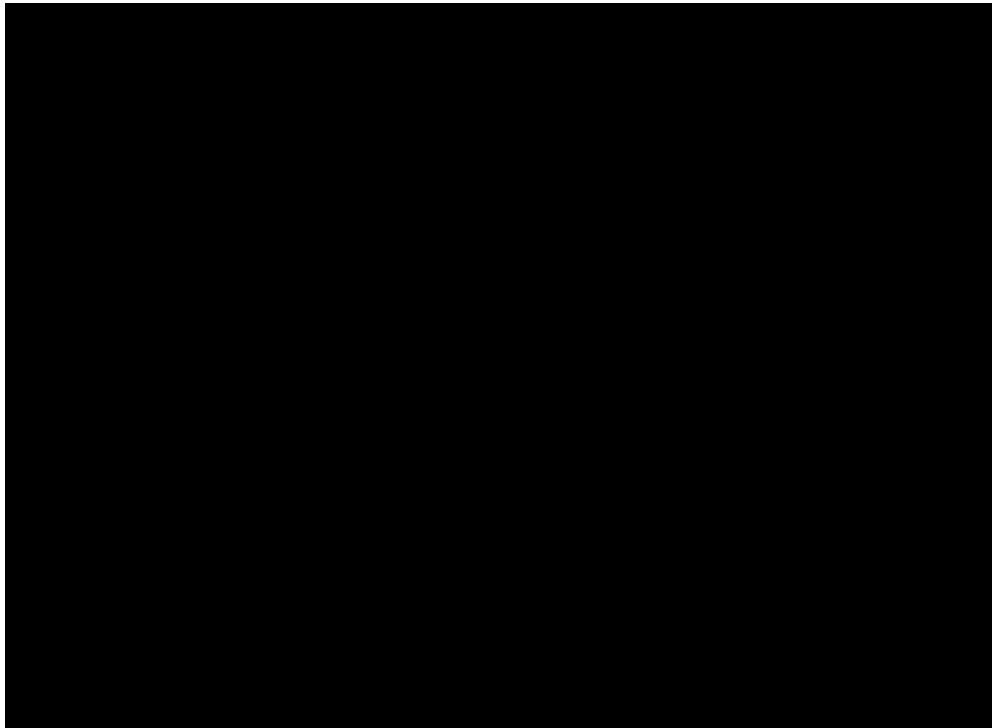


EX1015, 5 (partial, annotated); TI-1067, ¶13

Id. at 9. Petitioner annotated Exhibit 2015 to include notations of “[REDACTED]” and “single signal from control signal generator.” *Id.* Petitioner explains that “[t]he schematic shows 1) that the gates (control inputs) to all transistors [REDACTED] are connected together (green); and 2) that transistors [REDACTED] share the same common control signal (red). Thus, the common control signal will switch all transistors [REDACTED] at the same time.” *Id.* (citing Ex. 1067 ¶¶ 14–15). Petitioner contends that “the operation for the asserted second matched filtering/correlating module is not performed using a second control signal—that is, there is only one control signal for all of switches [REDACTED].” *Id.* (citing Ex. 1067 ¶¶ 14–15). Additionally, Petitioner points to Dr. Ricketts’

testimony, asserting that Dr. Ricketts testified that the mixer only has one switch, not more than one and, because “each matched filtering/correlating module requires its own switch, the circuit does not show two matched filtering/correlating modules.” *Id.* at 9–10 (citing Ex. 1065, 78:6–12).

Petitioner contends that a second deficiency regarding missing elements of claim 14 is that the circuits identified by Patent Owner “would not have worked for the claimed ‘down-converting an electromagnetic signal.’” Pet. Reply 10–11 (citing Ex. 1067 ¶¶ 16–20). Petitioner reproduces a version of Exhibit 2011 annotated by Patent Owner to show the first and second matched filtering/correlating modules, one with a dashed red box, the other with a dashed blue box:



EX2015, 8 (showing EX2011)

Pet. Reply 11. Petitioner contends that the circuits would not have down-converted an electromagnetic signal as claimed because the input signals “would take the path of least resistance and flow to ground” as opposed to

being affected by switching in the mixer. *Id.* at 12–13. In that case, according to Petitioner, “capacitors [REDACTED] do not accumulate or discharge energy based on the switching, and no down-conversion to baseband occurs.” *Id.* at 13 (citing Ex. 1067 ¶¶ 19–22). Petitioner asserts that Patent Owner “has not asserted, nor provided analysis of, the circuits operating at a different input signal frequency” and, therefore, “cannot prove actual reduction-to-practice.”³⁴ *Id.*

As a third alleged deficiency regarding an element of claim 14, Petitioner asserts that Patent Owner’s arguments and evidence fail to demonstrate that the first and second down-converted signals (assuming they are down-converted) are combined. Pet. Reply 13 (citing Ex. 1067 ¶¶ 23–24). Petitioner contends that one of ordinary skill in the art would have understood “combining” “to include merging two or more signals into a single output signal,” but “as shown in [Exhibit 2011], the signals are never combined.” *Id.* at 14 (citing Ex. 1067 ¶¶ 23–24). Petitioner provides an annotated version of Exhibit 2011 below, allegedly showing that the signals are directed to two different circuits and remain separated.

³⁴ Petitioner similarly contends that the circuits do not satisfy Patent Owner’s construction of “matched filtering/correlating module” because the switches identified by Patent Owner in what it calls the Eddie chip “are effectively a single switch controlled by a single control signal” and, therefore, “none of the [REDACTED] capacitors [REDACTED] store charge / accumulate energy at [REDACTED], nor do they discharge / transfer energy based on the switch operation.” Pet. Reply 13 (citing Ex. 1067 ¶¶ 19–22). Since we do not adopt Patent Owner’s proposed construction for “matched filtering/correlating module,” we do not reach this argument.



Ex.-2011.

EX2015 (annotated); TI-1067, ¶24

Pet. Reply 14. Petitioner’s annotations state “ParkerVision’s schematic & annotation show that the signals remain separated.” *Id.*

As a fourth alleged deficiency regarding an element of claim 14, Petitioner asserts that Patent Owner’s arguments and evidence fail to demonstrate that the asserted first and second matched filtering/correlating modules accumulate charge when the switch is closed and transfer charge when the switch is open. Pet. Reply 14. Petitioner first points to Patent Owner’s argument that “the RF signal drives the low impedance load when the switch is closed (ON), and the storage module continues to drive the low impedance load when the switch is opened (OFF).” *Id.* at 14–15 (quoting PO Resp. 15, 19–22). Petitioner asserts that, as discussed above, “at [REDACTED], no charge is stored in any of [REDACTED], regardless of the switching position.” *Id.* at 15. Petitioner contends, however, that

“[a]ssuming, *arguendo*, that charge were stored in one of the capacitors, such charge would have been accumulated when the switches were open and discharged when the switches were closed.”³⁵ *Id.* (footnote omitted) (citing Ex. 1067 ¶¶ 21–22). But Petitioner asserts that, “[t]his is the opposite of how [Patent Owner] has argued that the claimed matched filtering/correlating module works.” *Id.* (citing PO Resp. 44–45).

Petitioner points to the following annotated figure as support for its argument.

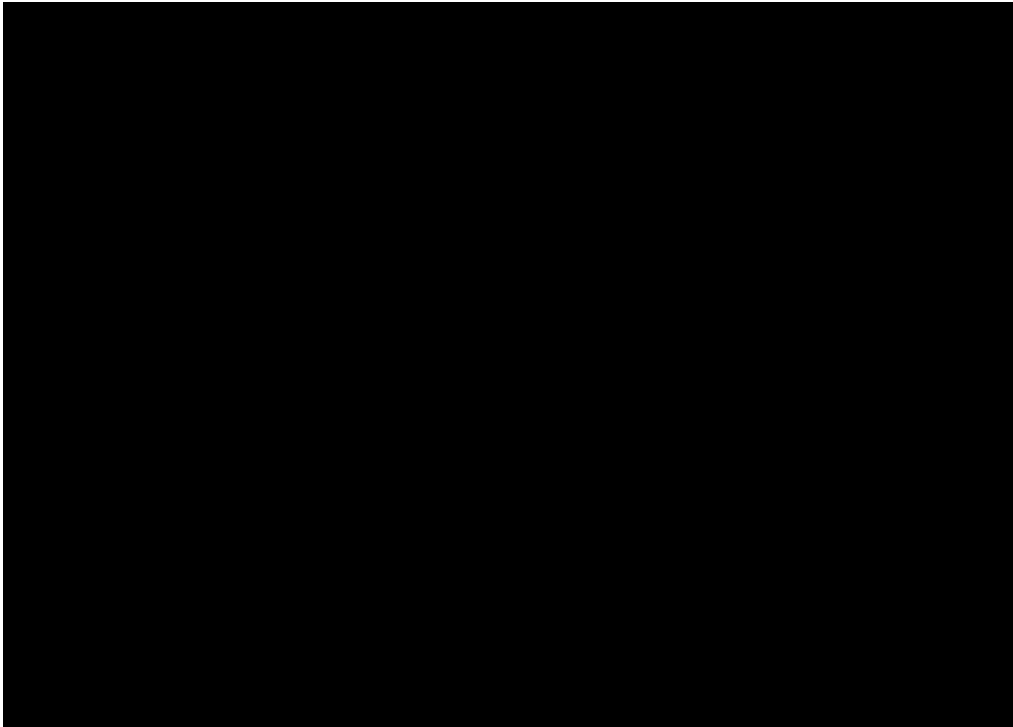


FIG. Dickens1

Pet. Reply 16 (reproducing “FIG. Dickens1” from Dr. Dickens’ Supplemental Declaration). Discussing what Patent Owner contends is the

³⁵ Petitioner contends Patent Owner “does not specify which capacitor is part of the asserted matched filtering/correlating modules or which circuit component constitutes a low-impedance load to which energy is transferred.” Pet. Reply 15 n.3.

first matched filtering/correlating module and the annotations in the figure above, Petitioner asserts that, “assuming the circuit worked, because there is a common control signal, when [REDACTED] are closed, nodes 1 and 2 are connected together.” *Id.* at 15 (citing Ex. 1067 ¶¶ 21–22). Petitioner contends that “[t]he charge on capacitors [REDACTED] is equalized when switch [REDACTED] is closed (ON).” *Id.* at 16 (citing Ex. 1067 ¶¶ 21–22). “When [REDACTED] are open (OFF), the RF input at [REDACTED] would provide charge to capacitor [REDACTED] and the RF input at [REDACTED] would provide charge to capacitor [REDACTED]. In that hypothetical, capacitors [REDACTED] would accumulate differential charge when switches [REDACTED] is open (OFF),” as shown in the annotated figure below. *Id.* (citing Ex. 1067 ¶¶ 21–22).

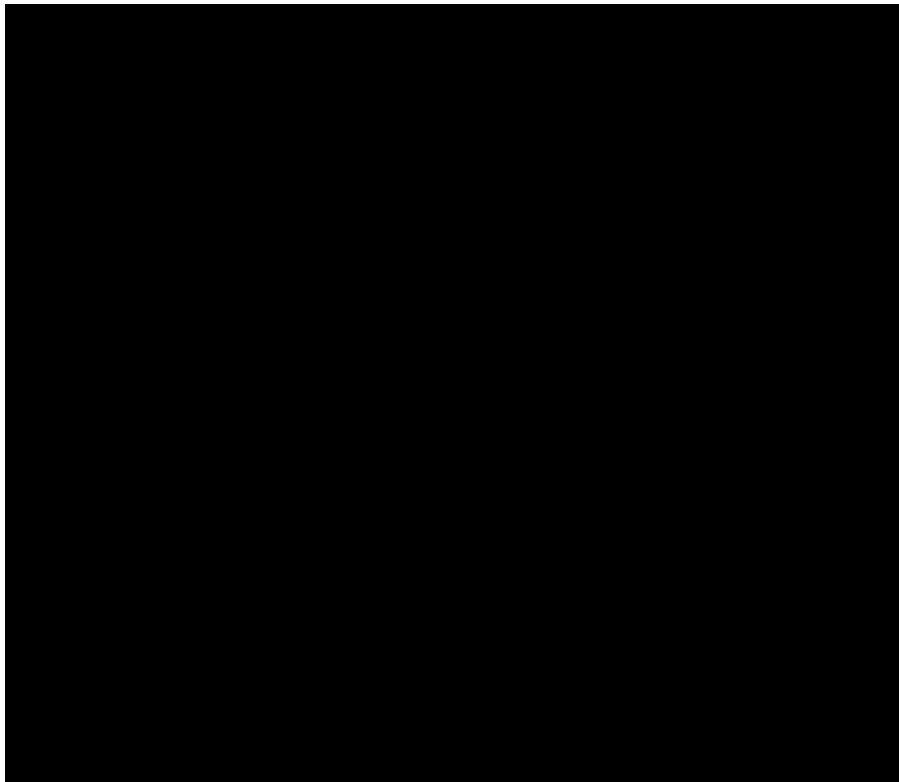
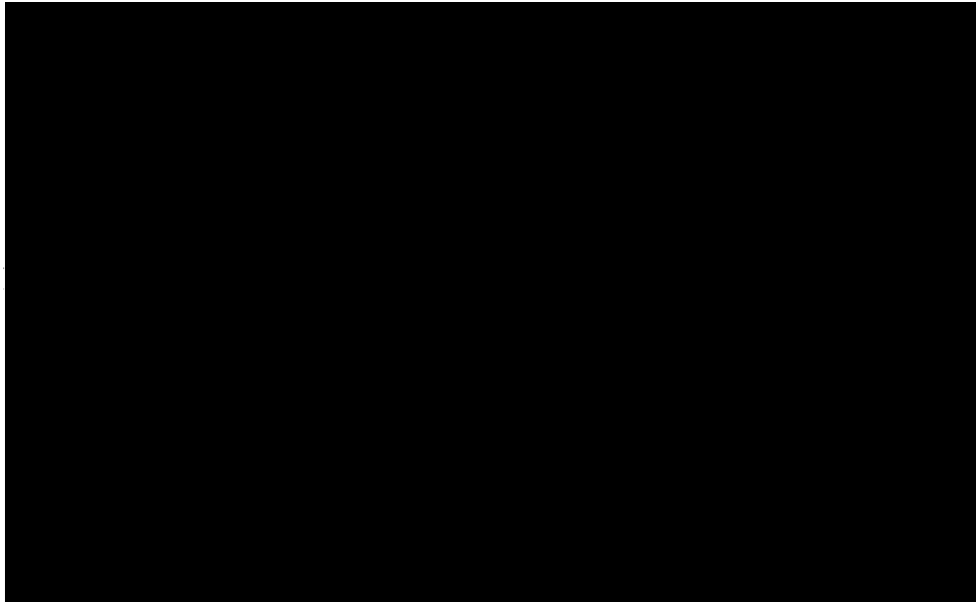


FIG. Dickens2, *id.*

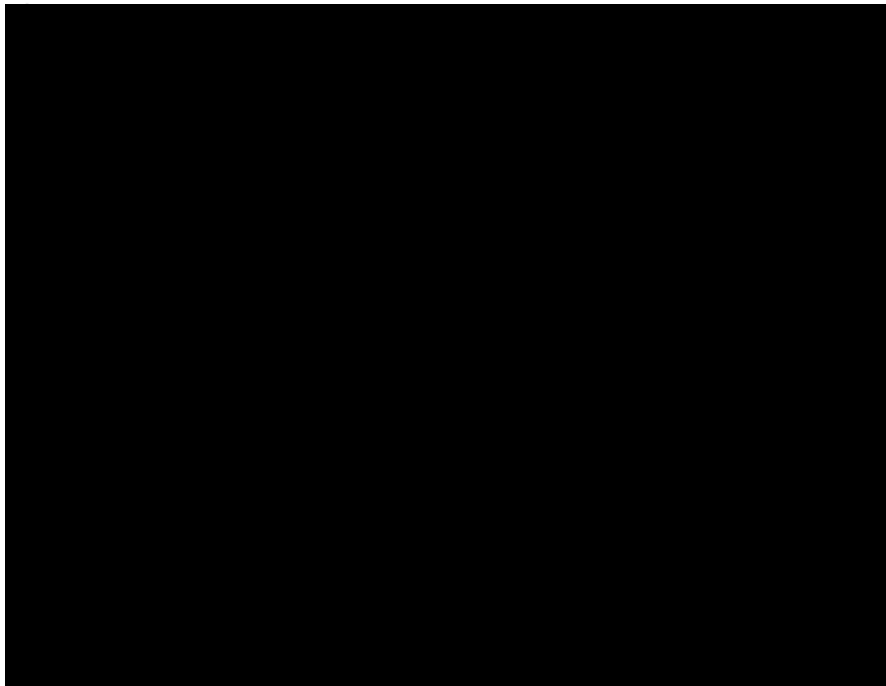
Pet. Reply 17 (reproducing “FIG. Dickens2” from Dr. Dickens’ Supplemental Declaration).

As a fifth alleged deficiency regarding an element of claim 14, Petitioner asserts that the alleged first and second matched filtering/correlating modules do not receive the same input signal. Pet. Reply 17. In particular, Petitioner notes that claim 14 recites “receiving an input signal at a first matched filtering/correlating module” and “receiving said input signal at a second matched filtering/correlating module,” but Patent Owner’s “circuit schematics show **two different input signals.**” *Id.* (citing Ex. 2015, 12, 21). Petitioner provides an annotated version of a portion of Exhibit 2011 below, identifying first and second input signals.



EX2011 (partial, annotated)

Pet. Reply 18 (annotating Exhibit 2011 to identify “first and second input signals). And Petitioner provides the following annotated version of Exhibit 2013, alleging that it shows [REDACTED] as separate inputs.



EX2013 (annotated)

Pet. Reply 19 (annotating Exhibit 2013 to state “[redacted] are separate inputs”). Petitioner contends that the schematics provided by Patent Owner “fail to satisfy this aspect of claim 14.” *Id.* Petitioner asserts that Patent Owner “offers no evidence that the input signals are separate parts of the same signal. At best, Dr. Ricketts refers to the circuits as a ‘differential receiver architecture,’” “[b]ut Ricketts does not cite to Sorrells[’] declaration for support or any other evidence of circuitry upstream of [redacted] 7 for creating a differential signal.” *Id.* (citing Ex. 1067 ¶¶ 25–27).

Sixth, Petitioner contends that the critical evidence on which Patent Owner relies to antedate Tayloe is inventor testimony provided by Mr. Sorrells, but that testimony is inadequate because it is insufficiently corroborated by independent evidence. Pet. Reply 22–24. Petitioner contends the following aspects of Mr. Sorrells’ testimony lack independent

corroboration and, therefore, are insufficient to establish that claim 14 antedates Tayloe.

As a first example of insufficient corroboration, Petitioner contends Patent Owner relies solely on Mr. Sorrells' testimony to establish "aliasing and a non-negligible aperture." Pet. Reply 22. Petitioner contends that Patent Owner's only citation is to Mr. Sorrells' declaration that "the circuit 'implemented a 50% duty cycle,' and nothing else." *Id.* (citing PO Resp. 26–27, 52). Petitioner contends that Mr. Sorrells does not cite to any other materials when addressing these issues in paragraph 5 of his declaration. *Id.* (citing Ex. 2016 ¶ 5). Petitioner argues that none of Patent Owner's materials "shows a 50% duty cycle, including the Boeing Documents" and, thus, "Sorrells's testimony concerning aliasing or the aperture window—both necessary features of the operation of the matched filtering/correlation module for down-conversion—stands bare." *Id.* at 23 (citing Ex. 1066 ¶ 16). Petitioner also notes that Mr. Sorrells "does not tie the circuit schematics or file names back to the limitations of claim 14; nor does [he] even mention the terms matched filtering and correlating. Thus, even in view of the uncorroborated inventor testimony, the evidence does not satisfy the burden of proving conception and actual reduction-to-practice." *Id.* at 23 n.5.

As a second aspect that Petitioner asserts lacks sufficient corroboration, Petitioner contends that "the only evidence of the pad layout necessary to understand the Eddie chip is Sorrells's, which is also uncorroborated. The GDSII [Graphic Data System II] tape-out of the Eddie chip lacks these labels." Pet. Reply 23 (citing Ex. 2015, 5). Thus, Petitioner asserts that "at least for the GDSII tape-out, there is no evidence at all to

corroborate that the mixer, differential amplifier, or other circuits are relevant to claim 14 or even worked.” *Id.*

As a third aspect that Petitioner contends lacks sufficient corroboration, Petitioner asserts that “all of the circuit schematics ([Exs. 2011, 2012]), filenames ([Exs. 2012, 2029]), and file properties ([Ex. 2016]) are explained only by Sorrells.” Pet. Reply 23. Petitioner notes that, “[m]oreover, that these files are ostensibly [Patent Owner’s] business records, the contents, metadata, and dates are only asserted by Sorrells.” *Id.*

As a fourth aspect that Petitioner contends lacks sufficient corroboration, Petitioner asserts that “[t]he Boeing Documents are likewise incomplete” because, “[f]or example, they do not describe the circuit that was tested, provide circuit schematics of the tested circuit, or mention the terms ‘matched filter/correlating module,’ ‘aliasing,’ and ‘duty cycle.’” Pet. Reply 24. Rather, “[t]he only evidence linking the Boeing Documents to the Eddie chip is Sorrells’s declaration. There is also no corroboration that the same ‘Eddie’ chip was tested by Boeing.” *Id.* Thus, Petitioner contends that “the Boeing Documents are inconclusive, at best,” and “the Sorrells declaration by itself cannot corroborate the assertion that the Boeing Documents prove conception and reduction-to-practice of claim 14.” *Id.*

As a fifth aspect that Petitioner contends lacks sufficient corroboration, Petitioner asserts that Patent Owner cannot rely on Dr. Ricketts’ testimony as providing corroboration because Dr. Ricketts’ “conclusions rely entirely on the Sorrells declaration” and “take[], on blind faith, Sorrells’s testimony and documents as authentic and accurate.” Pet. Reply 24. Petitioner explains that the weaknesses identified above similarly apply to Dr. Ricketts’ claim chart (Ex. 2015) “because it merely repeats the

information provided only by Sorrells.” *Id.* Thus, Petitioner asserts that Dr. Ricketts’ testimony “cannot show that the inventors reduced claim 14 to practice prior to Tayloe.” *Id.*

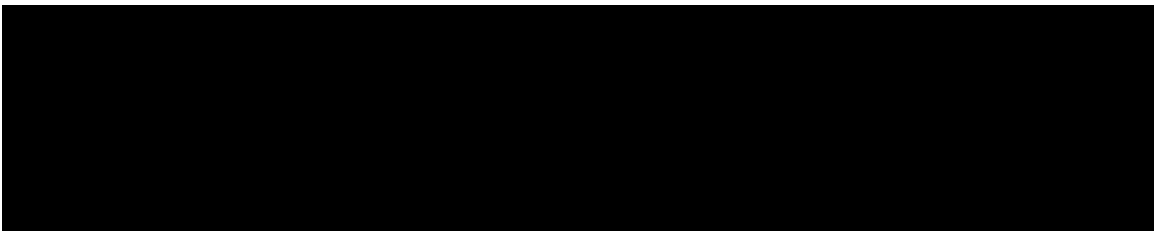
In its Sur-reply, Patent Owner first asserts that Petitioner’s Reply violates 37 C.F.R. §§ 42.6(a)(3) and 42.22(a)(2) because the Reply “improperly attempts to circumvent the word limits by incorporating arguments by reference from its expert declarations,” and “fails to cite to the expert declarations with the specificity required” by the rules governing an IPR. PO Sur-reply 1. Patent Owner contends that it is “unfairly prejudiced” and “requests that the Board decline to consider arguments/analysis/expert testimony and supporting exhibits not specifically discussed in the Reply.” *Id.* at 1–2.

We address this argument now by first noting that Patent Owner did not request any relief from the Board prior to filing its Sur-reply, such as requesting additional pages or requesting that a portion of the Reply be stricken from the record. Second, to the extent we find Petitioner improperly incorporated by reference a position solely set forth in one of its expert declarations or supporting exhibits, we note that below and do not consider the issue beyond the arguments made by Petitioner and evidentiary support directly cited by Petitioner in its Reply. We do not intend, however, by this statement that we have, in fact, identified any such instances by Petitioner.

In its Sur-reply, Patent Owner next asserts that Petitioner’s experts take inconsistent positions—“Dickens takes a narrow view of claim 14 to dispute conception/reduction, while Galton takes a broader view to argue

invalidity.” PO Sur-reply 2. Patent Owner provides the following examples of the alleged inconsistencies.

First, Patent Owner contends that, similar to Dr. Galton’s testimony regarding Razavi,³⁶ Dr. Ricketts opines that the Eddie device has a differential amplifier circuit that receives two inputs and outputs two signals, each of which is a combination of both inputs. PO Sur-reply 4 (citing Ex. 2024 ¶ 165; Ex. 2015, 30). Patent Owner asserts that, “[a]s [Dr.] Galton makes clear, in a differential amplifier with differential outputs, there are *two* outputs, and *each* output signal is a *combination* of *both* inputs.” *Id.* at 5 (citing Ex. 1003 ¶¶ 186–187). Additionally, Patent Owner contends that Dr. Dickens “never disputes that the Eddie device includes a differential amplifier,” and Patent Owner provides an enlarged portion of Exhibit 2015 highlighted to identify that the file name includes the phrase “WITH AMPLIFIER.” *Id.*



PO Sur-reply 5. Thus, Patent Owner asserts that Dr. Ricketts’ testimony regarding the Eddie device is similar to Dr. Galton’s testimony regarding Razavi and, therefore, we should not credit Dr. Dickens’ testimony regarding this aspect of the Eddie device.

Second, Patent Owner contends that Dr. Galton “identifies a shared control signal received at the gates of transistors as separate control signals”

³⁶ Razavi is relied on by Petitioner in Grounds 2 and 3.

in Razavi (i.e., a single control signal V_{LO} that is common to transistors M5/M6) “as being the first and second control signals.” PO Sur-reply 6. Patent Owner contends that Dr. Ricketts’ analysis of the Eddie device is consistent with Dr. Galton’s analysis of Razavi because Dr. Ricketts similarly identifies first and second control signals, where each is derived from a common LO signal, and each is routed to a gate. *Id.* at 7 (citing Ex. 2015, 14, 24).

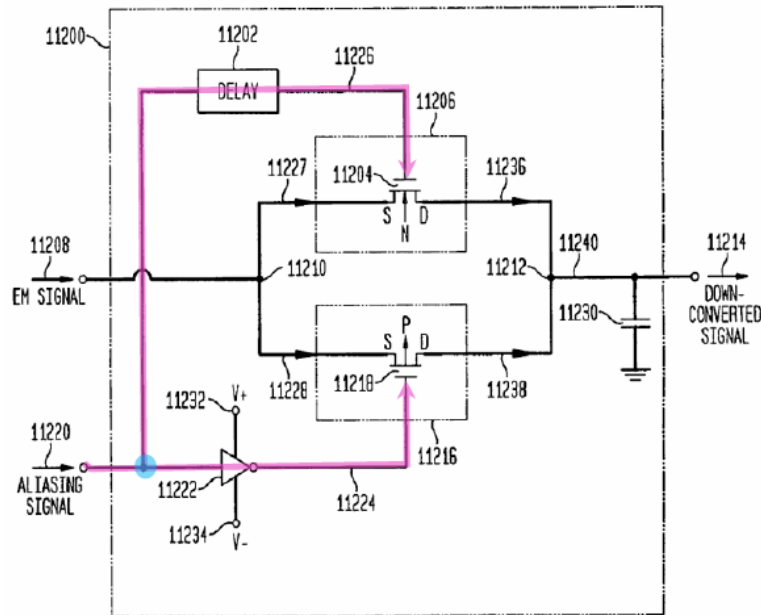
Patent Owner asserts that, in contrast, Dr. Dickens contends that the Eddie chip has only a single control signal because “transistors [REDACTED] share a common gate node . . . and also share the same common control signal.”³⁷ PO Sur-reply 7 (omission in original) (quoting Ex. 1067 ¶¶ 13–15). Patent Owner contends that “[n]othing in the claim language, however, excludes this. Claim 14 only requires down-converting ‘according to a [first/second] control signal.’” *Id.* at 8 (second alteration in original). According to Patent Owner, “[w]hile the control signals in Eddie may share a common node or be derived from a common LO signal, they are routed separately to different switches. That is, each switch has a respective signal line (or branch) which turns the switch on/off to down-convert a signal.” *Id.*

Additionally, Patent Owner contends that Figure 112 of the ’177 patent, reproduced below with Patent Owner’s annotations, is consistent with Eddie’s configuration because this figure “illustrates

³⁷ Patent Owner asserts that the one “switch” Dr. Ricketts identified in Eddie is actually “several transistors” and that “each transistor meets the PTAB’s construction of ‘switch’ as opening and closing a circuit.” PO Sur-reply 7 n.3 (citing Ex. 2015, 18, 27). Patent Owner also contends that Dr. Dickens recognizes that the mixer in Exhibit 2015 “illustrates *multiple* switches.” *Id.* (citing Ex. 1067 ¶¶ 5, 13).

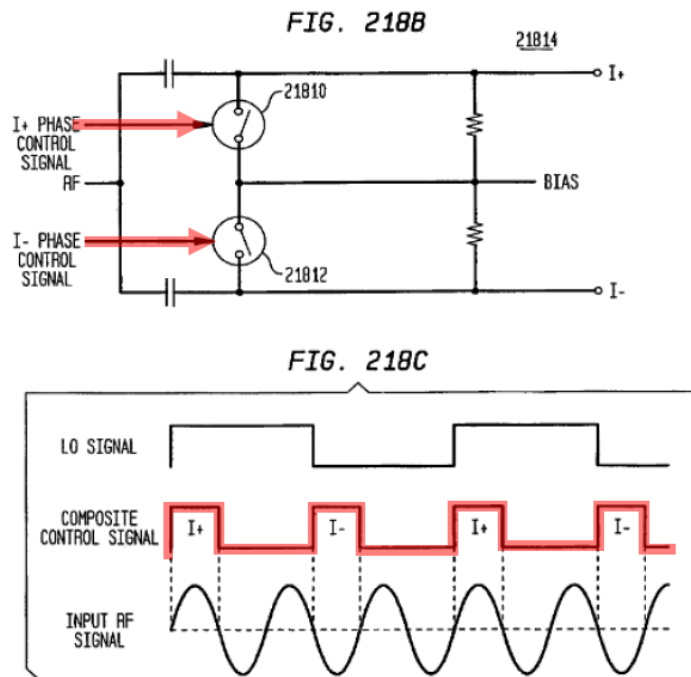
transistors having two control signals (pink) sharing a common node (blue) and common LO signal.” PO Sur-reply 8.

FIG. 112



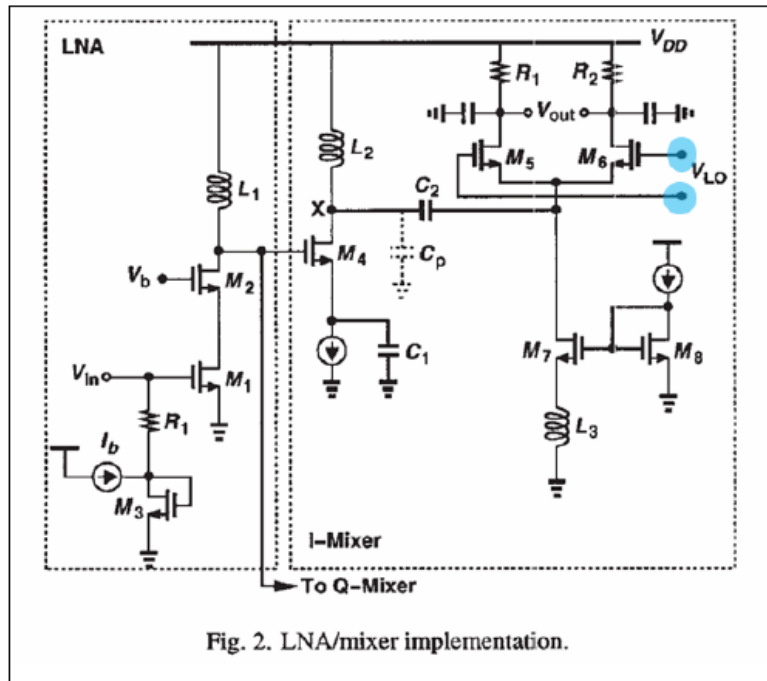
PO Sur-reply 9. Figure 112 of the '177 patent “illustrates aliasing module 11200 with a complementary [(field effect transistor)] FET configuration.” Ex. 1001, 9:45–46. Patent Owner asserts that the '177 patent “discloses ‘two complementary aliasing signals 11224, 11226 [] generated from [one] aliasing signal 11220 to control the sampling by FETs 11218, 11204, respectively.’” PO Sur-reply 9 (alterations in original) (citing Ex. 1001, 110:32–35, Figs. 114–115).

Further, Patent Owner contends that “Figures 218B/218C [of the '177 patent] demonstrate that a common control signal can serve as first and second control signals.” Patent Owner’s annotated versions of Figures 218B and 218C are reproduced below.



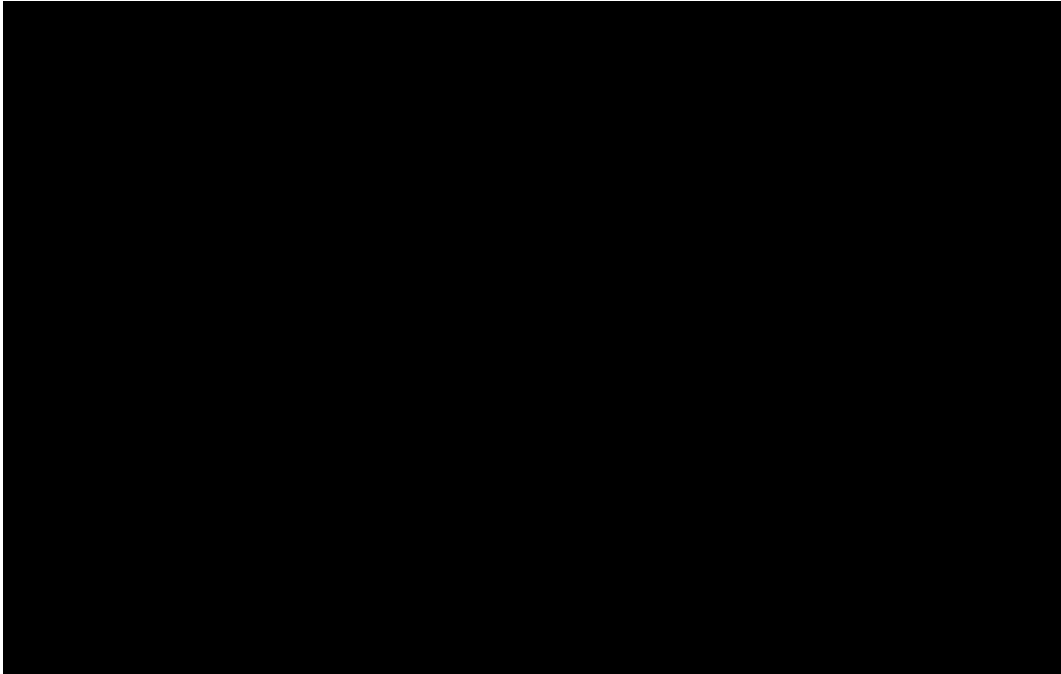
PO Sur-reply 10. Figure 218B of the '177 patent “illustrates an example receiver implementation, configured as an I-phase channel” and Figure 218C of the '177 patent “illustrates example waveforms related to the receiver of” Figure 218B. Ex. 1001, 12:46–50. Patent Owner contends that, “[a]s shown above, Figure 218B illustrates a first control signal (I+ phase signal), and a second control signal (I– phase signal). Figure 218C shows that both I-phase control signals are derived from the same LO signal.” PO Sur-reply 10.

Third, Patent Owner again compares Dr. Galton’s testimony regarding Razavi and a differential signal to Dr. Ricketts’ testimony regarding Eddie. PO Sur-reply 10–11. Specifically, Patent Owner contends that Dr. Galton “explicitly refers to a differential signal (V_{LO}) as a *single* signal: ‘the differential V_{LO} signal,’” which Patent Owner contends “is applied across two nodes (blue),” as shown below. *Id.*



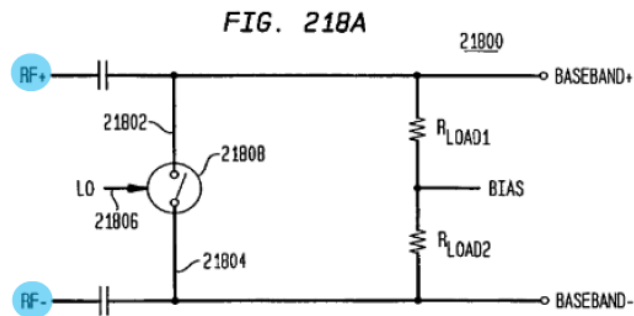
PO Sur-reply 11 (citing Ex. 1017, Fig. 2 (annotated)). Razavi's Figure 2 "shows the implementation of the [(low-noise amplifier)] LNA and the quadrature mixers." Ex. 1017, 1.

Patent Owner asserts that, as reproduced below, Dr. Ricketts "likewise identifies a differential signal input to the Eddie device across [REDACTED] (blue circles), and refers to it as a single input signal." PO Sur-reply 11 (citing Ex. 2015, 10, 12, 21; Ex. 1003 ¶ 46 (Patent Owner notes that Dr. Galton refers to "differential inputs as a single, 'differential-mode' signal.")).



PO Sur-reply 12 (annotating what Patent Owner alleges is a differential signal input to the Eddie device across two nodes [REDACTED] (blue circles)).

Additionally, Patent Owner points to Figure 218A of the '177 patent, reproduced below with Patent Owner's annotations, asserting that it "confirms that a differential signal applied across *two* nodes constitutes a *single* input signal." PO Sur-reply 12.



PO Sur-reply 13. Figure 218A of the '177 patent "illustrates an example differential input, differential output receiver configuration." Ex. 1001, 12:43–44. Patent Owner contends that "Figure 218A illustrates receiving an input signal across RF+/RF- (blue). The ['177] patent describes this configuration as 'an example *differential input* [i.e., single input].'" *Id.* at 12

(alteration in original) (citing Ex. 1001, 12:43–44, 6:5–6 (Patent Owner contends the ’177 patent describes Figure 44B as “having ‘a differential input.’”)).

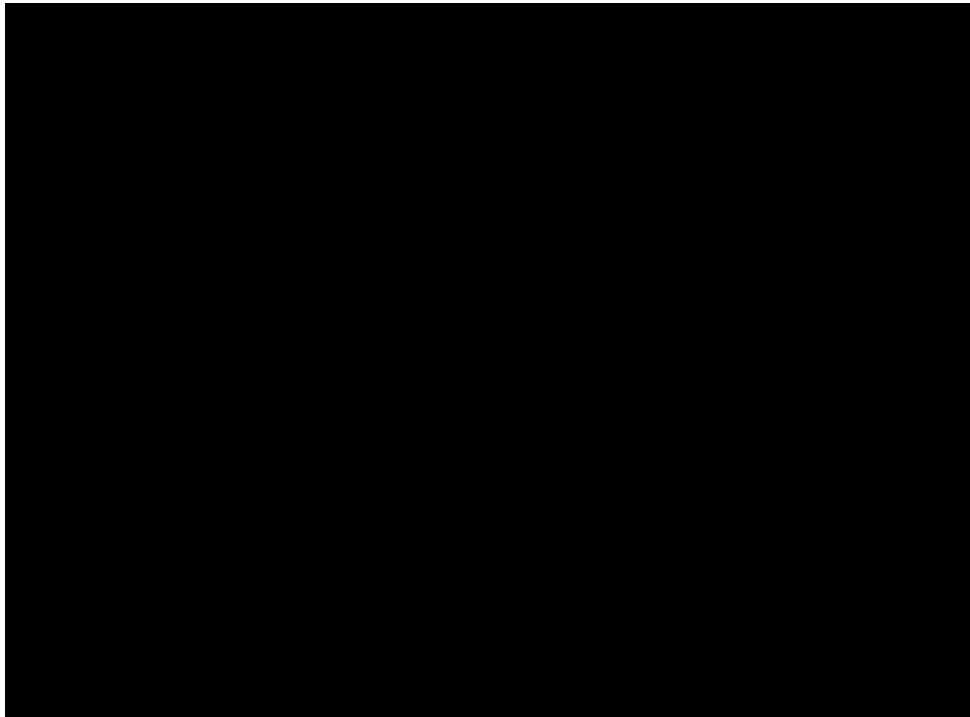
Patent Owner contends that, in contrast, Dr. Dickens asserts that Patent Owner’s “Eddie device schematics ‘do not show a single input signal; instead, they show two different input signals.’” PO Sur-reply 13 (citing Ex. 1067 ¶ 25). Patent Owner contends that Dr. Dickens “bases this assertion solely on the fact that the schematic shows [REDACTED],” but Dr. Dickens “fails to explain why this cannot constitute a single input signal. Nor does Dickens address whether the signal is, in fact, differential. Instead, he remains silent, despite Ricketts identifying the Eddie device as *differential* receiver architecture.” *Id.* (citing Ex. 1067 ¶¶ 25–27; Ex. 2015, 8–9). Patent Owner contends that Dr. Dickens’ position “implies that the claimed ‘input signal’ must be single-ended, not differential. But his interpretation finds no support in claim 14. The claim simply requires an ‘input signal.’” *Id.* Further, Patent Owner contends that Petitioner’s argument—that there is no support for Eddie’s differential configuration—is incorrect because the Boeing Agreement (Ex. 2021) “specifically references a differential input configuration,” as shown below and “[t]he Boeing notes further confirm this.” *Id.* at 14 (citing Ex. 2021, 11; Ex. 2022, 31).

[REDACTED]

PO Sur-reply 14 (citing Ex. 2021, 11 (highlighting “RF Input” and “Differential feed”)).

Patent Owner next addresses what it refers to as “Petitioner’s other arguments regarding the Eddie device,” asserting that they are “also flawed.” PO Sur-reply 14. Turning to these arguments, Patent Owner first contends that Petitioner’s position that Eddie would not have worked for down-converting an electromagnetic signal “is directly at odds with Petitioner’s expert’s own admissions.” *Id.* (citing Pet. Reply 10–13). In particular, Patent Owner contends that Dr. Dickens “*admits* that (1) the Eddie device successfully down-converts, and (2) testing showed the Eddie device performed at a ‘level that could be used for a [] consumer wireless device in [the] 1998 to 2000 time frame.’” *Id.* (alterations in original) (quoting Ex. 2041, 54:2–8) (citing Ex. 2041, 70:7–16, 55:1–59:18, 63:8–65:2). Thus, Patent Owner asserts that “the Eddie device works to down-convert an electromagnetic signal.” *Id.* at 15.

Additionally, Patent Owner contends that Dr. Dickens’ “analysis is flawed because it ignores the actual testing configuration.” PO Sur-reply 15 (citing Ex. 1067 ¶¶ 16–20). Patent Owner provides the followed annotated version of one of the Eddie schematics.



PO Sur-reply 15. Patent Owner contends that Dr. Dickens opined that “input signals entering the Eddie chip at [REDACTED] (blue arrows, PO annotated) would flow to capacitors [REDACTED] and immediately be dumped to ground (thrown away).” *Id.* (citing Ex. 2041, 21:22–22:9). Patent Owner asserts that “[t]his means that all other circuitry in the Eddie device would be useless.” *Id.* (citing Ex. 2041, 22:14–21). Patent Owner contends that Dr. Dickens’ “sole basis for this claim is the component values shown on the schematic.” *Id.* at 15–16 (citing Pet. Reply 11–13 (citing Ex. 1067 ¶¶ 16–20); Ex. 2041, 21:44–22:13).

Patent Owner asserts, “[c]ritically, [Dr.] Dickens admitted that he did not do anything to reconcile the testing configuration specified by Boeing (matching ports to 50-ohm for appropriate frequencies) and the values he used in his analysis.” PO Sur-reply 16 (citing Ex. 2041, 51:12–52:1). Patent Owner argues that “[Dr.] Dickens was aware of the ‘NOT LOADED’ notation in the schematic indicating that the component values shown may

not have been used in the tested circuit” (*id.* (citing Ex. 2041, 50:19–22)), and “he admitted that the Boeing test results show [REDACTED] could not have had the values he used in his calculation” (*id.* (citing Ex. 2041, 25:18–28, 30:16–22, 32:17–22, 36:3–12, 47:10–48:14 (discussing Exs. 2010, 2042))).

Additionally, Patent Owner contends that, even though Dr. Dickens “calculates the input impedance of capacitors [REDACTED],” he “baldly asserts—without analysis/support—that mixer inputs [REDACTED] ‘exhibit a significantly larger impedance than capacitors [REDACTED].’” PO Sur-reply 16 (citing Ex. 1067 ¶ 17). Patent Owner argues that Dr. Dickens “fails to specify/explain/calculate any *actual* impedance values of the mixer input impedance.” *Id.* Patent Owner asserts that “[t]he fact that the Boeing report shows successful down-conversion under commercial performance standards, however, demonstrates that Dickens made incorrect *assumptions* when performing his analysis. Petitioner’s assertion that Eddie does not work at all is unsupported and contrary to objective evidence.” *Id.* Similarly, Patent Owner contends that Dr. Dickens admitted that the Boeing report demonstrates successful down-conversion from 914.95 MHz to 4.95 MHz and, thus, establishes that the input signal was affected by repetitively opening/closing a mixer switch. *Id.* at 17 (citing Ex. 2010, 7–8; Ex. 2041, 54:2–8; PO Resp. 19, 43–45, 52–54).

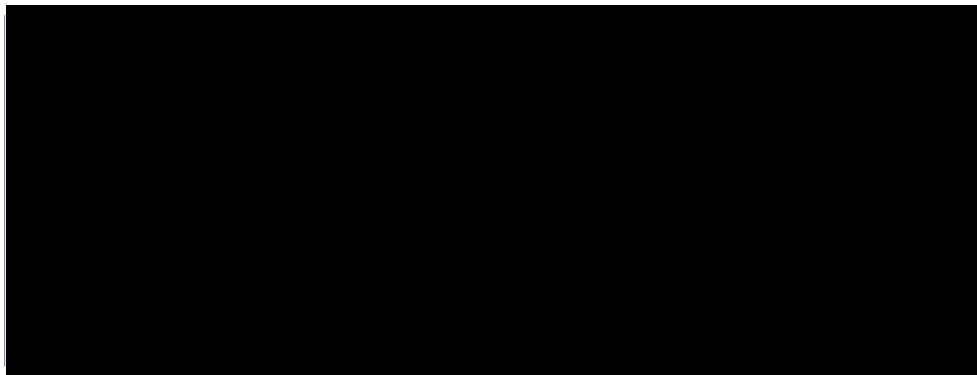
Further, Patent Owner contests Petitioner’s argument that the “charging/discharging behavior of Eddie’s storage elements is opposite to how it is claimed” because, although Dr. Dickens points to capacitors [REDACTED], those are not the relevant capacitors. PO Sur-reply 17. Instead, Dr. Ricketts points to capacitors [REDACTED]. *Id.* (citing Pet. Reply 16–17). Thus, Patent Owner asserts

that Dr. Dickens provides “no analysis of these capacitors, nor rebut[s] that their charging/discharging behavior satisfies the claim limitation.” *Id.*

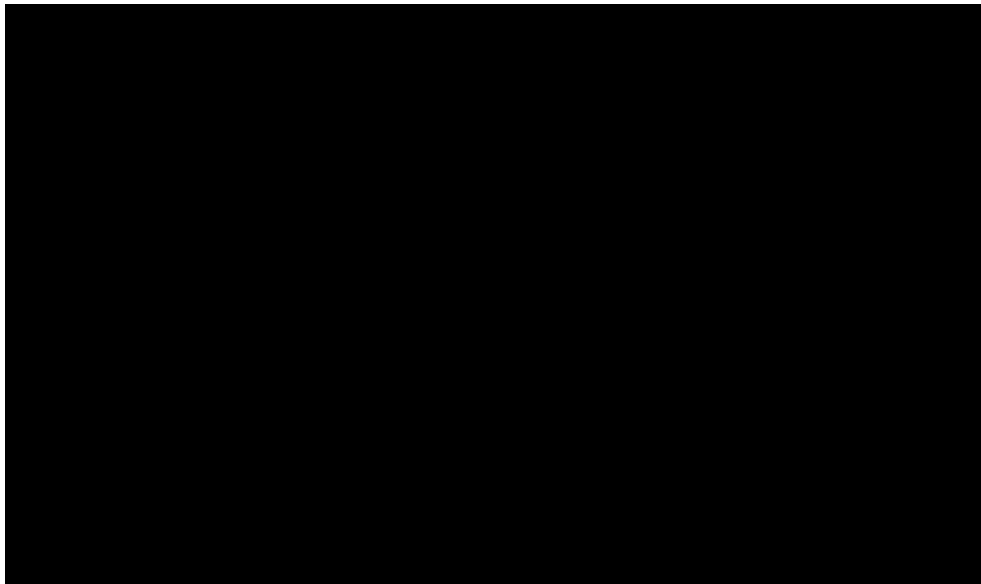
Patent Owner next addresses Petitioner’s arguments as to whether there is sufficient corroboration relating to conception and reduction to practice/diligence. PO Sur-reply 17. Patent Owner contends that Mr. Sorrells cites numerous contemporary documents to support every aspect of his invention story and that the evidence he relies on is sufficient to corroborate his story. *Id.* at 17–18 (citing Ex. 2016). Patent Owner similarly asserts that it is not impermissible for Mr. Sorrells to authenticate the documents on which he relies for corroboration because he is the person who was responsible for, and had personal knowledge of, these documents. *Id.* at 18 n.5 (citing *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1171 (Fed. Cir. 2006)).

Turning first to conception, Patent Owner contends that Petitioner’s attacks on Mr. Sorrells’ credibility are meritless. First, Patent Owner disagrees with Petitioner’s argument that nothing ties the layout/schematics files to Patent Owner’s Eddie device. PO Sur-reply 19 (citing Pet. Reply 2–4). Patent Owner points to Mr. Sorrells’ testimony that all of the files relate to Eddie and that 95 percent of his time from 1997 to 1998 was spent developing the patented technology embodied in Eddie. *Id.* (citing Ex. 1068, 12:13–13:18, 19:9–20:6). Patent Owner asserts that Mr. Sorrells’ testimony “is corroborated by contemporaneous 1997/1998 press releases and a 1998 Boeing report, which confirm that ‘Eddie’ was the focus of [Patent Owner’s] work at that time.” *Id.* (citing PO Resp. 19 (citing Exs. 2016, 2010, 2019, 2020)).

Additionally, Patent Owner contends that “[f]urther corroboration appears on the schematic (Ex. 2011) itself, which specifies an input configuration with ‘matching network’ and precise input frequency of [REDACTED].” PO Sur-reply 19. Patent Owner contends “this is the *same* setup described in the Boeing report, which indisputably pertains to *Eddie*.” *Id.* at 20. Patent Owner provides the following annotated versions of Exhibits 2011 and 2010 for comparison.

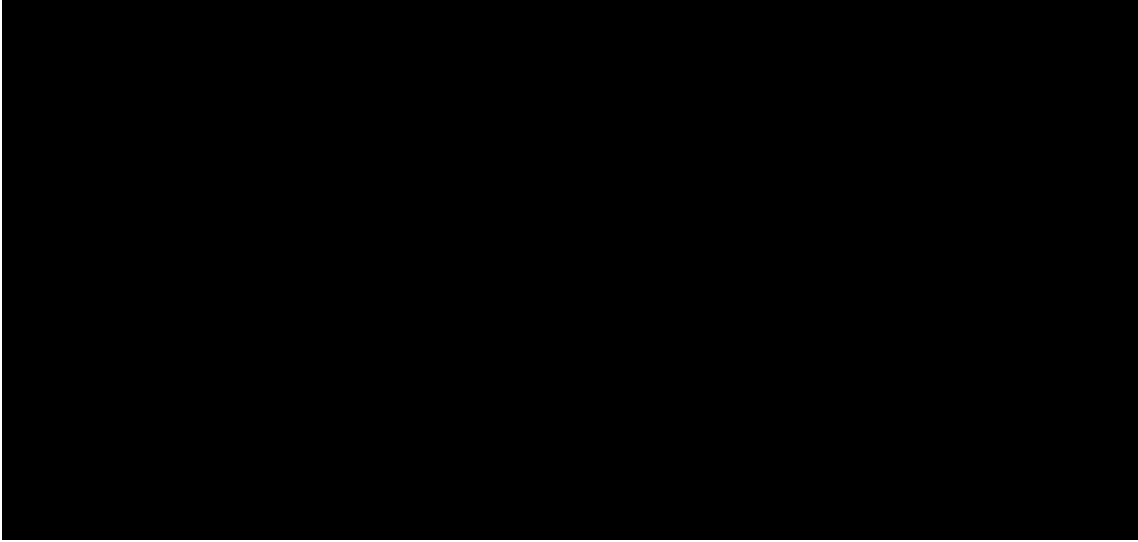


PO Sur-reply 19 (annotating Ex. 2011 with blue highlighting).



PO Sur-reply 20 (annotating Ex. 2010 with blue highlighting) (citing Ex. 2041, 52:17–20). Patent Owner thus contends that “evidence beyond

Sorrells’s testimony directly connects the schematic to the Eddie device. The layout file (Ex. 2012), in turn, is directly tied to the schematic.” *Id.* Additionally, Patent Owner points to the connection labels in the layout (shown on the left, below) as matching those in the schematic (shown on the right, below). *Id.*



PO Sur-reply 21.

Second, Patent Owner asserts that, although the label in the layout (shown in purple, above) is not the filename, the label [REDACTED] “is nearly identical to the layout’s file name,” [REDACTED]. PO Sur-reply 21 (citing Pet. Reply 3).

Third, Patent Owner contends that, even “[t]hough *different* versions of *some* files have different timestamps or names (which is expected because they are *different* versions), all files have dates that predate Tayloe by *many months*.” PO Sur-reply 21 (citing Pet. Reply 4, 6–7).

Fourth, Patent Owner argues that, although Petitioner asserts that Mr. Sorrells failed to corroborate that the Eddie device uses a 50% duty cycle LO,” Petitioner “does not explain how this is even relevant to conception/reduction.” PO Sur-reply 21 (citing Pet. Reply 5, 22–23). Patent

Owner, however, asserts that Mr. Sorrells' testimony is corroborated "by the layout (Ex.-2012), which shows the actual LO circuitry, and by [Dr.] Ricketts's analysis of that circuitry." *Id.* (citing Ex. 2015, 5, 16–18, 25–27). Additionally, Patent Owner points to the Boeing report, asserting that it states that [REDACTED], "independently corroborating Sorrells's statement that the Eddie chip operates at a sub-harmonic LO frequency." *Id.* (citing Ex. 2010, 1, 7, 11). Patent Owner also contends that the '551 patent (from which the '177 patent claims priority) discloses that apertures of the energy transfer signal (i.e., LO signal) can be " $\frac{1}{2}$ " (i.e., 50%) of the input signal. *Id.* (citing Ex. 2033, 69:27–38, 83:43–47, 104:60–105:7).

Lastly, Patent Owner responds to Petitioner's argument that Mr. Sorrells fails to show what schematic Boeing tested. PO Sur-reply 22 (citing Pet. Reply 7–8). Patent Owner contends that "Petitioner has not presented any evidence that there was anything other than the Eddie device (shown in the layout/schematic) that [Patent Owner] was working on in 1997/1998 and provided to Boeing." *Id.* Additionally, Patent Owner contends that Mr. Sorrells testified that "(1) the device Boeing tested is the configuration shown in the schematic/layout files, and (2) the schematics/layout files at that time were for that Eddie device." *Id.* (citing Ex. 2016 ¶¶ 20–22). And Patent Owner asserts that Mr. Sorrells' testimony "is corroborated not only by contemporaneous press releases but, as discussed above, by the specific configuration noted in the schematic that matches the setup described in the Boeing report." *Id.*

Turning to actual reduction to practice, Patent Owner contends that Petitioner's arguments are "belied by the Boeing report and [Dr.] Dickens

admission that, when tested, the Eddie device performed down-conversion.” PO Sur-reply 22–23 (citing Ex. 2041, 54:2–8; PO Resp. 28; Ex. 2010, 7–8; Ex. 2016 ¶¶ 20–24). Patent Owner contends that “[a]ll of this is corroborated with press releases, [Patent Owner’s] contract with Boeing/Triquant, the Boeing report, notes from Boeing, and as shown above, the Eddie device schematic and Boeing report both showing the same setup.” *Id.* at 23.

Based on the circumstances presented here, we need not address constructive reduction to practice or diligence. Specifically, Patent Owner does not rely on constructive reduction to practice to antedate Tayloe in its Patent Owner Response. *See generally* PO Resp. Rather, Patent Owner relies on actual reduction to practice occurring prior to the effective date of Tayloe. We find by not raising constructive reduction to practice in its Patent Owner Response, Patent Owner has waived that issue. *See* Paper 10 (Scheduling Order), 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”). Additionally, since the date of Patent Owner’s alleged actual reduction to practice precedes Tayloe and since constructive reduction to practice is not before us, we need not consider whether Patent Owner has established reasonable diligence. Therefore, we do not address Petitioner’s position as to constructive reduction to practice and diligence in its Reply (Pet. Reply 20–22 (noting that Patent Owner has not asserted constructive reduction to practice)) or Patent Owner’s response to those arguments in its Sur-reply (PO Sur-reply 23–26 (discussing constructive reduction to practice and diligence)).

Turning to conception and actual reduction to practice, Patent Owner's evidence as to each relies primarily on the testimony of Mr. Sorrells. *See* PO Resp. 26–29 (citing Ex. 2016). Patent Owner also relies on the testimony of Dr. Ricketts to map the Eddie chip and circuit board to the elements of claim 14, but Dr. Ricketts' testimony ultimately relies on evidence provided by Mr. Sorrells. *See id.* at 29–56. That evidence provided by Mr. Sorrells suffers from a significant failure of proof as to corroboration that fundamentally undermines Patent Owner's attempt to establish conception and actual reduction to practice. Specifically, there is a lack of evidence that corroborates Mr. Sorrells' testimony that the schematics alleged to be the Eddie chip and circuit board are actually the chip and circuit board tested by Boeing. The testing materials from Boeing (Exs. 2010, 2022) do not include any circuit schematics, especially those that Mr. Sorrells identifies from the Relativity database. Additionally, the Boeing materials do not refer to any specific, identifiable designation from the schematics, file names, or metadata to corroborate that Boeing actually tested the same chip and circuit board. Nor do the schematics identified by Mr. Sorrells use the term “Eddie.” Although we recognize that not every individual aspect of conception and reduction to practice needs to be corroborated, and that the “corroborative evidence simply needs to be sufficient to support the credibility of the inventors' story” (*see Medtronic*, 68 F.4th at 1306), Patent Owner's evidence fails the “rule of reason” test because it lacks key corroborative evidence on this critical connection.

Perhaps, more importantly, we find the facts presented here similar to those presented in *Apator*. In *Apator*, the Federal Circuit noted that “[t]he evidence proffered by [the inventor] is stuck in a catch-22 of corroboration:

Apator attempts to corroborate [the inventor's] testimony with the emails and the drawings, but the emails and drawings can only provide that corroboration with help from [the inventor's] testimony.” *Apator*, 887 F.3d at 1296; *see id.* at 1297 (“[I]t would be strange indeed to say that [an inventor], who filed the . . . affidavit that needs corroborating, can by his own testimony provide that corroboration.” (second alteration, and omission in original) (quoting *In re NTP*, 654 F.3d 1279, 1292 (Fed. Cir. 2011))). That is precisely the situation Patent Owner presents with Mr. Sorrells (a named inventor of the ’177 patent) who seeks to provide critical testimony connecting the alleged Eddie schematics with the Boeing testing documents that Patent Owner then seeks to use to corroborate Mr. Sorrells’ testimony as to conception and reduction to practice.

Additionally, we find inconsistencies in Mr. Sorrells’ testimony and evidence that raise further questions about conception and actual reduction to practice. Mr. Sorrells points to data from the Relativity database that he asserts identifies when a file named “[REDACTED]” was last modified, but at least one of the files identified has a different name—“[REDACTED]”—even though it also shows a “[m]odified” date of “[REDACTED].” *See* Ex. 2016 ¶ 9. Patent Owner acknowledges that “*different versions of some files have different timestamps or names,*” but contends that all of the files have dates that predate Tayloe. PO Sur-reply 21. Although it is true that the dates of the files predate Tayloe, that fact alone does not remedy the inconsistencies in Patent Owner’s evidence. Rather, we find that the inconsistencies in the file names and dates suggest that there are multiple potential versions of the schematics and the inconsistencies support

Petitioner's argument that there is a lack of corroborating evidence as to which schematic Boeing tested.

Patent Owner's reliance on 1997/1998 press releases and the 1998 Boeing report (PO Sur-reply 19) as evidencing that Eddie was the focus of ParkerVision's work at the time similarly fail to provide the missing evidence of corroboration connecting the schematics to the Boeing test results. So too does the [REDACTED] input noted in the Boeing report and schematic. *See id.* (citing Ex. 2010, 1, 5, 7; Ex. 2011; Ex. 2041, 52:17–20). The same is true of the connection labels in the layout and schematic. *Id.* at 20–21. Although the connection labels provide some degree of consistency between the layout and schematic, Patent Owner's evidence establishes that multiple versions of files and schematics were prepared during the relevant time period and none of the evidence sufficiently corroborates Mr. Sorrells' testimony connecting the specific schematics to the Eddie chip and circuit board actually tested by Boeing because it is unclear exactly which circuit and components Boeing tested.

Additionally, Patent Owner's evidence of actual reduction to practice is lacking in that it is not tied sufficiently to the schematics provided by Mr. Sorrells. Claim 14 is a method claim—“[m]ethod for down-converting an electromagnetic signal”—and in order to show actual reduction to practice, Patent Owner was required to produce evidence sufficient to demonstrate that the Eddie chip and circuit board tested by Boeing (1) is the chip and circuit board shown in the schematics from the Relativity database and (2) actually performed the claimed method. Although the Boeing test results indicate that the chip and circuit board Boeing tested worked for down-conversion (*see, e.g.*, Ex. 2010), Patent Owner acknowledges that

“component values shown [in the schematic] may not have been used in the tested circuit.” PO Sur-reply 16 (pointing to the “[REDACTED]” notation in the schematic). Patent Owner offers this argument in rebuttal of Dr. Dickens’ testimony showing that the schematic allegedly representing the Eddie chip did not perform the method of claim 14. *Id.* Contrary to Patent Owner’s attempt to assert that the “[REDACTED]” notation helps its argument to show actual reduction to practice, that indication and Patent Owner’s argument in rebuttal reinforces our findings above that Mr. Sorrells’ testimony lacks sufficient evidence corroborating that the schematics were embodied in the Eddie chip and circuit board tested by Boeing because it is unclear exactly which circuit and components Boeing tested.

As set forth above, we have considered Patent Owner’s evidence and argument, and Petitioner’s evidence and argument, and we have provided our analysis detailing specific issues with Patent Owner’s evidence that render Mr. Sorrells’ testimony insufficiently corroborated under the rule of reason.³⁸ Accordingly, we find that Patent Owner has not satisfied its burden of production to show conception and actual reduction to practice necessary to antedate Tayloe. *See, e.g., Apator*, 887 F.3d at 1297 (“a patentee bears the burden of establishing that its claimed invention is entitled to an earlier priority date than an asserted prior art reference” (emphasis

³⁸ We do not address other arguments raised by Petitioner because we find the lack of corroboration dispositive.

omitted) (quoting *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1275–76 (Fed. Cir. 2016)).³⁹

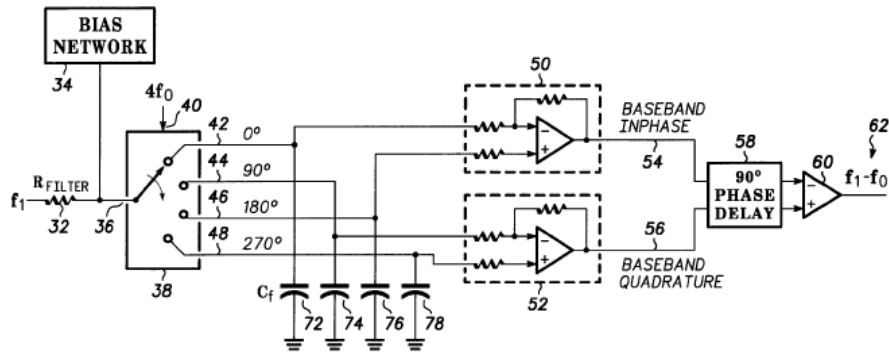
We now address the specific grounds set forth in the Petition challenging claim 14.

2. *Scope and Content of the Prior Art*

a. *Tayloe (Ex. 1004)*

Tayloe is directed to “a direct conversion receiver” and its method of “convert[ing] signal of interest directly to baseband (or near zero hertz) from a radio frequency (RF) or intermediate frequency (IF).” Ex. 1004, 1:10–13. Figure 3 is reproduced below:

³⁹ We note that, as discussed further below, Petitioner filed a Motion to Exclude several of the exhibits proffered by Mr. Sorrells in support of conception and actual reduction to practice based on hearsay and lack of authenticity. *See, e.g.*, Pet. MTE 5–11. Patent Owner opposes Petitioner’s challenge, in part, by relying on Mr. Sorrells’ testimony, which Patent Owner asserts he provides, in this instance, as a corporate witness since Mr. Sorrells was Patent Owner’s Chief Technology Officer. *See, e.g.*, PO Opp. 6. The parties have a fundamental disagreement regarding whether a named inventor can provide testimony on behalf of a corporation (Patent Owner) to authenticate documents that are then sought to provide corroborating evidence in support of that same inventor’s testimony as an individual fact witness. For the purpose of assessing Patent Owner’s evidence under the rule of reason, we need not determine whether Patent Owner’s approach is permissible because, even assuming it is, we find that Patent Owner has not satisfied its burden of production to show conception and actual reduction to practice necessary to antedate Tayloe under the rule of reason.



30 FIG. 3

Figure 3 is a block schematic circuit of a direct conversion receiver.

Ex. 1004, 1:51–52.

Regarding Figure 3, Tayloe explains that

an RF or IF signal f_1 is received at resistor 32. Resistor 32, as is more fully discussed below, forms a filter when taken in combination with capacitors 72-78. After passing through resistor 32, the input signal is received by commutating switch 38 at input 36. Commutating switch 38 switches input 36 to outputs 42, 44, 46, and 48. The rate at which commutating switch 38 operates is controlled by a signal present at control input 40. In the preferred embodiment as shown in FIG. 3, the control signal input to control input 40 is substantially equal to four times the local oscillator frequency that would exist in a simple direct conversion receiver. As a result, input 36 is switched to each of the four outputs substantially once during each period of the input signal f_1 .

In a preferred embodiment, commutating switch 38 remains closed at each of the four outputs for substantially 90 degrees at the frequency of the input signal. In alternate embodiments, commutating switch 38 remains closed at each of the four outputs for less than 90 degrees.

During the time that commutating switch 38 connects input 36 to output 42, charge builds up on capacitor 72. Likewise, during the time commutating switch 38 connects

input 36 to output 44, charge builds up on capacitor 74. The same principle holds true for capacitors 76 and 78 when commutating switch 38 connects input 36 to outputs 46 and 48 respectively. As commutating switch 38 cycles through the four outputs, capacitors 72-78 charge to voltage values substantially equal to the average value of the input signal during their respective quadrants. Each of the capacitors functions as a separate integrator, each integrating a separate quarter wave of the input signal. . . .

Output 42 represents the average value of the input signal during the first quarter wave of the period, and is termed the 0 degree output. Output 44 represents the average value of the input signal during the second quarter wave of the period, and is termed the 90 degree output. Output 46 represents the average value of the input signal during the third quarter wave of the period, and is termed the 180 degree output. Output 48 represents the average value of the input signal during the fourth quarter wave of the period, and is termed the 270 degree output.

The outputs of commutating switch 38 are input to summing amplifiers 50 and 52. Summing amplifier 50 differentially sums the 0 degree output and the 180 degree output, thereby producing baseband in-phase signal 54. Summing amplifier 52 differentially sums the 90 degree output and the 270 degree output, thereby producing baseband quadrature signal 56. Baseband in-phase signal 54 and baseband quadrature signal 56 are input to phase delay 58 which shifts the phase of baseband quadrature signal 56 by 90 degrees relative to baseband in-phase signal 54. The resulting signals are then summed by summing amplifier 60 to produce the signal of interest 62.

Ex. 1004, 2:13–67.

Tayloe teaches implementing “direct conversion receiver 30 (FIG. 3) utilizing an analog multiplexer and a digital counter as shown in FIG. 7,” reproduced below. Ex. 1004, 5:33–37.

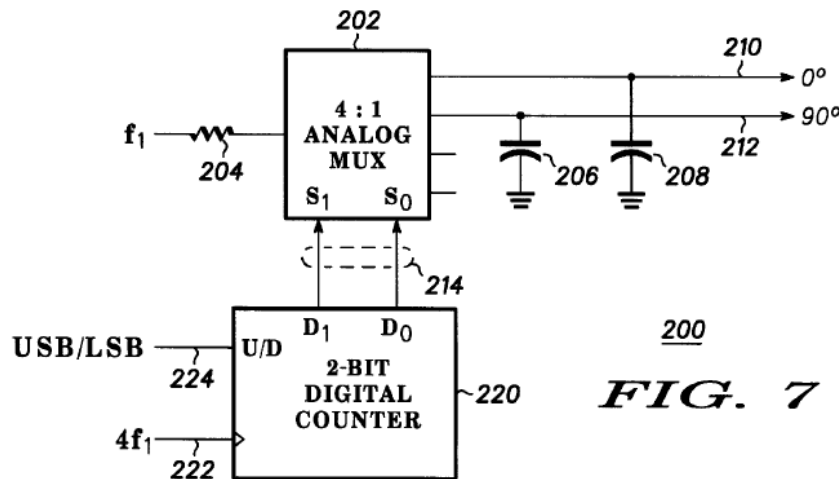


Figure 7 “shows a product detector” in accordance with one of Tayloe’s embodiments. Ex. 1004, 1:60–61. Tayloe discloses that “[t]he analog multiplexer is a Texas Instruments SN74BCT3253D.”⁴⁰ *Id.* at 5:36–37.

b. TI Datasheet (Ex. 1005)

TI Datasheet describes the SN74CBT3253 multiplexer/demultiplexer, “a dual 1-of-4 high-speed TTL-compatible [field effect transistor (FET)] multiplexer/demultiplexer.” Ex. 1005, 1. A demultiplexer may be used to receive one input signal and route it to several output lines. Ex. 1003 ¶ 92.

3. Claim 14

Petitioner sets forth its challenge based on the combination of Tayloe and TI Datasheet in the alternative: (1) Petitioner maps the combined

⁴⁰ Petitioner explains that the “BCT” in Tayloe’s reference to the TI Datasheet is a typographical error and should instead be read as “CBT.” Pet. 18 n.2. Patent Owner does not contest Petitioner’s characterization. *See generally* PO Resp.

teachings to claim 14 based on the construction of “matched filtering/correlating module” that Patent Owner presented in the Texas Litigation; and (2) Petitioner maps the combined teachings to claim 14 based on what it refers to as the plain and ordinary meaning of the term. *See* Pet. 6–7 (explaining that the Petition analyzes claim 14 under each construction). Because, for the reasons discussed above, we construe “matched filtering/correlating module” in accordance with its plain and ordinary meaning, we focus our discussion below and analysis on Petitioner’s challenge based on the plain and ordinary meaning of the term and we do not reproduce Petitioner’s challenge based on the construction Patent Owner previously presented in the Texas Litigation.

Patent Owner raises only two arguments in response to this challenge by Petitioner: (1) that Tayloe is not prior art to the ’177 patent and (2) that the Tayloe/TI Datasheet combination “does not disclose, teach, or suggest a ‘matched filtering/correlating module.’” PO Resp. 94–100 (emphasis omitted). Patent Owner bases its first argument on antedating Tayloe (*id.* at 94), which we addressed above, finding that Patent Owner has not established conception and actual reduction to practice prior to Tayloe. As such, we disagree with Patent Owner’s argument that Tayloe is not prior art to the ’177 patent. Patent Owner’s second argument—that the Tayloe/TI Datasheet combination does not disclose, teach, or suggest a matched filtering/correlating module—is based on two alternative constructions of a “matched filtering/correlating module”—(1) Patent Owner’s proposed construction of the term as presented here and (2) the construction of the term adopted in the Florida Litigation. *Id.* at 94–100. We address each of Patent Owner’s argument below when considering elements 14.1 and 14.2,

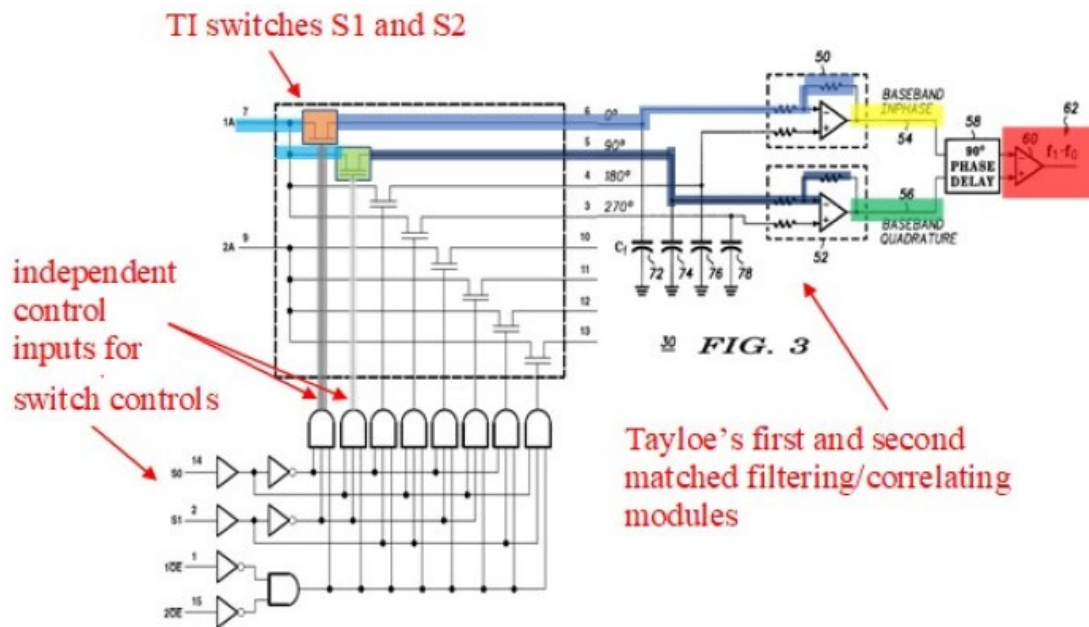
although we recognize that Patent Owner’s arguments are applicable to each element that includes the recitation of a “matched filtering/correlating module.”

a. Motivation to Combine and Reasonable Expectation of Success

Petitioner asserts that Tayloe discloses “a direct conversion receiver using a commutating switch to ‘sample an RF waveform four times per period at the RF frequency’ in which ‘[t]he samples are integrated over time to produce an average voltage of 0 degrees, 90 degrees, 180 degrees and 270 degrees’ across the 360-degree full cycle.” Pet. 20–21 (alteration in original) (quoting Ex. 1004, code (57)) (citing Ex. 1004, 2:13–67, Figs. 3, 4). Petitioner further asserts that Tayloe “expressly discloses that . . . switch 38 can be implemented using an analog multiplexer/demultiplexer, such as the TI SN74CBT3253D multiplexer/demultiplexer.” *Id.* at 21 (citing Ex. 1004, 5:33–37, 5:1–16, Fig. 7). Petitioner contends the TI Datasheet “describes the SN74CBT3253 ‘dual 1-of-4 high-speed [transistor-transistor logic]-compatible [field-effect transistor] multiplexer/demultiplexer.” *Id.* (alterations in original) (citing Ex. 1005, 1). In the combination proposed by Petitioner, “Tayloe’s first and second matched filtering/correlating modules use a demultiplexer, like that shown in TI-Datasheet . . . as a switch with an independent control input controlled by a control switch.” *Id.* (citing Ex. 1005, 2; Ex. 1003 ¶¶ 100–109).

Petitioner asserts that one of ordinary skill in the art “would have found it obvious to apply the teachings from TI Datasheet to implement . . . Tayloe’s multiplexer/demultiplexer” (Pet. 21 (citing Ex. 1003 ¶¶ 100–109)),

and Petitioner provides the following figure showing the combination of features from Tayloe and TI Datasheet with annotations added by Petitioner.



Tayloe FIG. 3 with TI Demux (TI-1005, 2) (annotated)

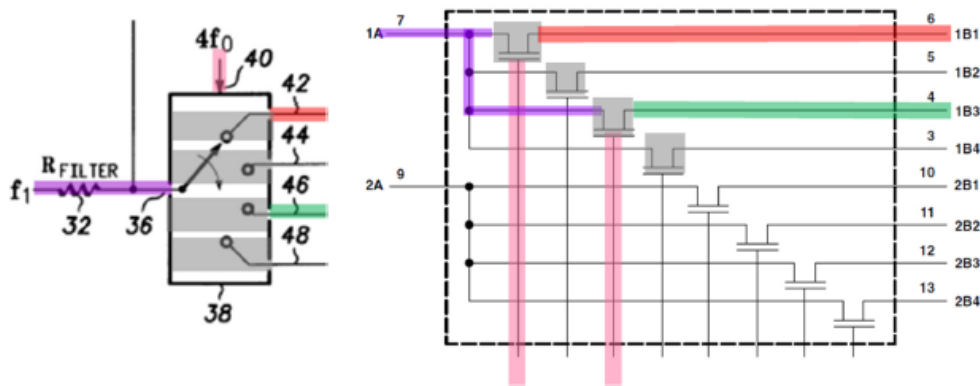
Pet. 22. Petitioner's figure combines the logic diagram of TI Datasheet's multiplexer/demultiplexer employed as a demultiplexer (left) (Ex. 1005, 2) and Tayloe's Figure 3 (right) (which "shows a direct conversion receiver" (Ex. 1004, 1:51–52)). Petitioner annotates the demultiplexer from TI Datasheet to identify "switch controls," "independent control inputs" for its switches, and switches S1 and S2. Pet. 22. And Petitioner annotates the portion from Tayloe's Figure 3 to identify "Tayloe's first and second matched filtering/correlating modules." *Id.* Petitioner uses different colors to show the sequence of the input signal (light blue) through TI Datasheet's demultiplexer (purple and dark blue) and the operation and effect of its switches (orange and light green) followed by the operations performed by Tayloe's direct conversion receiver (yellow, green, red). *Id.*

Petitioner contends the following regarding motivation to combine based on its combined figure shown above:

Taylor expressly teaches four switches (gray) in a “direct conversion receiver 30 (FIG. 3) utilizing an analog multiplexer . . . shown in FIG. 7” and specifically states “[t]he analog multiplexer is a Texas Instruments SN74BCT3253D.” [Ex. 1004,] 5:33–37. Taylor therefore discloses the express embodiment because the characteristics described in the TI Datasheet are inherent in Taylor and a [person of ordinary skill in the art] would have knowledge of the characteristics of the referenced multiplexer for implementing switch 38. [Ex. 1003 ¶¶] 100–109.

At a minimum, a [person of ordinary skill in the art] would have found it obvious to use four of the multiplexer switches (gray) from TI Datasheet to implement Taylor’s switch box 38 of FIG. 3 (which has four outputs), as annotated below.

Pet. 22 (alteration in original).



TI-1004, Fig 3 (switch 38), TI-1005, 1 (multiplexer/demultiplier)

Pet. 23. The figures shown above include a portion of Taylor’s Figure 3 showing the operation of switch box 38 (left) and a portion of TI Datasheet’s demultiplexer (right). *Id.* Petitioner includes highlighting in each to show the input signals (purple), the controls for the switches (pink), and the

outputs from Tayloe’s switch box 38 and TI Datasheet’s demultiplexer (red, green). *Id.*

Petitioner asserts the following regarding motivation to combine and reasonable expectation of success:

A datasheet is a well-known resource for learning detailed information of the multiplexer/demultiplexer, and a [person of ordinary skill in the art] would have been motivated to consult the TI Datasheet for a more complete understanding of Tayloe’s express teachings of the SN74CBT3253 demultiplexer, the only matching multiplexer available at the time. [Ex. 1023; Ex. 1003] ¶¶ 100–109; *see also Bayer Healthcare Pharms., Inc. v. Watson Pharms., Inc.*, 713 F.3d 1369, 1374–75 (Fed. Cir. 2013) (obvious to combine two prior art references where one reference “refers expressly” to the other).

When viewing the detailed diagram of the SN74CBT3253 demultiplexer, a [person of ordinary skill in the art] would have been motivated to apply four of the switches because the architecture of one switch on the demultiplexer is analogous to one of the four switching paths of Tayloe’s commutating switch 38. [Ex. 1003 ¶¶ 100–109. Thus, a [person of ordinary skill in the art] would have thought to implement the multiplexer switches from TI Datasheet in an analogous manner “by simple substitution of one known element for another.”

Pet. 23–24 (citing Ex. 1003 ¶¶ 100–109; *KSR*, 550 U.S. at 401).

Petitioner further contends that one of ordinary skill in the art “would have been motivated to use the TI demultiplexer for its advantages, including that ‘[t]he low on-state resistance of the switch allows connections to be made with minimal propagation delay.’” Pet. 24 (alteration in original) (citing Ex. 1005, 1; Ex. 1003 ¶¶ 100–109). And Petitioner asserts that one of ordinary skill in the art “would have a reasonable expectation of success

at combining Tayloe with TI Datasheet because the combination would have yielded only predictable results (e.g., ‘low on-state resistance of the switch [which] allows connections to be made with minimal propagation delay’).” *Id.* (alteration in original) (citing Ex. 1005, 1; Ex. 1003 ¶¶ 100–109).

Patent Owner does not address motivation to combine or reasonable expectation of success in its Patent Owner Response (*see generally* PO Resp.) and, therefore, we find that Patent Owner has waived any argument directed thereto. *See* Paper 10 (Scheduling Order), 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”).

We find Petitioner’s arguments in support of motivation to combine with a reasonable expectation of success persuasive and supported sufficiently on the complete record before us, and, therefore, we adopt them as our own findings. Accordingly, for the reasons explained by Petitioner, we find that one of ordinary skill in the art would have been motivated to combine Tayloe with TI Datasheet and would have had a reasonable expectation of success in achieving the claimed combination.

b. Element 14P (Preamble)

Element 14P recites “[a] method for down-converting an electromagnetic signal, comprising.” Ex. 1001, 194:59–60. Petitioner contends, “to the extent that the preamble is limiting, Tayloe teaches it.” Pet. 24. Petitioner asserts “Tayloe describes a ‘method and apparatus’ involving ‘a simple and inexpensive product detector which facilitates the conversion of a signal to baseband.’” *Id.* (citing Ex. 1004, 1:64–67). Petitioner further asserts “converting an RF or IF signal to baseband is ‘down-converting’ of ‘an electromagnetic signal.’” *Id.* (citing Ex. 1001,

code (57); Ex. 1003 ¶¶ 110, 112; Ex. 1004, 1:10–13, 5:61–64; Ex. 1008 ¶¶ 65–67).

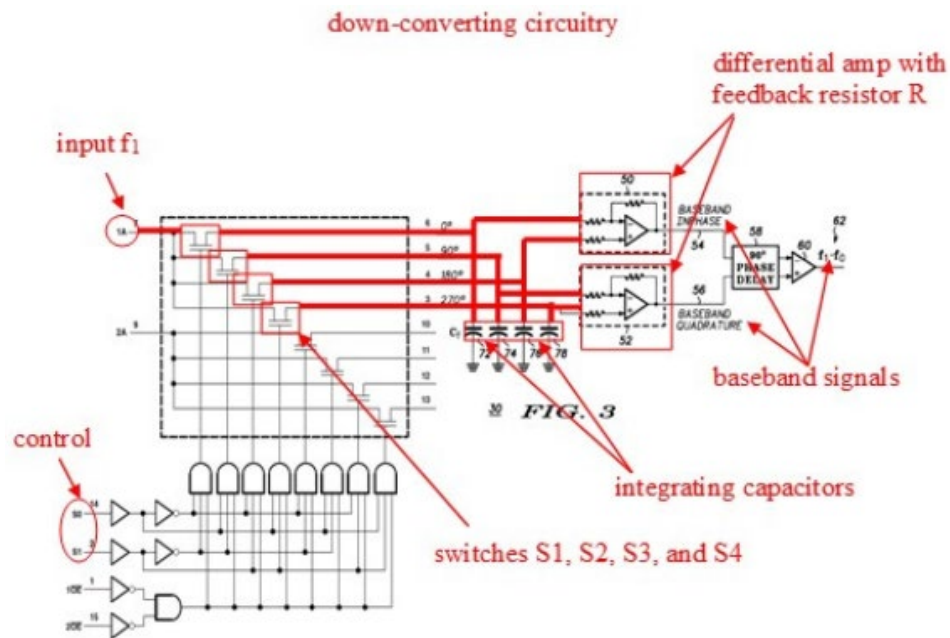
Patent Owner does not address Petitioner’s contentions regarding the preamble of claim 14 in its Patent Owner Response (*see generally* PO Resp.) and, therefore, we find that Patent Owner has waived any argument directed thereto. *See* Paper 10 (Scheduling Order), 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”).

We find Petitioner’s arguments regarding how Tayloe teaches element 14[P] persuasive and supported sufficiently on the complete record before us, and, therefore, we adopt them as our own findings. Accordingly, for the reasons explained by Petitioner, we find that the combination of Tayloe with TI Datasheet teaches the preamble of claim 14.

c. Elements 14.1 and 14.2

Element 14.1 recites “receiving an input signal at a first matched filtering/correlating module.” Ex. 1001, 194:61–62. Petitioner contends “Tayloe teaches that an RF or IF input signal f_1 is received into a circuit that performs down-converting.” Pet. 25 (citing Ex. 1004, 2:13–14).

Reproduced below is Petitioner’s combination of Tayloe’s Figure 3 and TI Datasheet’s multiplexer/demultiplexer, including various annotations by Petitioner showing the down-converting circuitry.



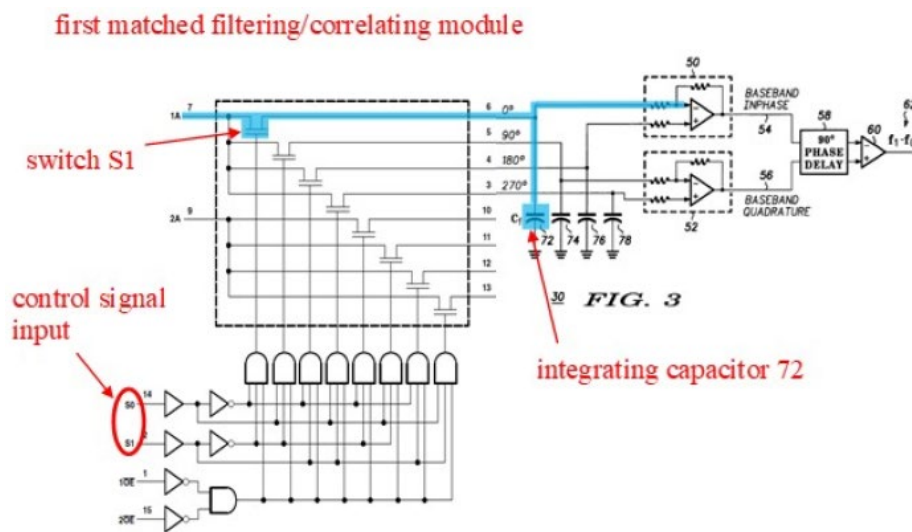
Tayloe, FIG. 3 + TI Datasheet (annotated)

Pet. 25. Petitioner’s figure combines the logic diagram of TI Datasheet’s multiplexer/demultiplexer employed as a demultiplexer (left) (Ex. 1005, 2) and Tayloe’s Figure 3 (right) (which “shows a direct conversion receiver” (Ex. 1004, 1:51–52)). Petitioner annotates its combined figure to identify control signals, an input signal (f_1); switches S1, S2, S3, and S4; integrating capacitors 72, 74, 76, 78; differential summing amplifier circuitry 50, 52 (including feedback resistor R); and baseband signals 54, 56, and 62. Pet. 25 (citing Ex. 1004, 2:8–12, Fig. 6; Ex. 1003 ¶¶ 111–112).

Petitioner asserts “Tayloe’s circuitry includes several down-converting circuits” and, regardless of which construction of “matched filtering/correlating module” is used, Tayloe, as modified by TI Datasheet, teaches element 14.1. Pet. 25–26.

Petitioner contends that Tayloe teaches element 14.1 under the plain and ordinary meaning of “matching filtering/correlating module.” Pet. 36–

40. After discussing the operations of the '177 patent and one embodiment of the matched filtering/correlating module that “includes a switch controlled by a control signal, and a capacitor that acts as an integrator,” Petitioner turns to Tayloe. *Id.* at 36–39 (citing Ex. 1001, 134:32–51, Fig. 153; Ex. 1003 ¶¶ 18–32, 62–67, 132–137; Pet. § II.C (discussing the plain and ordinary meaning)). In particular, Petitioner contends “the circuitry of Tayloe includes a switch S1 controlled by a control signal derived from f_0 and a capacitor 72 that performs integration.” *Id.* at 39 (citing Ex. 1003 ¶¶ 132–137). Petitioner asserts that Tayloe describes “a first matched filtering/correlating circuit” as shown in Petitioner’s combined figure, highlighted in blue, and reproduced below.



Tayloe FIG. 3 + TI Datasheet (annotated)

Pet. 40. Petitioner’s figure combines the logic diagram of TI Datasheet’s multiplexer/demultiplexer employed as a demultiplexer (left) (Ex. 1005, 2) and Tayloe’s Figure 3 (right) (which “shows a direct conversion receiver” (Ex. 1004, 1:51–52)). Petitioner labels the combined figure “first matched filtering/correlating module”; annotates the figure to identify a “control

signal input,” “switch S1,” and “integrating capacitor 72”; and includes blue highlighting in the figure identifying what Petitioner contends is the first matched filtering/correlating circuit. Pet. 40. Petitioner asserts, “in at least one embodiment of Tayloe, the control signal that controls the switch S1 is synchronized to the carrier of the received RF input signal because each switch is closed exactly once [sic] period of the received RF input signal’s carrier frequency.” *Id.* (citing Ex. 1004, 3:48–54; Ex. 1003 ¶¶ 18–32, 62–67, 132–137). Thus, Petitioner asserts “Tayloe provides a matched filtering/correlator module” consistent with the plain and ordinary meaning of the term. *Id.* (citing Ex. 1003 ¶¶ 18–32, 62–67, 132–137).

Element 14.2 recites “down converting said input signal at said first matched filtering/correlating module according to a first control signal and outputting a first down-converted signal.” Ex. 1001, 194:63–65. Petitioner contends “Tayloe teaches or renders obvious element 14.2” and relies on its discussion of element 14.1 and circuit operation and down-conversion to baseband. Pet. 40 (citing Pet. 26–36 (addressing Patent Owner’s construction and the plain and ordinary meaning of “matched filtering/correlating module”); Ex. 1003 ¶¶ 138–140). Petitioner adds that, in accordance with the plain and ordinary meaning, “Tayloe’s first matched filtering/correlating module outputs a first in-phase down-converted signal representative of the first quarter wave period (referred to as the 0 degree output).” *Id.* at 41 (citing Ex. 1004, 2:46–48; Ex. 1003 ¶¶ 138–140). Petitioner contends that “[t]his 0 degree output is a first down-converted signal because energy from the received RF input signal is transferred to the capacitor only when the carrier signal is positive, i.e., ‘during the first

quarter wave of the period’ . . . thereby aliasing the RF input signal to baseband.” *Id.* (citing Ex. 1004, 2:47; Ex. 1003 ¶¶ 138–140).

As noted above, Patent Owner contends that the Tayloe/TI Datasheet combination does not disclose, teach, or suggest a “matched filtering/correlating module.” PO Resp. 94. Patent Owner’s argument is based solely on its proposed claim construction requiring transferring to a load. *Id.* First, applying the construction that it presents in this proceeding, Patent Owner contends that “[a] ‘matched filtering/correlating module’ requires that ‘energy of the input signal is integrated and transferred to a load to form a down-converted signal.’ Tayloe does not disclose, teach or suggest this.” *Id.* (citing Ex. 2024 ¶¶ 282–283). Patent Owner asserts that Tayloe “is designed to hold charge” and its “capacitors do not transfer energy to amplifiers 50, 52, as Petitioner alleges.” *Id.* at 95. Patent Owner contends that “[n]one of the capacitors discharge towards amplifiers 50, 52. There is no current or energy being transferred to a load (from the input signal or capacitors). As a result, no energy will form a first or second down-converted signal.” *Id.* (citing Ex. 2024 ¶ 286).⁴¹

Second, applying the construction adopted in the Florida Litigation, which similarly requires transferring to a load, Patent Owner contends that Tayloe does not disclose a “matched filtering/correlating module” “for the same reason set forth” above because “no current, charge, or energy is transferred from the RF input signal to amplifiers 50, 52, or 60 in Tayloe.”

⁴¹ For completeness, we note that Patent Owner further contests Petitioner’s and Dr. Galton’s alternative analysis, applying the claim construction that Patent Owner proposed in district court, which asserts that Tayloe’s capacitor 72 discharges to load R1 when switch S1 is open. PO Resp. 96–99.

PO Resp. 99 (citing Ex. 2024 ¶ 298); *see also id.* at 99–100 (reiterating the assertion that Tayloe does not transfer to a load).

As discussed above, we construe “matched filtering/correlating module” in accordance with its plain and ordinary meaning wherein the module samples an input signal at an aliasing rate, and we do not agree that the plain and ordinary meaning of the term itself requires transferring to a load. Thus, in light of the construction we adopt, Patent Owner’s arguments do not contest Petitioner’s showing under the plain and ordinary meaning of the term and effectively leave Petitioner’s arguments and evidence unchallenged. We agree with Petitioner’s analysis and arguments, which we find fully supported by the evidence presented, that the combination of Tayloe and TI Datasheet teaches elements 14.1 and 14.2 for the reasons presented by Petitioner and as reiterated above and we adopt them as our own findings. *See, e.g.*, Pet. 25–26, 36–41.

d. Element 14.3

Element 14.3 recites “receiving said input signal at a second matched filtering/correlating module.” Ex. 1001, 194:66–67. Petitioner relies on its arguments and evidence from element 14.1, asserting that Tayloe teaches a second matched filtering/correlating module which receives an input signal. Pet. 42. In particular, Petitioner’s discussion of Tayloe’s first matched filtering/correlating module equally applies to the second matched filtering/correlating module. *See id.* at 48–49 (discussing application of the plain and ordinary meaning).

Aside from Patent Owner’s argument regarding the meaning of “matched filtering/correlating module” and its application to Tayloe, which

we addressed above, Patent Owner does not otherwise challenge Petitioner's contentions regarding element 14.3. *See generally* PO Resp.

We agree with Petitioner's analysis and arguments, which we find fully supported by the evidence presented, that the combination of Tayloe and TI Datasheet teaches element 14.3 and we adopt them as our own findings. *See, e.g.*, Pet. 42, 48–49.

e. Element 14.4

Element 14.4 recites “down converting said input signal at said second matched filtering/correlating module according to a second control signal and outputting a second down-converted signal.” Ex. 1001, 195:1–4. Petitioner relies on its arguments and evidence from elements 14.2 and 14.3, asserting Tayloe “teaches or renders obvious element 14.4.” Pet. 50. Petitioner further explains how Tayloe teaches element 14.4 when the plain and ordinary meaning of “matched filtering/correlating module” is applied. *See id.* at 51.

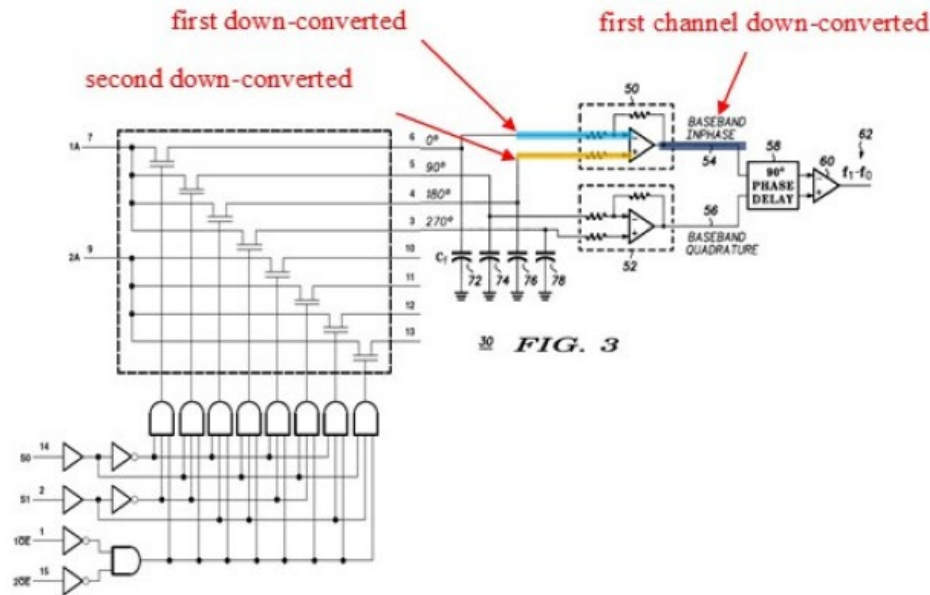
Aside from Patent Owner's argument regarding the meaning of “matched filtering/correlating module” and its application to Tayloe, which we addressed above, Patent Owner does not otherwise challenge Petitioner's contentions regarding element 14.4. *See generally* PO Resp.

We agree with Petitioner's analysis and arguments, which we find fully supported by the evidence presented, that the combination of Tayloe and TI Datasheet teaches element 14.4 and we adopt them as our own findings. *See, e.g.*, Pet. 50–51.

f. Element 14.5

Element 14.5 recites “combining said second down-converted signal and said first down-converted signal and outputting a first channel down-

converted signal.” Ex. 1001, 195:5–8. Petitioner contends “Taylor teaches element 14.5” under the plain and ordinary meaning, “where the first channel down-converted signal is the I-phase down-converted signal” as shown in Petitioner’s combined figure reproduced below. Pet. 52 (citing Ex. 1003 ¶¶ 139–140, 156).



Taylor FIG. 3 + TI Datasheet (annotated)

Pet. 53. Petitioner’s figure combines the logic diagram of TI Datasheet’s multiplexer/demultiplexer employed as a demultiplexer (left) (Ex. 1005, 2) and Taylor’s Figure 3 (right) (which “shows a direct conversion receiver” (Ex. 1004, 1:51–52)). Petitioner’s annotations identify a “first down-converted” signal (blue), a “second down-converted” signal (yellow), and a “first channel down-converted” signal (dark blue). Pet. 53.

Aside from Patent Owner’s argument regarding the meaning of “matched filtering/correlating module” and its application to Taylor, which

we addressed above, Patent Owner does not otherwise challenge Petitioner's contentions regarding element 14.5. *See generally* PO Resp.

We agree with Petitioner's analysis and arguments, which we find fully supported by the evidence presented, that the combination of Tayloe and TI Datasheet teaches element 14.5 and we adopt them as our own findings. *See, e.g.*, Pet. 51–54.

g. Summary as to Claim 14

For the reasons discussed above, on the complete record before us, we find that Petitioner has established that the combination of Tayloe and TI Datasheet teaches each element of claim 14.

4. Objective Indicia of Nonobviousness

Neither Petitioner nor Patent Owner has presented any evidence of objective indicia of nonobviousness.

5. Weighing the Graham Factors

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat*, 876 F.3d at 1361. On balance, considering the complete record before us, the evidence of obviousness is very strong, and Patent Owner has not presented objective evidence of nonobviousness. Accordingly, on balance, we determine that Petitioner has established by a preponderance of the evidence that the combination of Tayloe and TI Datasheet would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention.

E. Ground 2A: Obviousness over Razavi

Petitioner asserts Ground 2A (Obviousness over Razavi) and Ground 2B (Obviousness over Razavi and Uzunoglu) as alternatives to one another depending on the construction of “matched filtering/correlating module.” Pet. 54, 72. Specifically, if Patent Owner’s construction is adopted, Petitioner contends Razavi alone would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention. *Id.* at 54 (Ground 2A Heading (“Razavi Renders Claim 14 Obvious Under Patent Owner’s Construction” (bold omitted))), 58 (discussing Patent Owner’s construction). In the alternative, Petitioner contends that, if the plain and ordinary meaning of the term is adopted, the combination of Razavi and Uzunoglu would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention. *Id.* at 72 (Ground 2B Heading (“Razavi and Uzunoglu Render Claim 14 Obvious Under the Plain-and [sic] Ordinary Meaning ” (bold omitted))), 78 (discussing the plain and ordinary meaning). Petitioner does not present any argument that Razavi alone would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art when the plain and ordinary meaning of “matched filtering/correlating module” is applied. *See id.* at 54–72 (discussing Petitioner’s challenge based on Razavi alone). Because we apply the plain and ordinary meaning of “matched filtering/correlating module,” we determine that Petitioner has not established by a preponderance of the evidence that Razavi alone would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention.

F. Ground 2B: Obviousness over Razavi and Uzunoglu

As discussed above in the context of Ground 2A, Petitioner asserts Ground 2A (Obviousness over Razavi) and Ground 2B (Obviousness over Razavi and Uzunoglu) as alternatives to one another depending on the construction of “matched filtering/correlating module.” We now address Petitioner’s challenge based on the combination of Razavi and Uzunoglu.

1. Scope and Content of the Prior Art

a. Razavi (Ex. 1017)

Razavi describes a 900 MHz CMOS direct conversion receiver (Ex. 1017, title),⁴² that includes a low-noise amplifier (LNA), quadrature mixers, a local oscillator, and baseband amplifiers (*id.* at 1:4–7). Figure 1, reproduced below, illustrates Razavi’s receiver architecture.

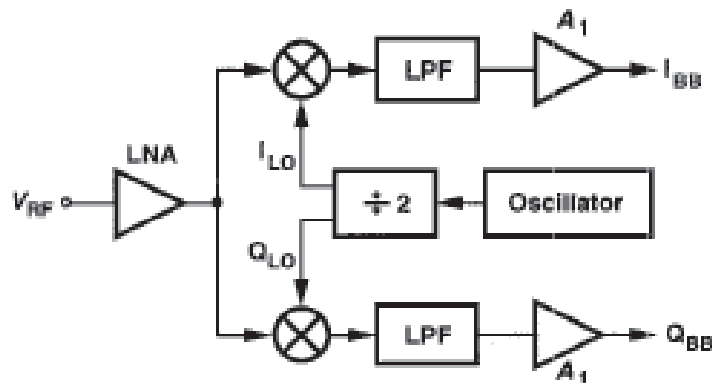


Fig. 1. Receiver architecture.

Razavi’s Figure 1 shows the direct conversion receiver architecture, including “a low-noise amplifier (LNA), quadrature mixers, simple low-pass

⁴² Citations to Razavi are to the page numbers of Exhibit 1017 inserted by Petitioner in the middle portion of each page as opposed to the native page numbers of the underlying document.

filters (LPFs), a local oscillator (LO), a divide-by-two circuit, and baseband amplifiers, A_1 .” *Id.* at 1:4–7.

Razavi's Figure 2 is reproduced below.

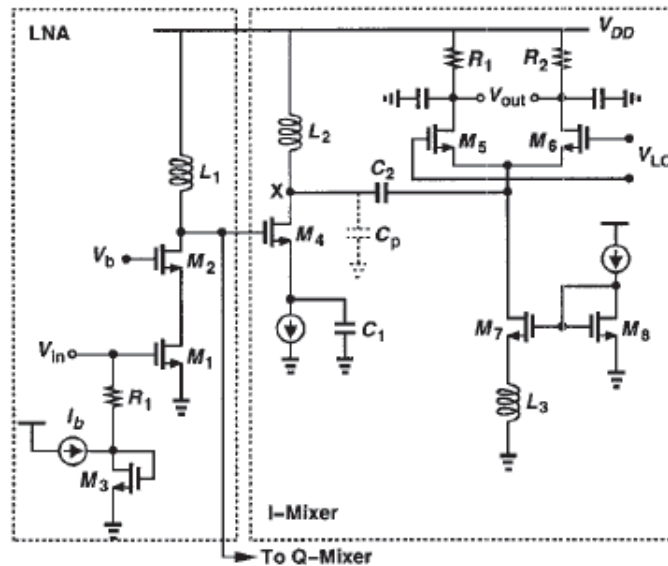


Fig. 2. LNA/mixer implementation.

Razavi’s Figure 2 “shows the implementation of the LNA and the quadrature mixers.” Ex. 1017, 1:16–17. Razavi explains that “[t]he mixer employs a single-balanced topology consisting of an input transistor M_4 and a switching pair M_5 - M_6 .” *Id.* at 1:32–33.

b. Uzunoglu (Ex. 1026)

Uzunoglu is directed to a synchronous oscillator (SO) that is a “free-running oscillator which oscillates at its natural frequency in the absence of an externally applied signal.” Ex. 1026, Abstract. Figure 1 is reproduced below.

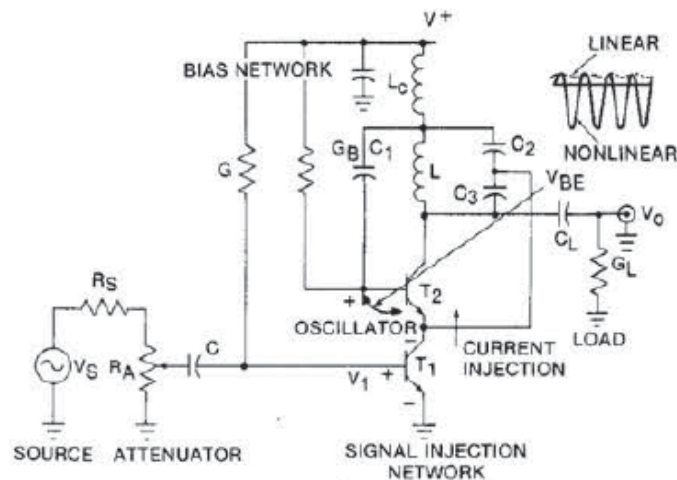


Fig. 1. Functional description of the SO circuit.

Uzunoglu’s Figure 1 “illustrates the basic injection-locked synchronous oscillator circuit and a functional description of its operation.” Ex. 1026, 2:30–31.⁴³ Uzunoglu explains that “[t]he synchronous oscillator (SO) is an important functional element for synchronization and tracking in communication systems,” and its “output signal amplitude remains constant and unaffected by variations in the input drive level; however, the output phase is modulated to synchronize and track the input signal.” *Id.* at 11:13–15, 11:20–12:3.

2. Claim 14

Petitioner asserts “Razavi describes a 900 M[H]z direct conversion receiver that uses first and second down-conversion circuitry to down-convert an RF signal to baseband.” Pet. 74 (citing Ex. 1003 ¶ 188). Petitioner contends that, “[w]hile Razavi’s control signal (from its [LO]) is nominally set to 900 MHz, which is the same as the carrier frequency of the

⁴³ Citations to Uzunoglu are to the page number of Exhibit 1026 inserted by Petition in the middle portion of each page as opposed to the native page numbers of the underlying document.

RF input signal, Razavi does not describe synchronizing the control signal with the frequency of the input signal.” *Id.* (citing Ex. 1003 ¶ 188).

Petitioner explains that, in the combination proposed, “the control signal of Razavi that controls the operation of the switches in the down-conversion circuitry is synchronized to the frequency of the carrier signal of the input signal in a manner similar to that described by Uzuno[gl]u.” *Id.* (citing Ex. 1003 ¶ 188).

In the context of addressing Petitioner’s challenge based on the combination of Razavi and Uzunoglu, Patent Owner contends that “Uzunoglu is only being used for the concept of synchrony and does not resolve the deficiencies of Razavi.” PO Resp. 111 (citing Ex. 2024 ¶ 337). Patent Owner thus relies on the same arguments initially raised in response to Petitioner’s challenge based on Razavi alone, which we do not expressly address because the challenge was presented in the alternative depending on the construction of “matched filtering/correlating module,” as explained above. *Id.* (citing Ex. 2024 ¶ 338). Accordingly, Patent Owner’s arguments discussed below, although raised in the context of Petitioner’s challenge based on Razavi, also apply to Petitioner’s challenge based on the combination of Razavi and Uzunoglu.

a. Motivation to Combine and Reasonable Expectation of Success

Petitioner asserts that one of ordinary skill in the art “would have been motivated to combine Razavi with Uzunoglu to synchronize the control signal from the [LO] signal of Razavi with the carrier frequency of the RF input signal.” Pet. 74–75 (citing Ex. 1003 ¶¶ 189–193). Petitioner explains why one of ordinary skill in the art would have been motivated to modify

Razavi, how the modification would have been performed, and that one of ordinary skill in the art would have had a reasonable expectation of success in achieving the combination. *Id.* at 75–78.

Patent Owner does not contest Petitioner’s arguments or evidence in support of motivation to combine or reasonable expectation of success (*see generally* PO Resp.) and, therefore, we find that Patent Owner has waived any argument directed thereto. *See* Paper 10 (Scheduling Order), 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”).

Additionally, we find Petitioner’s arguments in support of motivation to combine with a reasonable expectation of success persuasive and supported sufficiently on the complete record before us, and, therefore, we adopt them as our own findings. Accordingly, for the reasons explained by Petitioner, we find that one of ordinary skill in the art would have been motivated to modify Razavi with the teachings of Uzunoglu, as proposed, and would have had a reasonable expectation of success in achieving the proposed combination.

a. Element 14P (Preamble)

Element 14P recites “[a] method for down-converting an electromagnetic signal, comprising.” Ex. 1001, 194:59–60. Petitioner relies on the argument presented in the context of its alternative challenge based on Razavi alone in addressing the preamble of claim 14. Pet. 78 (referring to Ground 2A). There, Petitioner contends, “[t]o the extent that the preamble is limiting, Razavi teaches it.” *Id.* at 56 (citing Ex 1003 ¶¶ 157–158). Petitioner asserts “Razavi teaches a circuit that when implemented

down-converts a 900 MHz electromagnetic signal to baseband.” *Id.* at 56–57 (citing Ex. 1017, 1).

Patent Owner does not address Petitioner’s contentions regarding the preamble of claim 14 in its Patent Owner Response (*see generally* PO Resp.) and, therefore, we find that Patent Owner has waived any argument directed thereto. *See* Paper 10 (Scheduling Order), 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”).

We find Petitioner’s arguments regarding how Razavi teaches element 14[P] persuasive and supported sufficiently on the complete record before us, and, therefore, we adopt them as our own findings. Accordingly, for the reasons explained by Petitioner, we find that the combination of Razavi and Uzunoglu teaches the preamble of claim 14.

b. Elements 14.1 and 14.2

Element 14.1 recites “receiving an input signal at a first matched filtering/correlating module.” Ex. 1001, 194:61–62. Element 14.2 recites “down converting said input signal at said first matched filtering/correlating module according to a first control signal and outputting a first down-converted signal.” *Id.* at 194:63–65. Petitioner primarily relies on its arguments presented in the context of its alternative challenge based on Razavi alone in addressing elements 14.1 and 14.2. *See* Pet. 78 (discussing element 14.1 and stating that, “[a]s discussed in Ground 2A, 14.1, *supra*, Razavi describes all of the circuit components of a first matched filtering/correlating module, as claimed by the ’177 patent”), 79 (“The Razavi down-conversion circuitry described in Ground 2A operates the same way in the combination. . . . The only difference is the matching or correlating of the control signal to the carrier frequency of the RF input

signal.”). As noted above, Patent Owner’s arguments in response also rely on the arguments presented by Patent Owner to contest Petitioner’s challenge based on Razavi alone. *See* PO Resp. 111. Therefore, Petitioner’s and Patent Owner’s arguments addressing elements 14.1 and 14.2 and, specifically the recited “matched filtering/correlating module” discussed below, are those presented in the context of Petitioner’s alternative challenge based on Razavi alone because they have equal applicability to Petitioner’s challenge based on Razavi in combination with Uzunoglu.

Turning to Petitioner’s argument, Petitioner contends Razavi teaches element 14.1 and annotates Razavi’s Figure 2 as reproduced below:

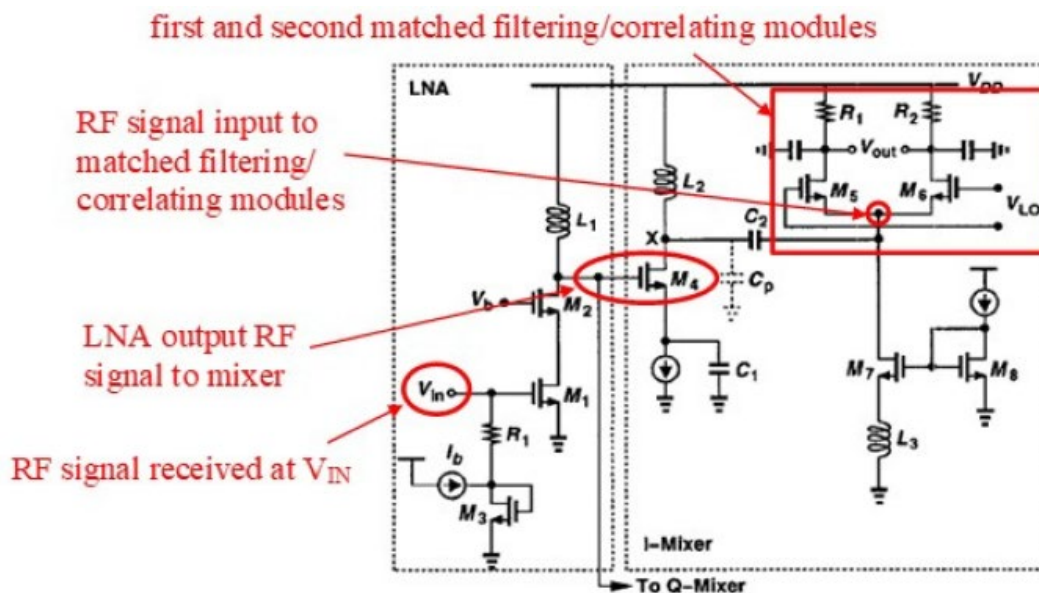
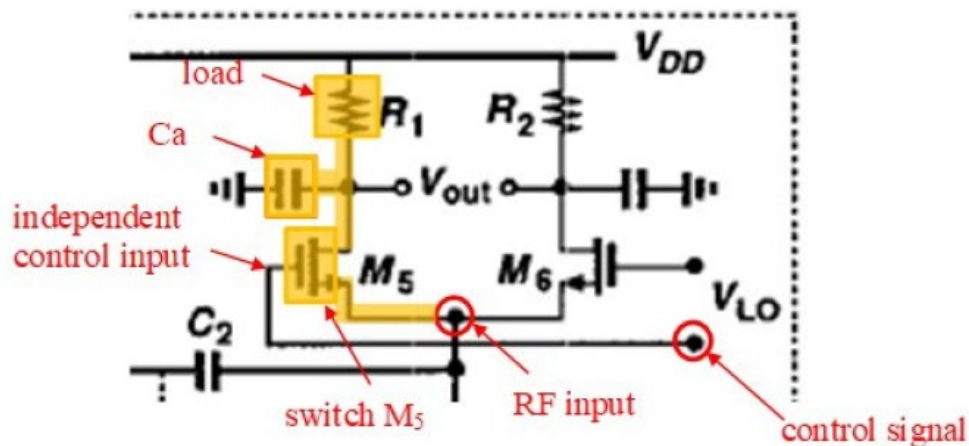


Fig. 2. LNA/mixer implementation.

Pet. 57. Ravazi's Figure 2 "shows the implementation of the LNA and the quadrature mixers." Ex. 1017, 1:16–17. Petitioner annotated Razavi's Figure 2 to show an "RF signal received at V_{IN} ," "LNA output RF signal to mixer," "RF signal input to matched filtering/correlating modules," and "first and second matched filtering/correlating modules." Pet. 57.

Although Petitioner’s analysis in the context of its challenge based on Razavi alone relies on Patent Owner’s construction of “matched filtering/correlating module,” we nonetheless include some of the discussion here because it overlaps with Petitioner’s argument based on its construction using the plain and ordinary meaning of “matched filtering/correlating module.” In that regard, Petitioner next asserts that “Razavi describes a direct conversion receiver, which a [person of ordinary skill in the art] would have understood to be used for down-converting a modulated RF carrier signal.” Pet. 61 (citing Ex. 1017, 1:1–3, Ex. 1003 ¶¶ 164–168). Petitioner contends “[t]he circuitry samples the RF signal at an aliasing rate because the spectrum of the RF signal is centered at 900 MHz and the differential V_{LO} signal in FIG. 2 causes each switching transistor to open and close at a rate of 900 MHz.” *Id.* Petitioner asserts that 900 MHz is “an aliasing rate because it is less than twice the EM carrier signal.” *Id.* (citing Ex. 1003 ¶¶ 164–168).

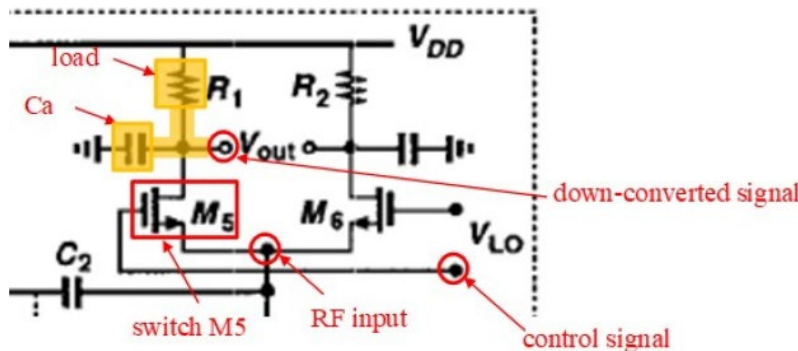
Petitioner contends that Razavi’s circuitry “includes a switch (transistor M_5) that has an independent control input for the [LO] control signal,” as shown in Petitioner’s annotated version of a portion of Razavi’s Figure 2 reproduced below. Pet. 61.



Razavi, FIG. 2 (partial, annotated)

Pet. 62. Petitioner annotates the portion of Razavi's Figure 2 shown above by highlighting a portion of the circuit and identifying a "control signal," "RF input," "switch M_5 ," "independent control input," " C_a ," and "load." *Id.* Petitioner contends that Razavi's "mixer employs a single-balanced topology consisting of an input transistor M_4 and a switching pair M_5 - M_6 ." *Id.* (quoting Ex. 1017, 1:33–35) (citing Ex. 1003 ¶¶ 164–168). Petitioner asserts that "[t]he energy accumulated on the capacitor C_a and transferred to the load while the switch M_5 is closed is non-negligible because the receiver requires a non-negligible signal to perform receiver functions, such as down-conversion of the RF input signal and decoding of the information contained in the received RF input signal." *Id.* (citing Ex. 1003 ¶¶ 164–168). Petitioner contends that, if the samples contained negligible energy, "the receiver could not function to perform the down-conversion." *Id.* Petitioner also asserts that, "[i]n addition to accumulating charge on capacitor C_a , Razavi's circuit also transfers charge to the load (resistor R_1) when the switch is closed." *Id.* at 63 (citing Ex. 1003 ¶¶ 164–168).

Relying on another annotated version of a portion of Razavi's Figure 2, reproduced below, Petitioner contends that "[t]he charge stored on the capacitor C_a discharges through the load R_1 when the switch is open." Pet. 63.



Razavi, FIG. 2 (partial, annotated)

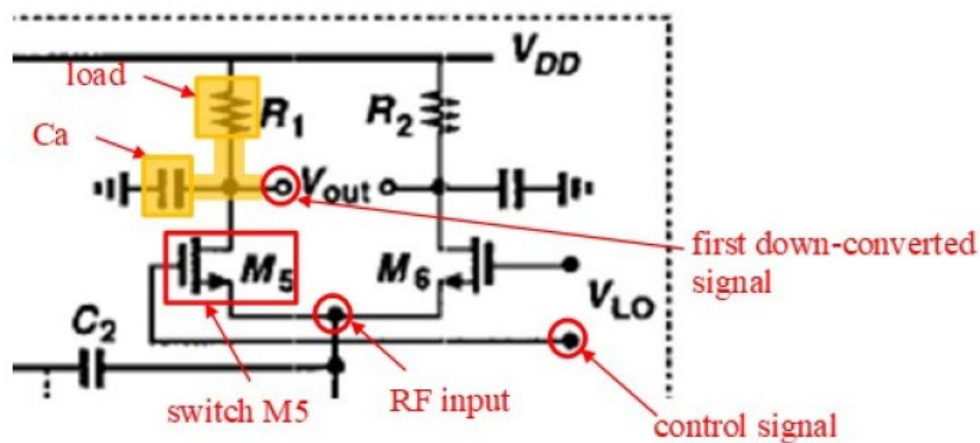
Pet. 64. Petitioner annotates the portion of Razavi's Figure 2 shown above by highlighting a portion of the circuit and identifying a "control signal," "RF input," "switch M5," " C_a ," "load," and "down-converted signal." *Id.* Petitioner contends the following:

When no RF signal is applied to the system, each capacitor charges to the same voltage, called the quiescent voltage, and therefore each capacitor holds the same amount of charge, called the quiescent charge. When an RF signal is applied to the system, it results in a variation of the voltage of each capacitor about its quiescent voltage, called the signal voltage, and a corresponding variation of charge held by each capacitor about its quiescent charge, called the signal charge. Signal energy is accumulated on capacitor C_a as a result of its signal charge changing when the RF signal is sampled by the bottom control signal of V_{LO} for a given aperture period. When the switch M_5 is open, the signal charge on C_a discharges through the load R_1 , transferring charge through the load R_1 .

Id. (citing Ex. 1003 ¶¶ 169–173). Petitioner asserts that "[t]he resulting voltage signal across the resistor R_1 is a first down-converted signal"

“because it periodically transfers energy from the RF signal to the capacitor for approximately half of each period of the 900 MHz V_{LO} control signal.” *Id.* at 64–65 (citing Ex. 1017, 2:21–34; Ex. 1003 ¶¶ 168–173).

Turning to element 14.2, Petitioner contends that “[t]he first matched filtering/correlating module down-converts the RF signal according to the control signal V_{LO} ,” as shown in Petitioner’s annotated version of a portion of Razavi’s Figure 2 reproduced below. Pet. 65.



Pet. 66. Petitioner annotates the portion of Razavi’s Figure 2 shown above by highlighting a portion of the circuit and identifying a “control signal,” “RF input,” “switch M_5 ,” “ C_a ,” “load,” and “first down-converted signal.” *Id.* Petitioner asserts that “[t]he switching operation of transistor M_5 produces a ‘downconverted signal’ across resistor R_1 ” and the circled left output of V_{out} in the annotated figure above “represents the output of a first down-converted signal.” *Id.* (citing Ex. 1017, 2:21–34, Fig. 2; Ex. 1003 ¶¶ 174–175).

Patent Owner raises several arguments in response to Petitioner’s challenge based on Razavi. First, Patent Owner contends that Razavi does not disclose, teach, or suggest a “matched filtering/correlating module.” PO Resp. 100–08. Second, Patent Owner asserts that Razavi does not disclose,

teach, or suggest “circuitry for down-converting an input signal ‘such that energy of the input signal is integrated and transferred to a load to form a down-converted signal.’” *Id.* at 108–10 (emphasis omitted from heading). Third, Patent Owner contends that Razavi does not disclose, teach, or suggest a “matched filtering/correlating module” under the Middle District of Florida’s construction of the term. *Id.* at 110–11. Taking them slightly out of order, Patent Owner’s second and third arguments are based on constructions for “matched filtering/correlating module” that we do not adopt and, therefore, we disagree with Patent Owner’s arguments based thereon. Thus, our focus here is on Patent Owner’s first argument.

Patent Owner contends that “[a] ‘matched filtering/correlating module’ requires ‘circuitry that samples an input signal at an aliasing rate.’” PO Resp. 100. As noted above in our construction of the term, we agree that the meaning of the term, and perhaps more specifically the operation of claim 14, includes the concept of down-converting an EM signal by aliasing the EM signal, and aliasing a signal means down-converting the EM signal by under-sampling the signal at an aliasing rate or down-converting an EM signal by transferring energy from the signal at the aliasing rate. And each option for down-converting by aliasing requires sampling the EM signal.

Patent Owner asserts that Razavi’s mixer “does not sample an input signal at an aliasing rate.” PO Resp. 100. Patent Owner contends that “sampling means reducing a continuous-time signal to a discrete-time signal” and that “in a sampling system, the RF input signal must physically pass through a switching element in a way that breaks the continuous signal into discrete-time samples.” *Id.* at 100–01 (citing Ex. 2024 ¶ 306). Patent Owner asserts that Razavi’s “RF input signal does not (and cannot)

flow—from drain to the source.” *Id.* at 102–03. Patent Owner contends that one of ordinary skill in the art “understands that in saturation, current only flows out of the source as shown by the blue arrows.” *Id.* at 103 (citing Ex. 2024 ¶ 310).

Patent Owner contends that the “RF input signal (AC current in capacitor C2) is applied to the common node of the source terminals of [transistors] M5 and M6, and the drain terminal of [transistor] M7” and that one of ordinary skill in the art “understands that the current from the RF input signal always flows downward toward M7, never passing through M5 or M6.” PO Resp. 103. Thus, Patent Owner asserts that the “RF input signal remains a continuous-time signal throughout the circuit” and “[n]othing in Razavi’s mixer changes this fact.” *Id.* (citing Ex. 2024 ¶ 311). And, Patent Owner contends that, “[e]ven assuming that transistors M5 and M6 are switches that open and close, this would not change the fact that no current from the RF input signal passes through M5 or M6 from the source to the drain,” and, therefore, “M5 and M6 cannot sample the input signal.” *Id.* Therefore, Patent Owner asserts “Razavi does not sample an input signal.” *Id.*; *see id.* at 103–07 (discussing the asserted operation of M5 and M6).

Additionally, Patent Owner contests Dr. Galton’s deposition testimony regarding distinguishing absolute or total current from VDD and “signal current” or “signal component.” PO Resp. 107. Patent Owner asserts that, although Dr. Galton testified that the signal current or signal component moves both upwards and downwards, “[t]here is only one physical current in the circuit—the absolute current from VDD.” *Id.* Patent Owner contends that the “‘signal component’ Dr. Galton refers to is not an

independent current that flows separately but merely describes how the RF input signal affects the current flow from VDD. The entire current, including any signal variations, flows downward. No portion of the RF input signal current moves upward.” *Id.* Thus, Patent Owner asserts “Dr. Galton’s reliance on a ‘signal current’ does not change the fact that the current always flows downward” and “the RF input signal is not sampled.” *Id.* (citing Ex. 2024 ¶ 321).

Further, Patent Owner contends that, “[e]ven if [transistors] M5 and M6 open and close, the RF input signal remains a constant signal. The current from the RF input signal always flows through [transistor] M7 to ground[,] i.e., the RF input signal is never broken into discrete-time samples.” PO Resp. 107. And “the output of the mixer, *V_{out}*, is a continuous signal because current is always flowing downward from VDD.” *Id.* at 108 (citing Ex. 2024 ¶ 322). Patent Owner asserts that one of ordinary skill in the art “understands that a circuit with a continuous input and a continuous output does not perform sampling” and “[t]here is always current flowing from VDD to M7 (either through M5 or M6).” *Id.* (citing Ex. 2024 ¶¶ 323–324).⁴⁴

⁴⁴ Patent Owner notes that, in a different matter, the Federal Circuit affirmed a finding that a mixer with a continuous input and continuous output does not sample. PO Resp. 108 (citing *ParkerVision, Inc. v. Qualcomm Inc.*, 621 F. App’x 1009 (Fed. Cir. 2015)). The specific holding in that decision was affirming the district court’s grant of a motion for judgment as a matter of law following trial and it was based on the Federal Circuit’s determination that, “[w]ithout any explanatory testimony or other evidence on that point, [Patent Owner’s infringement expert’s] conclusory statement regarding the 50% duty cycle products [of defendant Qualcomm] cannot establish that those products infringe the sampling limitation.” *ParkerVision*, 621 F. App’x at 1017.

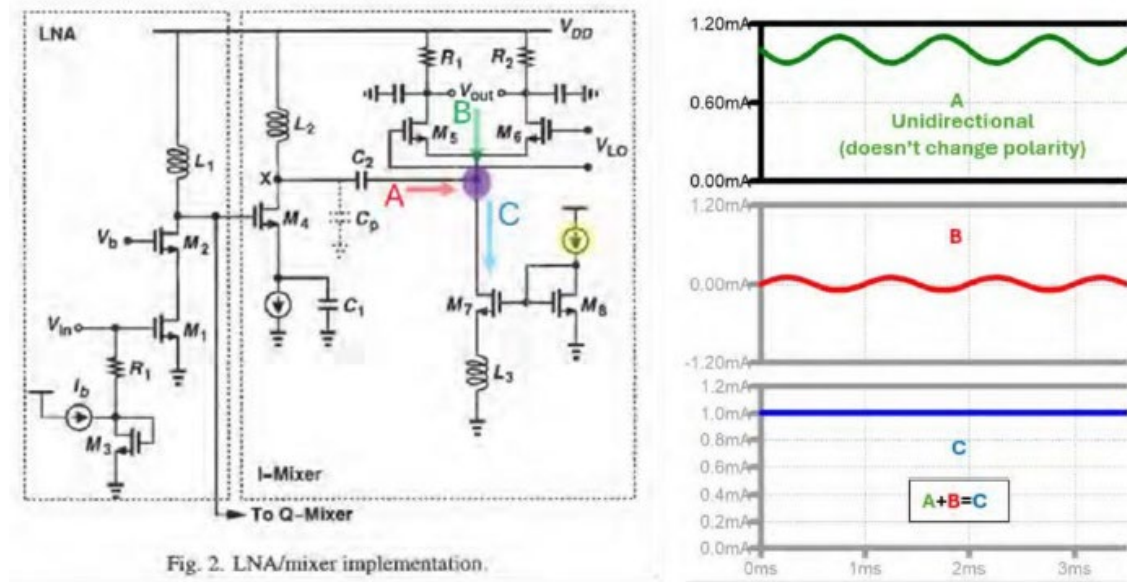
In its Reply, Petitioner first focuses on Patent Owner’s assertions regarding transferring to a load, contending that “claim 14 does not require transferring to a load.” Pet. Reply 40. We addressed this issue above in the context of our claim construction analysis for “matched filtering/correlating module” and we agree that claim 14 does not require transferring to a load.

Second, Petitioner contends that Patent Owner “admits that Razavi uses a 50% duty cycle LO, which is a non-negligible aperture” and “teaches a 900 MHz aliasing rate” and that “because of the aperture and aliasing rate, Razavi performs ‘energy transfer,’ and delivers real power.” Pet. Reply 40.

Third, Petitioner contends that Patent Owner’s “description of Razavi’s circuit operation defies physics.” Pet. Reply 40 (citing Ex. 1066 ¶¶ 65–71). Petitioner asserts that “[t]he experts agree that, in Razavi’s Figure 2, electrons from the input signal flow through the transistors M_5 and M_6 toward the positive supply terminal V_{DD} .” *Id.* (citing Ex. 1066 ¶¶ 65–71; Ex. 1065, 12:1–14:25). Petitioner thus contends that Patent Owner’s “assertion that ‘no current from the RF input signal passes through M_5 or M_6 from the source to the drain’ is both misleading and erroneous, based in an artificial current convention, not actual current flow.” *Id.* (citing PO Resp. 98–103, 70; Ex. 1066 ¶¶ 65–71).

Petitioner asserts that Patent Owner’s “own annotation demonstrates transferring energy as an output of Razavi’s switches (i.e., M_5 - M_6).” Pet. Reply 41. As shown below, Petitioner relies on Patent Owner’s annotated version of Razavi’s Figure 2 (left) and Patent Owner’s current flow diagrams (right). *Id.* (citing PO Resp. 85–86⁴⁵).

⁴⁵ Petitioner inadvertently cited pages 68–69 of the Patent Owner Response, but the reproduced figure and diagrams are actually from pages 85–86.

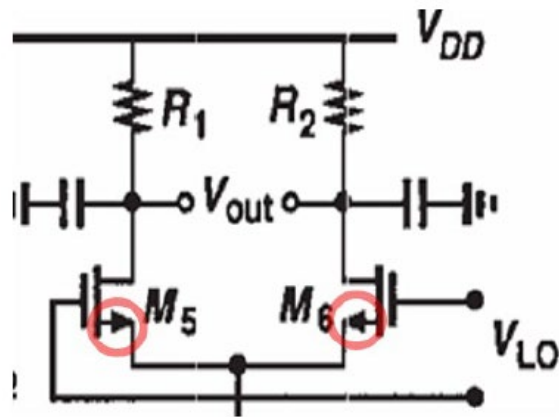


Pet. Reply 41. The left is Razavi's Figure 2 with Patent Owner's annotations to show what are labeled as currents "A," "B," and "C." PO Resp. 85. The right is Patent Owner's waveform plot showing current asserted to represent "A," "B," and "C."⁴⁶ *Id.* at 86. Petitioner contends that Patent Owner argues that "'current A' representing 'the RF input signal flowing into the node' causes 'current B,' which is 'flowing from VDD to M7,' to oscillate so that the oscillation is reflected on Vout terminals." Pet. Reply 41 (citing PO Resp. 68–69). Petitioner asserts, "[h]ence energy reflected on Vout terminals is transferred from the RF input signal." *Id.* (citing Ex. 1066 ¶¶ 72–82). Petitioner, thus, contends that, "in Razavi, electrons (charge) from the received signal flow from A, through M5 and accumulate on the capacitors when the switch M5 is ON," and "[w]hen M5 is

⁴⁶ Dr. Galton correctly observes in his Second Declaration that Patent Owner and Dr. Ricketts "mixed current A and current B in [the] annotation on the right-hand side waveform plots, i.e., the red waveform should have been labeled 'A' and the green waveform should have been labeled 'B.'" Ex. 1066 ¶ 98 n.2.

OFF, charge stored on the capacitors discharges through R_1 (i.e., energy is transferred to the load R_1).” *Id.* (citing Ex. 1066 ¶¶ 89–99). Petitioner further contends that, “[a]s discussed in the Petition, Razavi satisfies the correct construction of claim 14. But, for at least the reasons above, Razavi also satisfies [Patent Owner’s] claim constructions.” *Id.* at 41–42 (citing Pet. 72–80); *see also id.* at 42–43 (explaining that “Razavi expressly calls M5 and M6 ‘a switching pair’” and, therefore, “describes two matched filtering/correlating modules, each with a switch” (citing Ex. 1017, 1)).

In its Sur-reply, Patent Owner contends that, even if a matched filtering/correlating module does not require transferring to a load, directionality is relevant to Patent Owner’s argument that Razavi does not disclose sampling an input (RF) signal at an aliasing rate. PO Sur-reply 39. Patent Owner asserts that, “when transistors M_5 and M_6 in Razavi’s mixer are ON, energy is *not* transferred from the RF input upward through transistors M5/M6 towards capacitors C_p/C_m .” *Id.* (citing PO Resp. 101–07; Ex. 2024 ¶¶ 306–322). Patent Owner contends that, instead, as reproduced below, “current only flows only [sic] downward from VDD in the direction of the transistor arrows (red). Because current does not flow upward from the RF input through transistors M5/M6, Razavi does not sample the input signal (reducing the RF input from a continuous-time signal to a discrete-time signal).” *Id.* at 39–40. Patent Owner reproduces the following annotated portion of Razavi’s Figure 2, previously produced in its Patent Owner Response.



PO Sur-reply 40. Patent Owner annotated a portion of Razavi's Figure 2 to include red circles around the M_5 and M_6 transistor arrows. *Id.*

Patent Owner points to Razavi's statement that transistors M_5 and M_6 "must remain in saturation," arguing that Dr. Galton agreed that, in saturation, NMOS transistors "conduct current from drain to source—here, from V_{DD} downwards." PO Sur-reply 40 (citing Ex. 2040, 62:3–10, 63:8–20). Thus, Patent Owner contends "Razavi does not meet this claim element." *Id.*

Patent Owner contends that Petitioner and Dr. Galton change positions by "reframing the issue in terms of electron flow rather than current flow," which "underscores Petitioner's lack of substantive rebuttal and seeks to create confusion where none exists." PO Sur-reply 40. Patent Owner contends that there are "two ways to look at current flow – conventional current and the flow of electrons. The two are opposites. For conventional current, charge flows from a higher to lower potential (V_{DD} to ground). Electron flow is the opposite." *Id.* at 41 (footnote omitted) (citing Ex. 2040, 19:1–4; Pet. Reply 40). Patent Owner contends that claim 14 "must be looked at from the point of view of how the patent discusses the invention" and Dr. Galton admits that the '177 patent is written from the

perspective of conventional current, including its description of charging and discharging storage elements (capacitors). *Id.* (citing Ex. 2040, 61:16–62:2).⁴⁷ Patent Owner further asserts that claim 14 relates to transferring energy and Dr. Galton admits that the fundamental electrical equations used to describe energy transfer (power) are expressed in terms of conventional current. *Id.* (citing Ex. 2024 ¶ 50; Ex. 2040, 21:19–24:5, 19:16–20:1). Patent Owner, thus, contends that “[t]his should end the inquiry.” *Id.*

Patent Owner contends that Dr. Ricketts analyzes claim 14 and the prior art “using conventional current” as Patent Owner asserts one of ordinary skill in the art would do and Petitioner “offers no evidence that a [person of ordinary skill in the art] would rely on electron flow other than Galton’s bald assertions/say-so.” PO Sur-reply 42. And Patent Owner asserts that the technical references on which Dr. Galton relies use standard convention current notation and analyze current flow. *Id.* at 42–43. Thus, Patent Owner contends claim 14 “should be analyzed from the point of view of conventional current, not flow of electrons.” *Id.* at 43.

First, we begin our analysis by reiterating that element 14.1 recites “receiving an input signal at a first matched filtering/correlating module” and element 14.2 recites “down converting said input signal at said first matched filtering/correlating module according to a first control signal and outputting a first down-converted signal.” Ex. 1001, 194:61–65.

Second, we find that Petitioner has established that Razavi teaches elements 14.1 and 14.2. Specifically, Petitioner shows that Razavi’s

⁴⁷ Patent Owner cites *Phillips* for the principle that “claims must be read in view of the specification, of which they are a part.” PO Sur-reply 41 (citing *Phillips*, 415 F.3d at 1315).

Figure 2 teaches each and every limitation of elements 14.1 and 14.2. In particular, Petitioner's annotated version of Razavi's Figure 2 (reproduced below) illustrates the limitations of element 14.1.

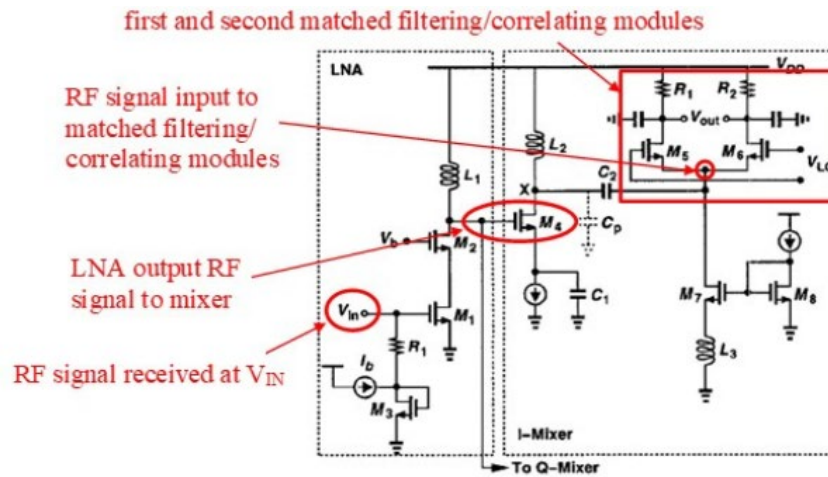
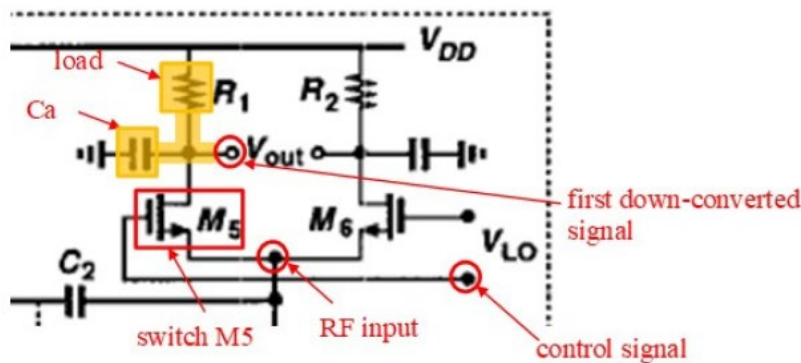


Fig. 2. LNA/mixer implementation.

Pet. 57. Razavi's Figure 2 "shows the implementation of the LNA and the quadrature mixers." Ex. 1017, 1:16–17. Petitioner annotated Razavi's Figure 2 to show an "RF signal received at V_{IN} ," "LNA output RF signal to mixer," "RF signal input to matched filtering/correlating modules," and "first and second matched filtering/correlating modules." Pet. 57. And Petitioner's annotated version of a portion of Razavi's Figure 2 (reproduced below) illustrates the limitations of element 14.2.



Pet. 66. Petitioner annotates the portion of Razavi's Figure 2 shown above by highlighting a portion of the circuit and identifying a "control signal,"

“RF input,” “switch M5,” “Ca,” “load,” and “first down-converted signal.”
Id.

Third, the dispute between the parties as to elements 14.1 and 14.2 centers on the meaning of “matched filtering/correlating module,” as well as how to interpret Razavi’s Figure 2. As reflected above, Patent Owner’s arguments primarily come down to the directionality of the RF input signal and whether Razavi’s circuit samples the input signal at an aliasing rate. *See, e.g.*, PO Resp. 100. And Patent Owner asserts that in order to sample a signal, the signal “needs to go from a continuous-time signal to a discrete-time signal.” *Id.* at 101. Thus, central to the parties’ positions is the operation of the circuit shown in Razavi’s Figure 2 and whether the mixer samples the input signal at an aliasing rate. That question is answered based on whether it is appropriate to consider the flow of electrons in the circuit (as Petitioner contends) or whether it is *only* appropriate to consider conventional circuit nomenclature. In that regard, Patent Owner’s argument pertaining to the directionality of the signal is central to (a) whether energy is transferred to a load in Razavi’s circuit and (b) whether Razavi samples an input signal at an aliasing rate. If we find that one of ordinary skill in the art would consider Razavi as proposed by Petitioner and Dr. Galton, that determination effectively resolves the issues raised by Patent Owner.

Reviewing the expert testimony presented in their respective declarations and deposition testimony, we find the testimony presented by Dr. Galton more credible than that presented by Dr. Ricketts. In particular, Dr. Galton’s testimony from paragraphs 65–98 in his Second Declaration (Ex. 1066) is highly persuasive. There, Dr. Galton explains his opinion as to Razavi’s operation as well as why Dr. Ricketts’ opinion is incorrectly based

on conventional current that does not accurately reflect how current moves through Razavi's circuit shown in Figure 2. Dr. Galton's testimony is both clear and convincing. He explains the history regarding conventional current and that it is based on the incorrect assumption that electricity moves from positive to negative. *See, e.g.*, Ex. 1066 ¶ 66. And Dr. Galton persuasively explains that the electron flow is toward V_{DD} . *Id.* Thus, we agree with Dr. Galton's testimony that the actual current (i.e., actual electron flow) in the circuit flows from the source to the drain of each of transistors M_5 and M_6 . *Id.* ¶ 67.

Fundamentally, the experts agree. Dr. Ricketts acknowledged during his deposition that “[b]y convention, current flows from – typically from a positive to a negative, and the electrons are actually traveling from the negative back up to the positive, by just how we have defined those things in the field.” Ex. 1065, 14:21–25. So, the question we resolve here is whether to interpret Razavi's circuit shown in Figure 2 as operating incorrectly by sticking with conventional naming that is recognized by both experts and explained by Dr. Galton as not representing the actual current, i.e., the electron flow, or whether we interpret Razavi's circuit shown in Figure 2 as it operates in the real world in terms of actual physics. *See* Ex. 1066 ¶¶ 90–91 (opining that Dr. Ricketts uses “a naming convention that defines current as flowing from high to low voltages for historical reasons, to reach an invalid conclusion”). We find that one of ordinary skill in the art would interpret Razavi in terms of how the current (i.e., electrons) actually flows as opposed to using a convention that is acknowledged to be opposite. In so doing, we also find particularly persuasive, Dr. Galton's testimony in paragraph 89 that, in the circuit shown in Razavi's Figure 2, “the RF input

signal directly transfers energy to both the capacitors and the resistors.” *Id.* ¶ 89 (further testifying that the capacitors perform integration, and the resistors are the loads, and, therefore, energy of the input signal is integrated and transferred to a load to form a down-converted signal).

We also find credible and persuasive Dr. Galton’s testimony that Razavi’s circuit shown in Figure 2 implements sampling and “does so in two places, one that uses M_5 as the switch and the capacitor above it as the storage element, and one that uses M_6 as the switch and the capacitor above it as the storage element.” Ex. 1066 ¶ 85. And we agree with Dr. Galton’s testimony that because the sample rate is the LO frequency (i.e., 900 MHz), which is the same as the frequency of the EM signal, Razavi samples at an aliasing rate. *Id.*

Additionally, Dr. Galton’s testimony regarding Figure 95 of the ’177 patent calls into question Patent Owner’s argument (based on Dr. Ricketts’ opinion) that a circuit with a continuous input and a continuous output does not perform “sampling.” Ex. 1066 ¶ 86. Dr. Galton provides persuasive testimony that the embodiment illustrated in Figure 95 has continuous input and continuous output time signals for the reasons he explains therein. *Id.*

Further, we do not agree with Patent Owner’s argument that, because the ’177 patent describes the circuits therein using conventional current, one of ordinary skill in the art would not have interpreted Razavi’s circuit shown in Figure 2 as Dr. Galton explains. In particular, both the ’177 patent and Razavi use conventional current, which is to be expected because it is, in fact, “conventional,” but as Dr. Galton explains, one of ordinary skill in the art would have understood that, in actuality, it is the flow of electrons that

influences the transfer of energy from the input signal. Thus, we do not agree with Patent Owner's argument that Dr. Galton's understanding of Razavi contradicts how one of ordinary skill in the art would have understood the '177 patent.

In light of the full record before us, we find Petitioner's argument more strongly supported on the record and Dr. Galton's testimony more credible for the reasons discussed above. Therefore, considering how the current—electrons—actually flows in Razavi, we agree with Petitioner that Razavi's circuit shown in Figure 2 teaches down-converting an EM signal by transferring energy from the EM signal at the aliasing rate, which meets the description in the Specification of the '177 patent regarding the “present invention” and also satisfies the plain and ordinary meaning of a “matched filtering/correlating module.” For the same reasons discussed above, we also disagree with Patent Owner's second argument—that Razavi does not teach that energy of the input signal is integrated and transferred to a load to form a down-converted signal. To reiterate, transferring to a load is not recited by claim 14 and we decline to construe “matched filtering/correlating module” to include said language. Nonetheless, Dr. Galton's testimony, on which Petitioner relies, provides sufficient support to show that Razavi integrates and transfers energy to a load to form a down-converted signal, as discussed above. Thus, for the reasons discussed above and as fully set forth in Petitioner's analysis in the Petition and Reply, which we find supported

by credible testimony provided by Dr. Galton, we find that Petitioner has shown that Razavi teaches elements 14.1 and 14.2.⁴⁸

c. Element 14.3

Element 14.3 recites “receiving said input signal at a second matched filtering/correlating module.” Ex. 1001, 194:66–67. Petitioner relies on its arguments and evidence from its challenge based on Razavi, contending that “Razavi describes all of the circuit components of a first and second matched filtering/correlating modules, as claimed by the ’177 patent.” Pet. 79 (citing Ex. 1003 ¶¶ 154–184). Petitioner explains that, in the proposed combination, “Razavi’s control signal is synchronized to the carrier frequency of the RF input signal, as described by Uzunoglu.” *Id.* (citing Ex. 1003 ¶¶ 188, 195–199). Petitioner contends

[t]he output of the Uzunoglu circuit directly generates one of the VLO control signals in Razavi. The SO does this through the principle of injection locking. The synchronous oscillator is coupled to the RF input signal in such a way that it is injection locked, also known as pulled, to the frequency and phase of the RF input signal’s carrier. The SO circuitry has a narrow locking range that ensures that it is relatively unaffected by the modulation of the RF signal, and instead the circuitry locks to the carrier. The output, therefore, is a signal that is synchronized with the carrier frequency. The synchronization between the control signal and the carrier frequency means that the operation of the circuitry in the Razavi-Uzunoglu combination is the same operation of a matched filtering/correlating module.

⁴⁸ As noted above, since we do not adopt the same construction as the Middle District of Florida, we do not address Patent Owner’s arguments directed to that construction beyond pointing out that Patent Owner’s arguments raise similar issues that we addressed above. *See* PO Resp. 110–11.

Id. at 79–80 (citing Ex. 1026, 1; Ex. 1003 ¶¶ 195–199). Petitioner asserts that Razavi’s down-conversion circuitry operates the same way in the proposed combination, but that “[w]ith the application of Uzunoglu’s circuitry to synchronize the control signal with the carrier frequency of the RF input signal, the Razavi mixer operates to down-convert the RF signal using the switch M₆, capacitor Ca and load R2.” *Id.* at 80 (citing Ex. 1003 ¶¶ 195–196, 198–199). According to Petitioner, the only difference “is the synchronization of the control signal to the carrier frequency of the RF input signal.” *Id.* (citing Ex. 1003 ¶¶ 195–196, 198–199).

Aside from Patent Owner’s argument regarding the scope and meaning of “matched filtering/correlating module” and its application to Razavi, which we addressed above in our claim construction analysis, Patent Owner does not otherwise challenge Petitioner’s contentions regarding element 14.3. *See generally* PO Resp.

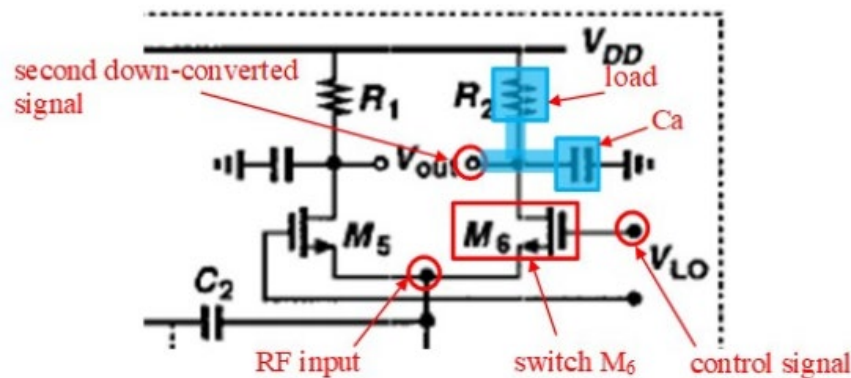
We agree with Petitioner’s analysis and arguments, which we find fully supported by the evidence presented, that the combination of Razavi and Uzunoglu teaches element 14.3 and we adopt them as our own findings. *See, e.g.*, Pet. 79–80.

d. Elements 14.4 and 14.5

Element 14.4 recites “down converting said input signal at said second matched filtering/correlating module according to a second control signal and outputting a second down-converted signal” and element 14.5 recites “combining said second down-converted signal and said first down-converted signal and outputting a first channel down-converted signal.” Ex. 1001, 195:1–8. Petitioner relies on its arguments and evidence from its

challenge based on Razavi alone. *See* Pet. 80–81 (cross-referencing to Petitioner’s challenge based on Razavi alone).

As to element 14.4, Petitioner relies on its prior discussion of elements 14.1 and 14.2 and additionally asserts that “[t]he second matched filtering/correlating module down-converts the RF signal according to the control signal V_{LO} ,” as shown in Petitioner’s annotated version of a portion of Razavi’s Figure 2 reproduced below. Pet. 70.



Razavi, FIG. 2 (partial, annotated)

Pet. 71. Petitioner annotated a portion of Razavi’s Figure 2 to highlight a portion of the circuit and to identify a “control signal,” “switch M_6 ,” “RF input,” “second down-converted signal,” “load,” and “ C_a .” *Id.* Petitioner contends that “[t]he switching operation of transistor M_6 produces a down-converted signal across resistor R_2 , that is ‘further processed by’ the baseband amplifier” and “[t]he circled V_{out} in FIG. 2 above represents the output of a second down-converted signal.” *Id.* (citing Ex. 1017, 2:21–34; Ex. 1003 ¶¶ 174–175, 185).

As to element 14.5, Petitioner contends

the down-converted signal output of the first matched filtering/correlating module (the left V_{out} terminal in Figure 2)

and the inverted down-converted signal output of the second matched filtering/correlating module (the right V_{out} terminal in FIG. 2) are connected to the respective input terminals (labeled V_{in}) of the baseband amplifier shown in FIG. 5. The baseband amplifier differentially amplifies its two V_{in} inputs while largely suppressing the common-mode component (i.e., the average) of its two V_{in} inputs. Thus, each of the baseband amplifier's V_{out} output signals contains an amplified version of the difference between the baseband amplifier's two V_{in} inputs (i.e., the difference between said down-converted signal and said inverted down-converted signal). The two V_{out} signals differ in that their above-mentioned amplified differences between the two V_{in} signals have different signs. Consequently, the difference between the two V_{out} signals is an amplified version of the difference between the two V_{in} signals.

Pet. 71–72 (citing Ex. 1017, 2:35–48, Figs. 2, 5; Ex. 1003 ¶¶ 186–187).

Petitioner asserts that one of ordinary skill in the art “would have recognized that it follows that each of the two V_{out} signals is a combined version of said first and second down-converted signals, and, furthermore, the two V_{out} signals taken together represent a differential version of the combination of said first and second down-converted signals.” *Id.* at 72 (citing Ex. 1003 ¶¶ 186–187).

Aside from Patent Owner's argument regarding the scope and meaning of “matched filtering/correlating module” and its application to Razavi, which we addressed above in our claim construction analysis, Patent Owner does not otherwise challenge Petitioner's contentions regarding elements 14.4 and 14.5. *See generally* PO Resp.

We agree with Petitioner's analysis and arguments, which we find fully supported by the evidence presented, that the combination of Razavi and Uzunoglu teaches elements 14.4 and 14.5 and we adopt them as our own findings. *See, e.g.*, Pet. 70–72, 80–81.

e. Summary as to Claim 14

For the reasons discussed above, on the complete record before us, we find that Petitioner has established that the combination of Razavi and Uzunoglu teaches each of the elements of claim 14.

3. Objective Indicia of Nonobviousness

Neither Petitioner nor Patent Owner has presented any evidence of objective indicia of nonobviousness.

4. Weighing the Graham Factors

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat*, 876 F.3d at 1361. On balance, considering the complete record before us, the evidence of obviousness is very strong, and Patent Owner has not presented objective evidence of nonobviousness. Accordingly, on balance, we determine that Petitioner has established by a preponderance of the evidence that the combination of Razavi and Uzunoglu would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention.

III. MOTIONS TO EXCLUDE

A. Petitioner’s Motion to Exclude

Following a timely objection (*see* Paper 22), Petitioner moves to exclude Exhibits 2010–2014, 2019–2022, 2027, and 2029, as well as portions of Exhibit 2016 (Sorrells’ Declaration). Pet. MTE 1. Petitioner contends that each of the exhibits were filed in support of Patent Owner’s argument that it conceived and actually reduced to practice the subject

matter of claim 14 prior to the October 15, 1998, filing date of Tayloe. *Id.* Petitioner asserts that Exhibits 2010–2012, 2022, and 2029 are inadmissible hearsay; Exhibits 2010–2014, 2019, 2020, 2022, 2027, and 2029 lack authentication; Exhibits 2013 and 2014 are irrelevant, and that certain portions of Mr. Sorrells’ declaration (e.g., Ex. 2016 ¶ 9) are irrelevant. *Id.* Petitioner organizes its Motion by objection, not by exhibit number. *See generally id.* For consistency and ease of discussion, we do the same below.

1. Hearsay

Petitioner contends that each of Exhibits 2010–2012, 2022, and 2029 are hearsay because Patent Owner offers them to prove the truth of the matter asserted—that Patent Owner had conceived and actually reduced to practice claim 14 of the ’177 patent prior to the filing date of Tayloe. Pet. MTE 5. Petitioner asserts that these exhibits are inadmissible because Patent Owner has not provided testimony from a custodian or other qualified witness to show that the factors outlined in Federal Rule of Evidence (“FRE”) 803(6)(A)–(C) are satisfied. *Id.* Therefore, Petitioner contends these exhibits should be excluded. *Id.* at 5–6.

Petitioner contends that Exhibits 2011 and 2012 are relied on by Mr. Sorrells for metadata from the Relativity database showing the last date certain files were modified and Exhibit 2029 is a list of files downloaded from the Relativity database with associated metadata, but Mr. Sorrells, the only witness Patent Owner offered to provide testimony regarding the exhibits, “is not a custodian or qualified witness to testify as to the storage or maintenance of files on the Relativity database” and he did not know where the database is stored or who maintains it. Pet. MTE 6–8. Petitioner asserts that Mr. Sorrells is not a custodian or another qualified witness to attest to

the requirements of FRE 803(6)(A)–(C) and, since exhibits 2011, 2012, and 2029 are not entitled to the business records hearsay exception, they are inadmissible. *Id.* at 9. Alternatively, Petitioner contends that, even if the circuit schematics are admissible under a hearsay exception, the metadata, including the date and time stamps and file names, are inadmissible hearsay for the same reasons. *Id.*

For Exhibits 2010 and 2022 (referred to in the parties’ motion papers collectively as the “Boeing reports”), Petitioner contends that, again, the only testimony offered is that of Mr. Sorrells, but Mr. Sorrells was not a custodian or a qualified witness of the Boeing reports under FRE 803(6) and his declaration does not indicate that he was present for Boeing’s testing conducted on April 27, 1998, that resulted in “the Smith chart . . . on page 15” of Exhibit 2010 (and Exhibit 2042⁴⁹) or February 23–27, 1998, the dates indicated on Exhibit 2022. Pet. MTE 9–10. Petitioner contends that, without evidence of first-hand knowledge regarding the testing, Mr. Sorrells is not a qualified witness to testify as to the details of the testing that occurred on those days, reflected on pages 3–39 of Exhibit 2022. *Id.* at 10. Thus, Petitioner asserts that pages 8–16 of Exhibit 2010 and pages 3–39 of Exhibit 2022 are inadmissible hearsay and should be excluded. *Id.* at 10–11.

In its Opposition, regarding Exhibits 2010–2014, 2019–2022, 2027, and 2029, Patent Owner contends that Mr. Sorrells was the former chief technology officer (CTO) and, therefore, was the “individual in charge of the

⁴⁹ Petitioner contends that Exhibit 2042 should also be excluded pursuant to Rule 803(6), because it includes a portion of the Smith chart from Exhibit 2010, and also pursuant to Rule 106 for lack of completeness. Pet. MTE 10 n.2.

research, development and design of the technology at issue” and “was fully qualified to testify that the documents are what they appear to be.” PO Opp. 3 (citing Ex. 2016 ¶¶ 2, 4). Patent Owner asserts that, in light of Mr. Sorrells’ declaration, “each of the challenged documents is self-authenticating under [FRE] 902(11) as certified domestic record[s] of a regularly conducted activity.” *Id.*

Additionally, Patent Owner contends that Exhibits 2010, 2019, and 2020 are “self-authenticating under [FRE] 902(7) by their ‘Trade Inscriptions’ because they have ‘[a]n inscription, sign, tag, or label purporting to have been affixed in the course of business and indicating origin, ownership, or control.’” PO Opp. 3 (second alteration in original) (citing Fed. R. Evid. 902(7); Ex. 2010, 2 (Boeing’s logo); Exs. 2019, 2020 (Patent Owner’s logo)).

Regarding Exhibits 2011 and 2012, Patent Owner contends that the metadata in each exhibit are not hearsay because they are machine generated and, therefore, they are not a “statement” by a person or declarant within the meaning of FRE 801. PO Opp. 4. Patent Owner also contends that the metadata is “useful for non-hearsay purposes—to corroborate the dates shown in Exhibits 2011 and 2012 and Mr. Sorrells’ testimony regarding creation of the same.” *Id.* at 5.

Regarding Exhibits 2011–2014, Patent Owner asserts that the exhibits are admissible pursuant to FRE 803(6) based on Mr. Sorrells’ testimony because he “is a qualified witness who is knowledgeable of [Patent Owner’s] regular business practice of creating, maintaining, and retrieving technical documentations,” including these exhibits. PO Opp. 6. Patent Owner contends that Mr. Sorrells’ testimony establishes that

(1) as [former] CTO, he was responsible for, and has personal knowledge of, the creation, maintenance, and retrieval of Exhibits 2011–2014; (2) Exhibits 2011–2014 [were] created at or around the time by individuals with knowledge of the designs set forth therein, as directed by Mr. Sorrells; (3) creation and maintenance of technical documents, including Exhibits 2011–2014, was a regular business practice of [Patent Owner].

Id. at 7. Patent Owner, thus, contends that Mr. Sorrells is a qualified witness, and his testimony shows that Exhibits 2011–2014 fall under the “‘Records of a Regularly Conducted Activity’ exception to hearsay under [FRE] 803(6)” and “Petitioner’s motion did not (and could not) allege any circumstance that indicates a lack of trustworthiness.” *Id.*

Regarding Exhibits 2012 and 2014, Patent Owner contends that the exhibits are admissible under FRE 803(16) because they are ancient documents prepared before January 1, 1998. PO Opp. 7 (citing Rule 803(16)). Patent Owner asserts Exhibit 2012 was last modified March 6, 1997, and Exhibit 2014 was last modified August 21, 1997. *Id.* at 8. Thus, Patent Owner argues Exhibits 2012 and 2014 are not hearsay pursuant to Rule 803(16). *Id.*

Regarding Exhibits 2011–2014, Patent Owner contends that they also are admissible pursuant to FRE 807 because “they are supported by sufficient guarantees of trustworthiness and [are] more probative on conception and reduction to practice than any other evidence that can be offered.” PO Opp. 8. Patent Owner asserts that these exhibits are technical documents routinely and regularly created and maintained by technology companies such as Patent Owner, and Patent Owner contends Mr. Sorrells’ testimony corroborates and confirms their creation. *Id.* at 8–9.

Turning to Exhibits 2010 and 2022, Patent Owner notes that they are Boeing's testing reports for the Eddie device, and they are admissible. PO Opp. 10. First, Patent Owner contends that Mr. Sorrells' testimony establishes that each exhibit is admissible pursuant to FRE 803(6). *Id.* Patent Owner asserts that Mr. Sorrells is a qualified witness who is knowledgeable about Patent Owner's "regular business practice of ordering and maintaining tests from independent testing company [sic] to evaluate performance of [Patent Owner's] technology." *Id.* at 11. Patent Owner asserts that Mr. Sorrells' testimony establishes that Patent Owner and Boeing entered into an agreement for Boeing to conduct testing on the Eddie device to evaluate its performance, that Mr. Sorrells observed some of the testing, that technical documents, including Exhibits 2010 and 2022, were stored on computer hard drives in 1997 and 1998, and in 2011 or 2012 were submitted to Patent Owner's IT department where full copies and images were made and uploaded to a Relativity database. *Id.* Thus, Patent Owner asserts that Mr. Sorrells' testimony establishes that

(1) as [former] CTO, he was responsible for, and has personal knowledge of, the creation, maintenance, and retrieval of Exhibits 2010 and 2022; (2) Exhibits 2010 and 2022 [were] created at or around the time by individuals with knowledge of the results set forth therein; (3) the ordering and maintenance of independent testing reports, including Exhibits 2010 and 2022, was a regular business practice of [Patent Owner].

Id. at 11–12. Thus, Patent Owner contends Mr. Sorrells is a qualified witness and that his testimony establishes Exhibits 2010 and 2022 fall under the "Records of a Regularly Conducted Activity" exception to hearsay under [FRE] 803(b)." *Id.* at 12. And Patent Owner contends that

Petitioner’s Motion “did not (and could not) allege any circumstance that indicates a lack of trustworthiness.” *Id.*

Second, Patent Owner contends that Exhibits 2010 and 2022 are admissible pursuant to FRE 807 “because they are supported by sufficient guarantees of trustworthiness and [are] more probative on conception and reduction to practice than any other evidence that can be offered.” PO Opp. 12. Patent Owner asserts that these exhibits “were created more than 20 years ago,” “were created by an independent party—Boeing—with no interest in this IPR and the parallel district court proceedings,” Exhibit 2010 bears the logo of Boeing and was signed by Boeing personnel, Exhibit 2021 “evince[s] an agreement between [Patent Owner] and Boeing for the purpose of conduct[ing] the test, the result of which was reported in Exhibit 2010,” Exhibit 2022 “includes photographs and notes of the test, consistent with the content of Exhibit 2010,” and Mr. Sorrells was present and observed some of the testing. *Id.* at 12–13.

Third, Patent Owner contends Exhibits 2010 and 2022 “also serve[] non-hearsay purposes of: (1) showing that communication relating to testing of [Patent Owner’s] down conversion technology took place at the relevant time”; and “(2) corroborating the design layouts and schematics shown in Exhibits 2011–2014, which corresponds with the content of Exhibits 2010 and 2022.” PO Opp. 13.

Turning to Exhibit 2029, Patent Owner asserts that this exhibit is “an excel spreadsheet export of search results generated by the Relativity database” and that the exhibit and the metadata therein “were machine generated” and, therefore, are not a “‘statement’ by a person/declarant within the meaning of [FRE] 801.” PO Opp. 14. Patent Owner contends

that Exhibit 2029 is useful for what Patent Owner asserts are non-hearsay purposes, “to corroborate the dates shown in Exhibits 2011–2014 and Mr. Sorrells’ testimony regarding [Patent Owner’s] ‘continuous work . . . related to designing and developing the Eddie chip and circuit’” and, therefore, “Exhibit 2029 and the metadata therein are not hearsay.” *Id.* at 14–15.

In reply, Petitioner addresses Patent Owner’s arguments in terms of several groupings of exhibits. First, regarding Exhibits 2010–2012, 2022, and 2029, Petitioner asserts that Patent Owner has not established that Mr. Sorrells is a qualified witness pursuant to FRE 803(6)(A)–(C) because he does not know how the files got from Patent Owner into the Relativity database and that the Relativity database was not used by Patent Owner in the relevant time period of 1997–1999. Pet. MTE Reply 1–2. Petitioner contends that Mr. Sorrells is neither a custodian nor someone with knowledge of the Relativity database and, therefore, does not offer testimony as a qualified witness at the time the documents in question were created. *Id.* at 2. Rather, Petitioner contends that Patent Owner was required to produce some statement or affidavit from someone with knowledge of the Relativity database itself and, without such, the documents lack authentication. *Id.* (citing *Standard Innovation Corp. v. Lelo, Inc.*, IPR2014-00148, Paper 42 at 10 (PTAB Apr. 23, 2015)).

Second, regarding Exhibits 2011 and 2012, Petitioner contests Patent Owner’s reliance on machine-generated metadata in these exhibits because Patent Owner seeks to offer the metadata “for the truth of the matter being asserted,” specifically, “the last modified date and timestamps,” but neither

of the exhibits was properly authenticated by someone with “knowledge” of the Relativity database. Pet. MTE Reply 3.

Third, regarding Exhibits 2011–2014, Petitioner contests Patent Owner’s reliance on FRE 803(6) because the chain of custody of the exhibits requires a statement or affidavit from someone with “knowledge” of the Relativity database. Pet. MTE Reply 3.

Fourth, Petitioner contests Patent Owner’s reliance on FRE 803(16) (ancient documents) for Exhibits 2012 and 2014 because Patent Owner has not established the authenticity of the exhibits, a prerequisite to relying on the ancient document exception to the rule against hearsay. Pet. MTE Reply 3–4.

Fifth, Petitioner contests Patent Owner’s reliance on FRE 807 for Exhibits 2011–2014 because, as asserted above, Mr. Sorrells lacks personal knowledge of the Relativity database and, therefore, he cannot properly authenticate the documents. Pet. MTE Reply 4.

Sixth, Petitioner contests Patent Owner’s reliance on FRE 803(6) and 807 for Exhibits 2011 and 2022 because (a) Mr. Sorrells is not qualified under FRE 803(6), and (b) the chain of custody has not been established and Patent Owner seeks to offer the exhibits for the truth of the matter asserted, namely that Boeing tested a working circuit in April 1998, contrary to the alleged non-hearsay purposes asserted by Patent Owner. Pet. MET Reply 4–5.

Seventh, Petitioner contests Patent Owner’s arguments directed to Exhibit 2029, asserting that the file listing was offered for the truth of the matter asserted (i.e., the date range) and that Mr. Sorrells cannot authenticate documents from the Relativity database. Pet. MTE Reply 5.

As a general matter, Petitioner, as the “moving party,” “has the burden of proof to establish that it is entitled to the requested relief.” 37 C.F.R.

§ 42.20. Here, we have serious concerns regarding the admissibility of the exhibits challenged by Petitioner. Specifically, Mr. Sorrells acknowledged that he does not have specific knowledge of the Relativity database, how the documents were added to the database, where the database is located, who maintains the database, and whether the metadata reflected in the database is current. Ex. 1068, 21:5–21, 22:8–13, 23:19–24:18; *see* Pet. MTE 8–9. In short, Mr. Sorrells is not a custodian or other qualified witness to attest to the authentication requirements that underly many of the hearsay exceptions on which Patent Owner seeks to rely to gain admissibility of these exhibits. Nor do we agree with Patent Owner’s argument that it seeks to rely on the information in these exhibits for a non-hearsay purpose. Rather, the information is directed specifically to the truth of the matter asserted, namely corroborating Mr. Sorrells’ statements regarding conception and reduction to practice. Even accepting that metadata and other computer-created information is not specifically hearsay, Patent Owner’s reliance on Mr. Sorrells’ testimony alone fails to offer proper authentication for the specific exhibit proffered. The same is true of the Boeing reports (Exhibits 2010 and 2022). Simply because Mr. Sorrells was present for “some” of the testing, does not establish that he can authenticate the entirety of these reports prepared by a third party such as Boeing.

The lack of proper foundation for the admissibility of these exhibits is particularly concerning because of the purpose for which Patent Owner seeks to use them, namely providing corroboration for Mr. Sorrells’ testimony as to conception and reduction to practice. Even though we note

below that the cases relied on by Petitioner do not speak to admissibility of evidence, we share Petitioner's concerns that a patent owner's reliance solely on an inventor's testimony to establish authentication of exhibits that are then used to establish corroboration of that same inventor's testimony appears circular and contrary, at least in-part, to the purpose of having independent corroborating evidence.

Thus, based purely on the arguments presented before us, we would find these exhibits inadmissible based on authenticity and hearsay grounds. Nonetheless, because we determine that, even with our consideration of the exhibits, Patent Owner fails to establish sufficient corroboration of conception and reduction to practice necessary to antedate Tayloe, we decline to take the substantial step of granting Petitioner's motion to exclude these exhibits. To the extent, however, that our reviewing court determines that we erred in some respect regarding our determination as to corroboration, the record shall reflect that it is our opinion that Petitioner sufficiently shows that the exhibits challenged herein constitute inadmissible hearsay and lack proper authentication based on the complete record before us. Thus, we *deny* Petitioner's Motion challenging certain of the above-exhibits as inadmissible hearsay.

2. Lack of Authentication

Petitioner challenges Exhibits 2010–2014, 2019–2022, 2027, and 2029 pursuant to FRE 901 as lacking authentication or “identification of non-testimonial evidence as a precondition to their admissibility.”

Pet. MTE 11. Petitioner contends that Patent Owner cannot rely solely on Mr. Sorrells' testimony because an inventor's testimony “is insufficient to corroborate documents relied on for purposes of establishing conception or

actual reduction to practice of a circuit that performs the method of claim 14.” *Id.* (citing *Apator*, 887 F.3d at 1295).

In opposition, Patent Owner first asserts that Petitioner conflates admissibility with sufficiency of corroboration for conception and reduction to practice as there was no issue of admissibility of evidence in *Apator*, and Petitioner fails to cite any authority for the proposition that inventor testimony cannot be used for authentication as a matter of law. PO Opp. 2. Additionally, Patent Owner contends that Exhibits 2010–2014, 2019, 2021, 2022, and 2027 “have corroborative value that stand on their own, independent of Mr. Sorrells[’] testimony.” *Id.* at 2–3. And Patent Owner contends that Exhibit 2029 is authenticated by Mr. Sorrells’ testimony “that he (along with [Patent Owner’s] attorney) performed the search on the Relativity database, the result of which was exported to an excel spreadsheet and produced as Exhibit 2029.” *Id.* at 15. Patent Owner asserts that Mr. Sorrells “created the document and there is no better person to authenticate than him.” *Id.*

In reply, Petitioner contends that, “[h]ere, the only witness testimony offered to authenticate these exhibits is from the inventor himself. However, **‘inventor testimony alone, without more, is not considered credible** for the purposes of corroborating documentary evidence purporting to show earlier conception/reduction-to-practice to antedate a prior art reference.” Pet. MTE Reply 1 (quoting *Chen v. Bouchard*, 347 F.3d 1299, 1309 (Fed. Cir. 2003)) (citing *Apator*, 887 F.3d at 1295–96). Petitioner asserts that Exhibits 2010–2014, 2019–2022, 2027, and 2029 can only corroborate inventor testimony with help from inventor testimony, presenting the same “catch-22” issue rejected by *Apator*. *Id.* (citing Pet. MTE 5–11; *Apator*, 887

F.3d at 1296). Thus, Petitioner contends these exhibits should be excluded as inadmissible pursuant to FRE 901. *Id.*

We disagree that Patent Owner has failed to authenticate the subject exhibits based on Petitioner's citations to cases involving the standard for corroboration. Petitioner conflates two different issues—authentication pursuant to FRE 901 and the requirement of corroboration to show conception/actual reduction to practice. The caselaw cited by Petitioner, *Chen* and *Bouchard*, pertain to the latter, not the former, as Petitioner's quotations and citations above reflect. Although not explicitly discussed, it appears that, in each case, the use of the term “evidence” reflects that the documents at issue were admitted into evidence. In neither case, however, was the Federal Circuit addressing the requirements for authentication pursuant to FRE 901. Nonetheless, several of the exhibits challenged here also are challenged as introducing inadmissible hearsay, which for some of the exhibits also implicates authenticity, and we have addressed those above. Accordingly, as pertains specifically to Petitioner's allegations of lack of authenticity solely based on *Chen* and *Apator*, we *deny* this portion of Petitioner's Motion.

3. *Relevancy*

Petitioner challenges Exhibits 2013 and 2014 and paragraph 9 of Exhibit 2016 as being irrelevant pursuant to FRE 402. Pet. MTE 11–13. Petitioner contends that Dr. Ricketts did not cite either of these exhibits in his claim chart regarding conception and actual reduction to practice and, therefore, these exhibits are irrelevant and should be excluded. *Id.* at 12.

Additionally, Petitioner contends that paragraph 9 of Exhibit 2016 should be excluded from Mr. Sorrells' declaration because “[t]h[e]

screenshot is irrelevant to the question of whether [Patent Owner] reduced claim 14 of the '177 patent to practice prior to the Tayloe patent based on the testing of the Eddie circuit.” Pet. MTE 13. Petitioner asserts that Mr. Sorrells “does not provide an explanation for what ‘Pv7_3_79.sfn’ is, what it contains, or how it relates to the circuit shown in ‘Pv1_3_79.sfn.’” *Id.* Thus, Petitioner contends that the screenshot of the properties is irrelevant and should be excluded. *Id.*

In opposition, Patent Owner contends that Mr. Sorrells “relied upon Exhibits 2013–2014 to show design iterations of the circuit board for the Eddie device, what was fabricated by TriQuint, and what was tested by Boeing.” PO Opp. 10. Patent Owner also asserts that Petitioner relies on Exhibit 2013 to argue lack of performance of claim 14.⁵⁰ *Id.*

Additionally, Patent Owner contends paragraph 9 of Exhibit 2016 “is at least probative [as] to the last modified date of a file with an almost identical name” to the file Patent Owner contends is the Eddie device. PO Opp. 15. Patent Owner asserts that we “should not exclude paragraph 9 . . . and should instead weigh the probative value of the evidence and testimony therein in view of the substantial similarity between the file names.” *Id.*

⁵⁰ Patent Owner contends that Petitioner also challenges the relevancy of Exhibits 2019, 2020, and 2022 without providing an explanation as to why and cites to pages 11–12 of Petitioner’s Motion to Exclude. PO Opp. 9 n.2. Petitioner does not mention Exhibits 2019, 2020, or 2022 in that section of its Motion to Exclude and we understand that Patent Owner’s reference is a typographical error because Patent Owner repeats the same position in related case IPR2024-00936. In that case, Petitioner’s Motion to Exclude does reference these exhibits without explanation. *See* IPR2024-00936, Paper 45 at 11–2 (heading in Petitioner’s Motion to Exclude), Paper 48 at 9 n.2 (including the same footnote in Patent Owner’s Opposition).

Petitioner contends that Patent Owner admits that the two file names are different and, thus, they are two different files. Pet. MTE Reply 5 (citing PO Opp. 15). Petitioner asserts that Patent Owner’s statement effectively acknowledges that the screenshot reproduced in paragraph 9 of Exhibit 2016 is irrelevant to the circuit schematics that allegedly reduced the subject matter of claim 14 to practice. *Id.*

FRE 401 provides that evidence is relevant if it “has any tendency to make a fact more or less probable than it would be without the evidence” and “the fact is of consequence in determining the action.” Courts routinely characterize the relevance threshold as being “very low.” *See United States v. White*, 692 F.3d 235, 246 (2nd Cir. 2012) (quoting *United States v. Al-Moayad*, 545 F.3d 139, 176 (2nd Cir. 2008)). Under this standard, we find that Exhibits 2013 and 2014 are relevant at least for the purposes described by Patent Owner above, even though Dr. Ricketts does not cite to either exhibit in his claim chart.

On the separate issue of paragraph 9 of Exhibit 2016, we find that relevancy of the screenshot and hence the paragraph is tenuous at best, but that the better course of action is to decline to exclude the paragraph. Therefore, we *deny* this portion of Petitioner’s Motion.

For the reasons explained above, we *deny* Petitioner’s Motion to Exclude.

B. Patent Owner’s Motion to Exclude

Following a timely objection (*see* Paper 35), Patent Owner moves to exclude Exhibits 1047–1049, 1054, 1058–1061 and portions of Exhibits 1066, 1067, 2034, and 2040 relied on by Petitioner. PO MTE 1.

1. Exhibit 1047

Patent Owner contends that Exhibit 1047 should be excluded pursuant to FREs 401 and 402 “because it is not prior art and thus is irrelevant to the knowledge of a [person of ordinary skill in the art] at the relevant time of the invention.” PO MTE 1–2. Patent Owner also contends that Exhibit 1047 should be excluded pursuant to FRE 901 because “Petitioner produced no evidence to support a finding that it is what Petitioner claims it to be—description of an implementation of the Tayloe reference.” *Id.* at 2 (citing Pet. Reply 39).

In its Opposition, Petitioner contends that Exhibit 1047 is relevant rebuttal evidence and, even though it is not prior art, it can be relied on to indicate, among other things, (1) the level of ordinary skill in the art and (2) how one of ordinary skill in the art would have understood Tayloe’s disclosure. Pet. Opp. 1–2. Petitioner contends that Dr. Galton relied on Exhibit 1047 in rebuttal to Dr. Ricketts’ testimony regarding the size of Tayloe’s resistors, and Petitioner contends that Patent Owner did not and cannot provide evidence that the general understanding of circuits has changed between the time of the ’177 patent and the date of Exhibit 1047 such that Exhibit 1047 is not representative of a person of ordinary skill in the art’s understanding of basic circuit concepts in the relevant time frame. *Id.* at 2–3.

Additionally, Petitioner proffered the testimony of Ms. Munford to authenticate Exhibit 1047 pursuant to FRE 901(b)(1). Pet. Opp. 3. And Petitioner contends that there is a large amount of circumstantial evidence that Exhibit 1047 was authored by the same named inventor of Tayloe. *Id.* at 3–4. Petitioner asserts, however, that whether or not the author of

Exhibit 1047 is the same as the named inventor of Tayloe, “the article is relevant rebuttal evidence in at least that it discloses implementation details of circuits determined by Dr. Galton to be highly similar to those disclosed in the Tayloe” reference. *Id.* at 4. Thus, Petitioner contends Exhibit 1047 is admissible as rebuttal evidence to corroborate Dr. Galton’s response to Dr. Ricketts’ testimony. *Id.*

Patent Owner contends that Petitioner relies on Exhibit 1047 as an implementation of Tayloe even though the exhibit was published years later. PO MTE Reply 1–2. Patent Owner asserts that the potential prejudice of Exhibit 1047 outweighs the probative value because it is unclear which (if any) portion of Exhibit 1047 was known before its publication. *Id.* at 3.

Dr. Galton (in Exhibit 1066) relies on Exhibit 1047 in his opinion that Tayloe teaches a low-impedance load. *See, e.g.*, Ex. 1066 ¶ 39. This portion of Dr. Galton’s Second Declaration is specifically directed to responding to Dr. Ricketts’ testimony regarding Tayloe that is based on Patent Owner’s proposed construction of “matched filtering/correlating module,” which we do not adopt. Therefore, we do not rely on Exhibit 1047 or the paragraphs of Exhibit 1066 in which the exhibit is discussed because whether Tayloe has a low-impedance load or not is not an issue that we need to decide in order to determine that Petitioner has shown that the combination of Tayloe and TI Datasheet would have rendered the subject matter of claim 14 obvious to one of ordinary skill in the art at the time of the invention. Accordingly, we *dismiss as moot* this portion of Patent Owner’s Motion.

2. *Exhibit 1054*

Patent Owner contends that Exhibit 1054 should be excluded pursuant to FREs 401 and 402 because “it is not prior art and thus is irrelevant to the knowledge of a [person of ordinary skill in the art] at the relevant time of the invention.” PO MTE 3. Patent Owner asserts that this exhibit is not relevant because its date, January 2019, comes many years (19–21 years) after the priority date of the ’177 patent. *Id.*

Petitioner contends, in similar response to that discussed above in the context of Exhibit 1047, that it is permissible to rely on non-prior art references, such as Exhibit 1054, to understand both the level of ordinary skill in the art and how one of ordinary skill would have understood a prior art disclosure. Pet. Opp. 5. In particular, Petitioner asserts that Exhibit 1054 is a review article cited by Dr. Galton to illustrate mixer operation and it is relevant because Razavi, one of the references on which Petitioner’s challenge is based, teaches a system including a mixer. *Id.* Thus, Petitioner contends Exhibit 1054 is relevant as corroborating evidence to shed light on how one of ordinary skill in the art would have understood Razavi, and Patent Owner has not argued or proffered any evidence that the general understanding of circuits has changed such that Exhibit 1054 does not represent the understanding of one of ordinary skill in the art at the relevant time frame. *Id.* at 5–6.

In reply, Patent Owner raises a similar argument as the one it raised above regarding Exhibit 1047, namely that Exhibit 1054 comes too late in time to be relevant to the issues addressed in the proceeding. PO MTE Reply 3–4.

Dr. Galton (in Exhibit 1066) relies on Exhibit 1054 in two locations—paragraphs 58 and 103. Each of those paragraphs pertains to his opinion that LOs that drive RF down-conversion mixers in wireless receivers are designed to be as close to square waves as possible. *See* Ex. 1066 ¶¶ 58, 103. We do not rely on Exhibit 1054 or the specific portions of paragraphs 58 and 103 that rely on the exhibit in reaching our decision herein. Accordingly, we need not decide the propriety of Dr. Galton’s reliance on Exhibit 1054. Thus, we *dismiss as moot* this portion of Patent Owner’s Motion.

3. *Exhibit 1066*

Patent Owner contends that certain paragraphs of Dr. Galton’s Second Declaration should be excluded because they are either based on Exhibits 1047 and 1054 or not relied on by Petitioner in its briefing. PO MTE 4–5. In particular, Patent Owner contends that paragraphs 39–42, 44, 45, and 47 of Exhibit 1066 rely on Exhibit 1047 and, therefore, they should be excluded pursuant to FREs 401, 402, 701, 703, and 802. *Id.* at 4. Patent Owner asserts that, in these paragraphs, Dr. Galton asserts that Exhibit 1047 was written by the named inventor of Tayloe and that the exhibit shows an implementation of Tayloe. *Id.* Patent Owner contends that the Exhibit 1047 does not mention Tayloe and Dr. Galton has no personal knowledge as to the truthfulness of his assertions. *Id.*

Additionally, Patent Owner contends that paragraphs 58 and 103 of Exhibit 1066 rely on Exhibit 1054, and Petitioner’s Reply, in turn, relies on paragraph 58 of Exhibit 1066, but does not rely on paragraph 103. PO MTE 5. Patent Owner contends that because Exhibit 1054 should be excluded, so too should Dr. Galton’s testimony based thereon. *Id.*

Further, Patent Owner contends that paragraphs 5, 27, 28, 61–64, 87, 88, and 103–106 of Exhibit 1066 should be excluded pursuant to FREs 401 and 402 because Petitioner does not rely on any of those paragraphs of Dr. Galton’s Second Declaration. PO MTE 5.

In Opposition, Petitioner contends that paragraphs 39–42, 44, 45, 47, 58, and 103 of Exhibit 1066 are admissible for the same reasons Exhibits 1047 and 1054 are admissible, as discussed above. Pet. Opp. 6–7. Additionally, Petitioner contends that paragraph 5 was cited in Petitioner’s Reply (*id.* at 7 (citing Pet. Reply 25, 27, 34)); paragraphs 27–28 refer to matched filtering/correlating modules and synchrony and are related to testimony provided in Dr. Galton’s Declaration (Ex. 1003); paragraphs 61–64 and 87–88 provide relevant technical background information for context for Dr. Galton’s rebuttal of Dr. Ricketts’ testimony; paragraphs 103–104 explain statements made in Dr. Galton’s Declaration and also provide context for Dr. Galton’s rebuttal of Dr. Ricketts’ testimony; and paragraphs 105–106 are attestation paragraphs that qualify Dr. Galton’s Second Declaration as carrying the same force and consequences as a sworn statement submitted under oath. *Id.* at 7–8.

Patent Owner reiterates, in its reply, that paragraphs 39–42, 44, 45, 47, 58, and 103 of Exhibit 1066 rely on Exhibits 1047 and 1054 and these paragraphs should be excluded for the same reasons the exhibits should be excluded. PO MTE Reply 4. And Patent Owner maintains that Petitioner does not rely on paragraphs 27, 28, 61–64, 87, 88, 103, and 104 of Exhibit 1066 and, therefore, they should be excluded as well. *Id.*

For the same reasons discussed above in our consideration of Patent Owner’s arguments directed to Exhibits 1047 and 1054, we do not rely on

the paragraphs of Dr. Galton's Second Declaration that address these exhibits in order to reach the decision we reach here. Accordingly, we *dismiss as moot* this portion of Patent Owner's Motion. As to paragraphs 27, 28, 61–64, 87, 88, 103, and 104 of Exhibit 1066, we agree with Petitioner that they are relevant for the reasons Petitioner provides above. Therefore, we *deny* the portion of Patent Owner's Motion directed thereto.

4. *Exhibit 1067*

Patent Owner seeks to exclude paragraphs 16–20 and 28–33 of Exhibit 1067, Dr. Dickens' Supplemental Declaration. PO MTE 6–7. In particular, Patent Owner seeks to exclude paragraphs 16–20 of Exhibit 1067, which Petitioner relies on in pages 10–13 of its Reply. *Id.* at 6. Patent Owner contends that, in those paragraphs, Dr. Dickens opines that “capacitors C67 and C68 create a shunt to ground for the 915 MHz input signal,” but that his opinion is based on his assertion that SP1 and SP2 “exhibit a significantly larger impedance than capacitors C67 and C68,” which he calculated based on frequency and capacitance values shown in Exhibit 2011. *Id.* Patent Owner, however, contends that Exhibit 2011 does not provide sufficient information from which to calculate the impedance of SP1 and SP2 and, therefore, Dr. Dickens “has no reliable basis to determine the impedance of SP1 and SP2, let alone comparing them to the impedance of C67 and C68.” *Id.* Thus, Patent Owner contends that Dr. Dickens' opinions, reflected in paragraphs 16–20 of Exhibit 1067, are “not based on any reliable facts, data, or methodology” and, thus, should be excluded pursuant to FREs 702 and 703. *Id.* at 6–7.

Additionally, Patent Owner asserts that paragraphs 28–33 of Exhibit 1067 should be excluded pursuant to FREs 401 and 402 because Petitioner does not rely on those paragraphs in its briefing. PO MTE 7.

Petitioner contends that paragraphs 16–20 of Exhibit 1067 are supported by more than Exhibit 2011 because Dr. Dickens also based his analysis on Exhibits 2010, 2012, 2013, 2015, 2016, 2022, and 2024. Pet. Opp. 8–9. Petitioner asserts that Dr. Dickens considered each of these exhibits, as well as Dr. Ricketts’ testimony, and that Dr. Dickens’ analysis is supported by reliable facts, data, or methodology. *Id.*

Additionally, Petitioner contends that paragraphs 28–31 of Exhibit 1067 provide context for adjacent paragraphs in Dr. Dickens’ Supplemental Declaration supporting statements made in Petitioner’s Reply. Pet. Opp. 10–11 (citing Pet. Reply 13–14). And Petitioner asserts that paragraphs 32–33 are attestation paragraphs. *Id.* at 11.

Patent Owner asserts, in reply, that Petitioner points to other evidence relied on by Dr. Dickens, in addition to Exhibit 2011, but that does not remedy Dr. Dickens’ reliance on Exhibit 2011. PO MTE Reply 4–5. Additionally, Patent Owner asserts that Petitioner does not contest that paragraphs 28–31 of Exhibit 1067 were not cited in Petitioner’s briefing. *Id.* at 1.

We disagree with Patent Owner’s challenge to these paragraphs of Dr. Dickens’ Supplemental Declaration (Ex. 1067). We determine that Patent Owner’s arguments go to the weight to be assigned to Dr. Dickens’ testimony as opposed to its admissibility. In particular, as Petitioner explains, Dr. Dickens relied on Exhibit 2011 in addition to other exhibits and evidence in deriving his opinion addressed at the paragraphs noted

above. Additionally, the paragraphs not cited in Petitioner's Reply provide some context for Dr. Dickens' testimony, even though we do not rely on these paragraphs in reaching our decision here. Therefore, we *deny* this portion of Patent Owner's Motion.

5. Exhibits 1048, 1049, 1058–1061, and 1064

Patent Owner seeks to exclude Exhibits 1048, 1049, 1058–1061, and 1064 for lack of relevancy pursuant to FREs 401 and 402 because neither Petitioner nor its experts cite or rely on any of these exhibits. PO MTE 7.

Petitioner contends that these exhibits were considered by Dr. Galton when preparing his Second Declaration (Ex. 1066) and they provide underlying foundational knowledge of one of ordinary skill in the art at the relevant time period. Pet. Opp. 11–12.

In its reply to Petitioner's Opposition, Patent Owner contends that these exhibits were not cited in Petitioner's briefing and Petitioner's argument that they are relevant for context and background should be rejected. PO MTE Reply 1.

We decline to exclude these exhibits because we agree that several of the exhibits were relied on by Petitioner's experts and they provide underlying foundational knowledge on which the expert's opinions were based. That being said, we rely on the arguments raised by the parties in reaching our decision here. Accordingly, we *deny* this portion of Patent Owner's Motion.

6. Exhibits 2034 and 2040

Patent Owner contends that certain portions of the deposition transcripts of Dr. Galton (Exhibit 2034 (109:10–113:2, 179:21–182:19, and 209:18–211:2) and Exhibit 2040 (87:4–88:14)) should be excluded because

Dr. Galton provided answers that were non-responsive to the questions asked and irrelevant to any issues in this proceeding. PO MTE 7–10.

Petitioner contests Patent Owner’s characterization of Dr. Galton’s testimony and provides several examples of responsive answers. Pet. Opp. 12–15.

In reply, Patent Owner contends that the portions of Dr. Galton’s testimony identified by Petitioner do not respond to Patent Owner’s point that the answers were nonresponsive. PO MTE Reply 5.

We have the ability to discern for each deposition question and response whether Dr. Galton’s answer was sufficiently responsive to warrant our consideration. *See, e.g., Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) (“One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received.”). From our review of the challenged testimony, we do not determine that any of the responses were particularly off track based on the question or subject matter raised during the deposition to warrant exclusion. Therefore, we *deny* this portion of Patent Owner’s Motion.

Accordingly, for the reasons explained above, we *dismiss in part* as moot and *deny in part* Patent Owner’s Motion to Exclude Evidence.

IV. SUMMARY⁵¹

For the reasons discussed above, Petitioner has demonstrated, by a preponderance of the evidence, that claim 14 of the ’177 patent is

⁵¹ Should Patent Owner wish to pursue amendment of claim 14 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*

unpatentable. Additionally, we *deny* Petitioner’s Motion to Exclude Evidence, and we *dismiss in part and deny in part* Patent Owner’s Motion to Exclude Evidence.

Our conclusions regarding claim 14 are summarized below:

Claims Challenged	35 U.S.C. §	Reference(s) /Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
14	103(a)	Tayloe, TI Datasheet	14	
14	103(a)	Razavi		14
14	103(a)	Razavi, Uzunoglu	14	
Overall Outcome			14	

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claim 14 of U.S. Patent No. 7,865,177 B2 is determined to be unpatentable;

FURTHER ORDERED that Petitioner’s Motion to Exclude Evidence (Paper 52) is *denied*;

FURTHER ORDERED that Patent Owner’s Motion to Exclude Evidence (Paper 48) is *dismissed in part and denied in part*; and

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 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).

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

IPR2024-00935
Patent 7,865,177 B2

For PETITIONER TEXAS INSTRUMENTS INC.

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