

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

WIPQTUS INC.,
Patent Owner

Case No. IPR2024-00023

Patent No. 10,038,339

NOTICE OF APPEAL

37 C.F.R. § 90.2

PLEASE TAKE NOTICE, pursuant to 35 U.S.C. § 141, 35 U.S.C. § 319, 35 U.S.C. § 142, 37 C.F.R. § 90.2, Patent Owner WiPQTUS, Inc. ("WiPQTUS") hereby appeals the Final Written Decision of the United States Patent Trial and Appeal Board (Paper No. 29) reached in IPR2024-00023 regarding U.S. Patent No. 10,038,339 (the "'339 patent").

Specifically, WiPQTUS appeals the Board's determination that claims 1 - 3, 5, 7, and 9 of the '339 patent are unpatentable; the Board's consideration of the expert testimony, prior art, and other evidence in the record; the Board's factual findings, conclusions of law, or other determinations supporting or related to those issues; and all other issues decided adversely to SB IP in any orders, decisions, rulings, and opinions. In addition, WiPQTUS appeals the Board's denial of WiPQTUS' Motion to Amend. The Final Written Decision is attached hereto as Exhibit A.

This Notice is filed within the 63 day period allowed under 37 C.F.R. § 90.3. WiPQTUS has submitted payment for the requisite filing fees in connection with filing this appeal.

Date: March 21, 2025

/s/ Brian A. Carpenter

Brian A. Carpenter

USPTO Reg. No. 37,109

CERTIFICATE OF FILING

The undersigned certifies that the foregoing NOTICE OF APPEAL was filed on March 21, 2025, with (1) the Federal Circuit via CM/ECF; and (2) the Director of the United States Patent and Trademark Office via PTAB E2E and electronic mail to the Director at the following email address: efileSO@uspto.gov.

Respectfully submitted,

BY: /s/ Brian A. Carpenter
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CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing NOTICE OF APPEAL was filed via PTAB E2E and served pursuant to 37 C.F.R. § 42.6(e) via electronic mail on March 21, 2025, on the following:

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IPR2024-00023
U.S. Patent No. 10,038,339
Patent Owner's Notice of Appeal

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EXHIBIT A

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

WIPQTUS INC.,
Patent Owner.

IPR2024-00023
Patent 10,038,339 B2

Before KARL D. EASTHOM, STEVEN M. AMUNDSON, and
RUSSELL E. CASS, *Administrative Patent Judges*.

AMUNDSON, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

Denying Patent Owner's Revised Contingent Motion to Amend

35 U.S.C. § 318(a)

I. INTRODUCTION

Samsung Electronics Co., Ltd. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–3, 5, 7, and 9 in U.S. Patent No. 10,038,339 B2 (“the ’339 patent”) (Exhibit 1001) under 35 U.S.C. §§ 311–319. Paper 1 (“Pet.”). WiPQTUS Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

After analyzing the arguments and evidence presented by the parties, we instituted an *inter partes* review based on all challenged claims and all challenges included in the Petition. Paper 7 (“Inst. Dec.”).

We have jurisdiction under 35 U.S.C. § 6. We issue this Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons explained below, Petitioner has shown by a preponderance of the evidence that claims 1–3, 5, 7, and 9 in the ’339 patent are unpatentable. *See* 35 U.S.C. § 316(e) (2024). Further, for the reasons explained below, we deny Patent Owner’s Revised Contingent Motion to Amend.

II. BACKGROUND

A. Procedural History

After we instituted review, Patent Owner filed a Response to the Petition. Paper 10 (“Resp.”). Petitioner filed a Reply to Patent Owner’s Response. Paper 13 (“Reply”). Patent Owner filed a Sur-reply to Petitioner’s Reply. Paper 16 (“Sur-reply”).

Further, Patent Owner filed a Contingent Motion to Amend. Paper 11. In its motion to amend, Patent Owner requested the Board’s Preliminary Guidance regarding the motion to amend. *Id.* at 1. Petitioner filed an Opposition to Patent Owner’s motion to amend. Paper 14. Then,

we provided Preliminary Guidance regarding Patent Owner’s motion to amend. Paper 15 (“Prelim. Guid.”).

After receiving the Board’s Preliminary Guidance, Patent Owner filed a Revised Contingent Motion to Amend. Paper 17 (“Mot.”). Petitioner filed an Opposition to Patent Owner’s revised motion to amend. Paper 20 (“Opp.”). Patent Owner filed a Reply to Petitioner’s Opposition. Paper 24 (“Mot. Reply”). Petitioner filed a Sur-reply to Patent Owner’s Reply. Paper 25 (“Mot. Sur-reply”).

On January 10, 2025, we held an oral hearing, and the record includes the hearing transcript. Paper 28 (“Tr.”).

B. Real Parties in Interest

Petitioner identifies the following real parties in interest: Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. Pet. 73. Patent Owner identifies itself as the sole real party in interest. Paper 5, 1.

C. Related Matters

Petitioner and Patent Owner identify the following civil action as a related matter involving the ’339 patent: *WiPQTUS Inc. v. Samsung Electronics Co., Ltd.*, No. 2:23-cv-00054 (E.D. Tex. filed Feb. 14, 2023) (the “Texas case”). Pet. 73; Paper 5, 1–2.

D. The ’339 Patent (Exhibit 1001)

The ’339 patent, titled “Dual Mode Wireless Power Receiver,” issued on July 31, 2018, from U.S. application no. 15/095,070 (“the ’070 application”) filed on April 10, 2016. Ex. 1001, codes (21), (22), (45), (54). The ’339 patent identifies the ’070 application as a continuation-in-part of U.S. application no. 13/964,310 (“the ’310 application”) filed on August 12, 2013, and later issued as U.S. Patent No. 9,343,929 B2

(“the ’929 patent”) (Exhibit 2002). *Id.* at 1:7–9, code (63). The ’339 patent states that the ’310 application for the ’929 patent “claims benefit from” U.S. provisional application no. 61/682,312 (“the ’312 provisional”) (Exhibit 2004) filed on August 13, 2012. *Id.* at 1:7–11. Although the ’929 patent incorporates the ’312 provisional by reference, the ’339 patent does not incorporate the ’312 provisional by reference. *Id.* at 1:4–11; Ex. 2002, 1:6–11.

Referencing travel for business or pleasure, the ’339 patent identifies the desirability of “mobile devices with big battery capacity such as a notebook, tablet, etc., that typically are carried along on the trips” to wirelessly charge “other lower battery capacity mobile devices such as a mobile phone, camera, etc., that are also carried on the trips.” Ex. 1001, 1:15–27. For example, “a notebook’s battery capacity would typically be at least 8 times that of a mobile phone’s so using the notebook’s battery to charge up the mobile phone would not place a heavy drain on the notebook’s battery.” *Id.* at 1:27–31.

Additionally, the ’339 patent notes that some mobile devices include “completely independent” circuitry for (1) wireless charging and (2) near-field communication (NFC). Ex. 1001, 1:44–52. The patent explains that “a parallel approach is too costly particularly for mobile devices catering to the mid and lower tiers of the market.” *Id.* at 1:52–54. The patent also explains that if “some of the NFC-like functionality were achieved via the wireless charging circuitry,” then “mobile device manufacturers could eliminate the NFC circuitry and yet deliver a very feature rich device with just wireless charging.” *Id.* at 1:54–59.

The '339 patent endeavors to address deficiencies in conventional mobile devices by providing a dual mode wireless power receiver configured to (1) “selectively apply a received power to a load device” and (2) “utilize at least a part of the stored power to power-up and communicate with a secondary wireless power receiver to cause an action or transaction or charge the secondary wireless power receiver’s load device.” Ex. 1001, 2:24–29; *see id.* at code (57). The “dual mode wireless power receiver comprises a first circuitry and a second circuitry.” *Id.* at 2:29–31.

The first circuitry receives power in a charging mode and transmits power in a communication mode. Ex. 1001, code (57); *see id.* at 2:37–39, 3:57–62. The second circuitry, among other things, (1) “configures the first circuitry to allow receipt and transmittal of power,” (2) “receives and interprets data from” the secondary wireless power receiver, and (3) “authenticates, decrypts and encrypts data transfer,” depending on the type of secondary wireless power receiver. *Id.* at code (57); *see id.* at 3:11–56, 4:46–5:10, 9:48–10:3. As an example, if the secondary wireless power receiver is a one-way authenticating device or a two-way authenticating device, the second circuitry “provides authentication information,” “receives, decrypts and interprets” data from the secondary wireless power receiver, and “responds with suitable encrypted data” according to an identified wireless power protocol. *Id.* at 3:18–42.

The “first circuitry comprises an impedance network, a switch network, a filter capacitor, and one or more switches.” Ex. 1001, 2:31–33; *see id.* at 21:27–26:7, code (57), Figs. 10A–10H. The “switch network of the first circuitry is configured as an inverter or a rectifier depending upon the mode of operation of the dual mode wireless power receiver.” *Id.*

at 2:60–62. The “second circuitry comprises a security engine configured to authenticate, decrypt and encrypt a data transfer between the dual mode wireless power receiver and the secondary wireless power receiver, a control logic circuit, and a modulator/demodulator circuit.” *Id.* at 2:33–37; *see id.* at code (57).

The “dual mode wireless power receiver is in the charging mode by default.” Ex. 1001, 3:62–63; *see id.* at 10:51–52. The dual mode wireless power receiver transitions from the charging mode to the communication mode when “triggered by the user,” e.g., via a software application or an externally toggled hardware switch. *Id.* at 4:14–16, 11:63–12:1, 12:51–58, 15:27–33.

The dual mode wireless power receiver may receive a request from a power-sinking secondary wireless power receiver. Ex. 1001, 5:10–14; *see id.* at 3:42–47. Then, the dual mode wireless power receiver “interprets the received request and performs a function associated with the transmitted power.” *Id.* at 5:12–15; *see id.* at 9:67–10:3. “The function performed may include one of increase the transmitted power, decrease the transmitted power, maintain the transmitted power, turn off the transmitted power, etc.” *Id.* at 5:15–18; *see id.* at 3:49–54, 10:3–6. The “dual mode wireless power receiver takes action as per the wireless power protocol to effectively transmit power to the secondary wireless power receiver.” *Id.* at 5:18–21.

To receive power in the charging mode, the “dual mode wireless power receiver configures the first circuitry,” based on an input from the control logic circuit, “to change the impedance of the impedance network and topology of the switch network to obtain a modified form of the received power, and apply the modified form of the power to the load

device.” Ex. 1001, 2:39–46. In the charging mode, the switch network of the first circuitry “is configured as a rectifier to convert alternating current to direct current (ac-to-dc).” *Id.* at 2:62–65. The first circuitry applies “the modified form of the power to the load device, for example, a Charge Management Integrated Circuit (CMIC), a Power Management Integrated Circuit (PMIC), a simple battery charger, a battery, a capacitor, etc., that consumes or stores or enables the storage of the modified power.” *Id.* at 2:45–50.

To transmit power in the communication mode, the “dual mode wireless power receiver configures the first circuitry, based on an input from the control logic circuit, to change the topology of the switch network and the impedance of the impedance network to transmit a part of the stored power to the secondary wireless power receiver.” Ex. 1001, 2:50–57; *see id.* at 4:16–23, 12:1–7, 12:58–64, 15:33–39. In the communication mode, the switch network of the first circuitry “is configured as an inverter to convert direct current to alternating current (dc-to-ac).” *Id.* at 2:65–67. The first circuitry applies the alternating current “to one of a coil and capacitor electrodes (active and passive electrodes).” *Id.* at 8:47–55, 11:14–18. The coil or capacitor electrodes “emanate power via a magnetic field or an electric field, respectively.” *Id.* at 11:16–18; *see id.* at 8:55–59.

“direct the rectified and filtered power to the load device.” Ex. 1001, 8:37–40, 10:57–59, Fig. 1. In the communication mode, “switch network 102 of the first circuitry is configured as an inverter, transforming the dual mode wireless power receiver 100 into a wireless power transmitter for transmitting power to a secondary wireless power receiver,” “switch S1 is closed,” and “switch S2 is open” to “direct the power from the battery via the inverter” to coil 106. *Id.* at 8:47–55, 11:14–18, Fig. 1. Coil 106 wirelessly transmits battery power from the dual mode wireless power receiver to a secondary wireless power receiver via a magnetic field. *Id.* at 8:55–58; *see id.* at 11:16–18.

The ’339 patent describes an impedance network’s constituents as follows:

The impedance network 101 comprises one or more of passive electronic components, for example, a resistor, a capacitor, a magnetic device, a transducer, transformer etc.; active electronic components, for example, a diode, a transistor such as a metal oxide semiconductor field effect transistor (MOSFET), a bipolar transistor, etc., operational amplifiers, an optoelectronic device, etc., and electronic switches.

Ex. 1001, 9:4–11. The ’339 patent then states, “These electronic components in combination are utilized to vary impedance of the dual mode wireless power receiver 100 prior to transmitting power to a secondary wireless power receiver 300.” *Id.* at 9:11–14.

The ’339 patent identifies the following as examples of control logic circuit 105: “a state machine, a microcontroller, etc.” Ex. 1001, 9:15–16. In the charging mode, “the control logic circuit 105 is configured to receive a pulse width modulated (PWM) signal from the first circuitry and provide/receive a digital signal to and from the modulator/demodulator circuit 103

for the communication link that exists between the dual mode wireless power receiver 100” and a wireless power transmitter. *Id.* at 9:16–22. In the communication mode, “the control logic circuit 105 is configured to provide a pulse width modulated (PWM) signal to the first circuitry and provide/receive a digital signal to and from the modulator/demodulator circuit 103 for the communication link that exists between the dual mode wireless power receiver 100” and a secondary wireless power receiver. *Id.* at 9:22–28.

The ’339 patent’s Figure 10A (reproduced below) depicts an embodiment of the first circuitry for dual mode wireless power receiver 100:

FIRST CIRCUITRY OF DUAL MODE WIRELESS POWER RECEIVER

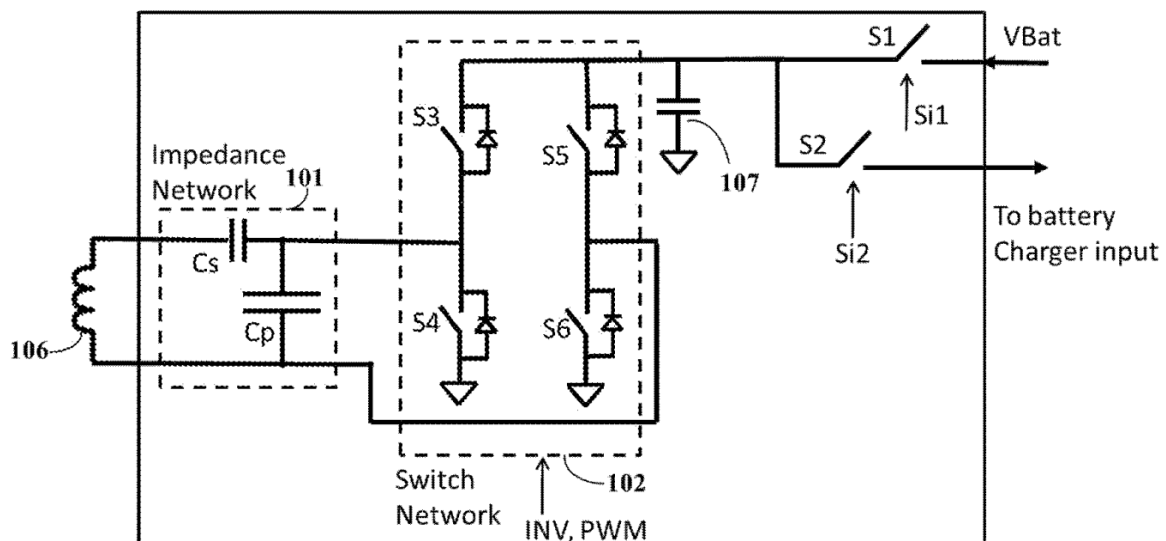


FIG. 10A

Figure 10A illustrates first circuitry including the following components:

- impedance network 101 with capacitor C_s connected in series with coil 106 and capacitor C_p connected in parallel with coil 106 and capacitor C_s ;
- switch network 102 with switches S3, S4, S5, and S6 that receives (i) an INV signal controlling whether switch

network 102 functions as an inverter or a rectifier and
(ii) a PWM signal specifying switching frequency;

- filter capacitor 107;
- switch S1 activated by signal Si1 to connect the first circuitry to a power source, e.g., a battery; and
- switch S2 activated by signal Si2 to connect the first circuitry to a load device, e.g., a battery charger.

See Ex. 1001, 21:27–63, 26:8–21, Fig. 10A; *see also id.* at 9:16–28.

Power flows “in and out of the dual mode wireless power receiver 100” through the first circuitry shown in Figure 10A. Ex. 1001, 21:27–31, Fig. 10A. In the charging mode, “the dual mode wireless power receiver 100 receives AC (alternating current) wireless power when its receiver coil 106 is placed in an external varying magnetic field.” *Id.* at 21:36–39. Then, the “AC power flows through the impedance network 101 comprised of capacitors Cs and Cp.” *Id.* at 21:39–40. “Capacitors Cs’s and Cp’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101.” *Id.* at 21:41–43. Switch network 102 receives the AC power from impedance network 101 and converts the AC power into DC power “via one of asynchronous, semi-synchronous and fully synchronous operation of switches S3, S4, S5 and S6.” *Id.* at 21:43–48.

In the communication mode, switch network 102 receives DC power from an “external power repository” and converts the DC power into AC power “via synchronized inverting operation of switches S3, S4, S5 and S6” at a frequency determined by the PWM signal. Ex. 1001, 21:53–59, 26:14–17. Then, the AC power flows through impedance network 101 into coil 106. *Id.* at 21:60–61.

The '339 patent's Figure 10C (reproduced below) depicts another embodiment of the first circuitry for dual mode wireless power receiver 100:

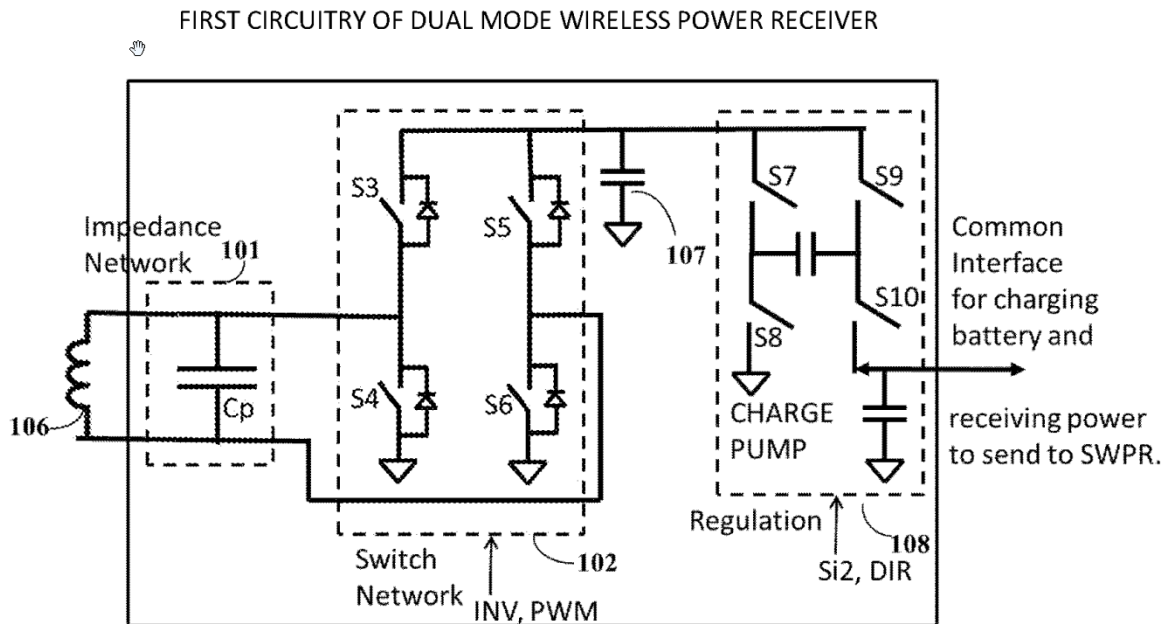


FIG. 10C

Figure 10C illustrates first circuitry including the following components:

- impedance network 101 with capacitor C_p connected in parallel with coil 106;
- switch network 102 with switches S3, S4, S5, and S6 that receives (i) an INV signal controlling whether switch network 102 functions as an inverter or a rectifier and (ii) a PWM signal specifying switching frequency;
- filter capacitor 107; and
- power regulation circuit 108 configured as a charge pump in the charging mode and including switches S7, S8, S9, and S10 along with two unlabeled capacitors.

See Ex. 1001, 22:41–23:15, 26:8–17, 26:23–38, Fig. 10C; see also *id.* at 5:34–35, 6:19–23, 9:16–28, 18:2–3.

Power flows “in and out of the dual mode wireless power receiver 100” through the first circuitry shown in Figure 10C. Ex. 1001,

22:43–45, Fig. 10C. In the charging mode, “the dual mode wireless power receiver 100 receives AC (alternating current) wireless power when its receiver coil 106 is placed in an external varying magnetic field.” *Id.* at 22:50–53. Then, the “AC power flows through the impedance network 101 comprised of capacitor C_p .” *Id.* at 22:53–54. “Capacitors [sic] C_p ’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101.” *Id.* at 22:54–57. Switch network 102 receives the AC power from impedance network 101 and converts the AC power into DC power “via one of asynchronous, semi-synchronous and fully synchronous operation of switches S3, S4, S5 and S6.” *Id.* at 22:57–61.

In the communication mode, switch network 102 receives DC power and converts the DC power into AC power “via synchronized inverting operation of switches S3, S4, S5 and S6” at a frequency determined by the PWM signal. Ex. 1001, 23:1–11, 26:14–17. Then, the AC power flows through impedance network 101 into coil 106. *Id.* at 23:11–13.

The '339 patent's Figure 10E (reproduced below) depicts another embodiment of the first circuitry for dual mode wireless power receiver 100:

FIRST CIRCUITRY OF DUAL MODE WIRELESS POWER RECEIVER

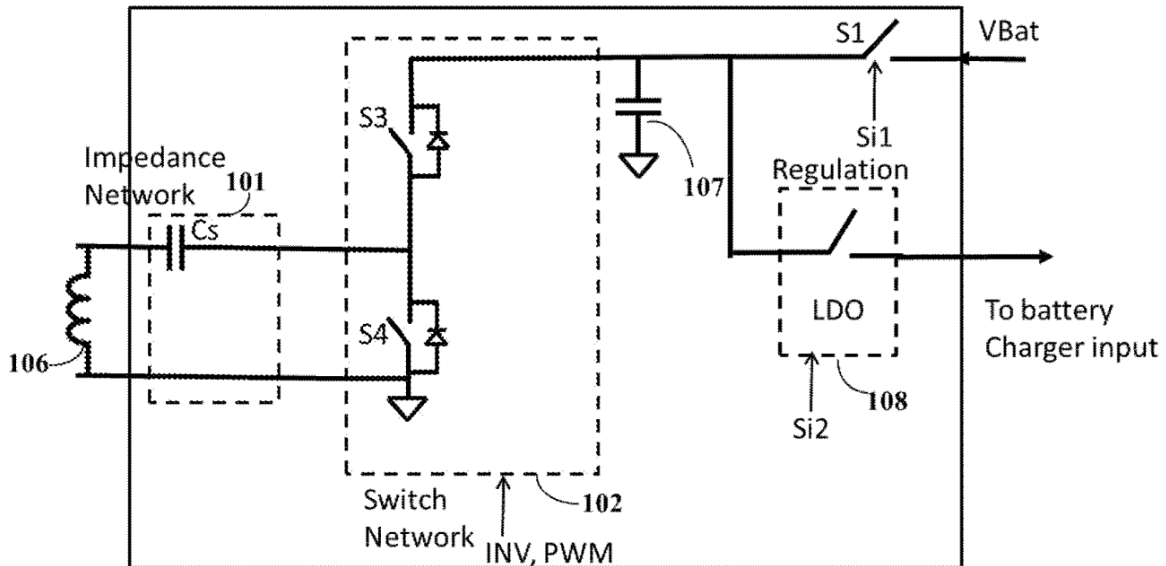


FIG. 10E

Figure 10E illustrates first circuitry including the following components:

- impedance network 101 with capacitor Cs connected in series with coil 106;
- switch network 102 with switches S3 and S4 that receives (i) an INV signal controlling whether switch network 102 functions as an inverter or a rectifier and (ii) a PWM signal specifying switching frequency;
- filter capacitor 107;
- power regulation circuit 108 configured as a low dropout (LDO) regulator in the charging mode and activated by signal Si2 to connect the first circuitry to a load device, e.g., a battery charger; and
- switch S1 activated by signal Si1 to connect the first circuitry to a power source, e.g., a battery.

See Ex. 1001, 23:60–24:31, 26:8–17, 26:39–46, Fig. 10E; *see also id.* at 5:34–35, 6:27–30, 9:16–28, 18:2–3.

Power flows “in and out of the dual mode wireless power receiver 100” through the first circuitry shown in Figure 10E. Ex. 1001, 23:62–64, Fig. 10E. In the charging mode, “the dual mode wireless power receiver 100 receives AC (alternating current) wireless power when its receiver coil 106 is placed in an external varying magnetic field.” *Id.* at 24:2–5. Then, the “AC power flows through the impedance network 101 comprised of capacitor Cs.” *Id.* at 24:5–7. “Capacitors [sic] Cs’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101.” *Id.* at 24:7–9. Switch network 102 receives the AC power from impedance network 101 and converts the AC power into DC power “via a voltage doubler synchronization of switches S3 and S4.” *Id.* at 24:9–13.

In the communication mode, switch network 102 receives DC power and converts the DC power into AC power “via a half-bridge inverter synchronized operation of switches S3 and S4” at a frequency determined by the PWM signal. Ex. 1001, 24:20–28, 26:14–17. Then, the AC power flows through impedance network 101 into coil 106. *Id.* at 24:27–28.

The ’339 patent includes twenty claims, i.e., independent apparatus claim 1, claims 2–12 that depend directly or indirectly from claim 1, independent method claim 13, and claims 14–20 that depend directly from claim 13. Ex. 1001, 27:2–30:60.

E. The Challenged Claims

Petitioner challenges independent apparatus claim 1 and claims 2, 3, 5, 7, and 9. Pet. 1, 12–69.

Claim 1 exemplifies the challenged claims and reads as follows (with formatting added for clarity and with bracketed numbers and letters added for reference purposes):¹

1. [1.p] A dual mode wireless power receiver configured to selectively apply a received power to a load device and utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary wireless power receiver to cause an action or transaction or charge said secondary wireless power receiver's load device, said dual mode wireless power receiver comprising:

[1.a] one of coil and capacitor electrodes;

[1.b] a first circuitry comprising:

an impedance network;

a switch network;

a filter capacitor;

[1.c] a second circuitry comprising:

a control logic circuit; and

a modulator/demodulator circuit;

[1.d] said first circuitry configured to receive said power from a wireless power transmitter;

[1.e] said first circuitry, based on an input from said control logic circuit, configured to change impedance of said impedance network and topology of said switch network to obtain a modified form of said received power, and apply said modified form of said power to said load device;

[1.f] said first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and said impedance of said impedance network to transmit at least part of said stored power to said secondary

¹ We use the same numbers and letters that Petitioner uses to identify the claim language. *See* Pet. 15–58.

wireless power receiver to power-up said secondary wireless power receiver;

[1.g] said second circuitry, on power-up of said secondary wireless power receiver, configured to identify a type of said secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver;

[1.h] said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;

[1.i] said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.

Ex. 1001, 27:2–43.

F. The Asserted References

For its challenge, Petitioner relies on the following references:

Name	Reference	Exhibit
Chatterjee	US 2011/0018356 A1, published January 27, 2011 (based on an application filed December 1, 2009)	1003
Corbridge	US 2010/0083012 A1, published April 1, 2010 (based on an application filed June 4, 2009)	1004

Pet. 1, 12–69. Petitioner asserts that each reference qualifies as prior art under “at least pre-AIA 35 U.S.C. §§ 102(a), 102(b), 102(e), or post-AIA 35 U.S.C. §§ 102(a)(1) and/or 102(a)(2).” *Id.* at 12, 14; *see* 35 U.S.C. § 102(a), (b), (e) (2006); 35 U.S.C. § 102(a)(1)–(2).²

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 102 and § 103 effective March 16, 2013. Patent Owner contends that claims 1 and 2 have an effective filing date of August 13, 2012 (the ’312 provisional’s filing date), whereas claims 3, 5, 7, and 9 have an effective filing date of April 10, 2016 (the ’070 application’s filing date). *See, e.g.*, Resp. 8, 15, 25, 28, 39–40.

Patent Owner does not dispute that each reference qualifies as prior art. *See, e.g.*, Resp. 8, 49–67.

G. The Asserted Challenge to Patentability

Petitioner asserts the following challenge to patentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5, 7, 9	103	Chatterjee, Corbridge

Pet. 1, 12–69.

H. Testimonial Evidence

To support its positions, Petitioner relies on declarations from Joshua W. Phinney, Ph.D., P.E. (Exhibit 1002, Exhibit 1015, and Exhibit 1021). Dr. Phinney states, “I am a Principal Engineer in the Electrical Engineering and Computer Science practice at Exponent, an engineering and scientific consulting firm,” and “I received a Ph.D. in Electrical Engineering from the Massachusetts Institute of Technology (‘MIT’) in 2005.” Ex. 1002 ¶ 3. Dr. Phinney also states, “I have been retained on behalf of” Petitioner to “provide my technical review, analysis, insights, and opinions concerning the validity of” claims 1–3, 5, 7, and 9 in the ’339 patent. *Id.* ¶ 1.

To support its positions, Patent Owner relies on declarations from Randal H. Direen, Ph.D. (Exhibit 2001, Exhibit 2003, Exhibit 2008, and Exhibit 2011). Dr. Direen states, “I have over 20 years of experience as an engineer, scientist, and consultant in the electronics industry, including in

Petitioner does not dispute Patent Owner’s identification of effective filing dates for the challenged claims. *See, e.g.*, Reply 6–7. Because at least one claim has an effective filing date on or after March 16, 2013, the AIA versions of § 102 and § 103 apply in determining patentability. *See* AIA § 3(n)(1)(A). But our patentability analysis would not change if the pre-AIA versions of § 102 and § 103 applied.

the areas of electronic design, layout, structure, and operation, in RF technology for wireless communications, in technology development,” and “extensive experience (in both engineering and in litigation support) with both wireless technologies and power-management technologies.” Ex. 2003 ¶ 4. Dr. Direen also states, “I have been retained by counsel for” Patent Owner to “offer opinions regarding the patentability of the claims in” the ’339 patent. *Id.* ¶ 1.

Additionally, Petitioner submits Dr. Direen’s deposition testimony. *See* Ex. 1019 (Aug. 6, 2024, Direen Dep. Tr.); Ex. 1020 (Nov. 14, 2024, Direen Dep. Tr.).

I. Burden

In an *inter partes* review, a petitioner bears the burden of persuasion to prove “unpatentability by a preponderance of the evidence.” *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (quoting 35 U.S.C. § 316(e)); *see* 37 C.F.R. § 42.1(d) (2024).

III. PATENTABILITY ANALYSIS

A. Legal Principles: Obviousness

A patent may not be obtained “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103. An obviousness analysis involves underlying factual inquiries including (1) the scope and content of the prior art; (2) differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective indicia of nonobviousness, such as commercial success, long-felt but unsolved

needs, and failure of others.³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18, 35–36 (1966); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047–48 (Fed. Cir. 2016) (en banc). When evaluating a combination of references, an obviousness analysis should address “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

We analyze the obviousness issues according to these principles.

B. Level of Ordinary Skill in the Art

Factors pertinent to determining the level of ordinary skill in the art include (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior-art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983). Not all factors may exist in every case, and one or more of these or other factors may predominate in a particular case. *Id.* These factors are not exhaustive, but merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). Moreover, the prior art itself may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

³ The parties do not provide evidence or argument regarding objective indicia of nonobviousness. *See, e.g.*, Pet. 12–69; Resp. 49–67. Dr. Phinney states that “I am not aware of any objective indicia of non-obviousness that would make claims 1–3, 5, 7, and 9 of the ’339 patent non-obvious over the prior art.” Ex. 1002 ¶ 199. Dr. Phinney similarly states that “I am not aware of any objective indicia of non-obviousness that would make substitute claims 21 and 22 of the ’339 patent non-obvious over the prior art.” Ex. 1021 ¶ 95.

Petitioner asserts that a person of ordinary skill in the art at the earliest effective filing date “would have had a bachelor’s degree in electrical engineering or a similar discipline, and two or more years of experience working with wireless charging systems.” Pet. 11. Petitioner also asserts that “[a]dditional education, such as a master’s degree of electrical engineering could substitute for professional experience and significant work experience could substitute for formal education.” *Id.* at 11–12. Dr. Phinney’s testimony supports Petitioner’s assertions. *See* Ex. 1002 ¶ 65. For instance, Dr. Phinney states that a person of ordinary skill in the art “would have had a bachelor’s degree in electrical engineering or a similar discipline, and at least two years of professional experience working with wireless power systems.” *Id.*

Patent Owner states that it “will rely on the definition” of an ordinarily skilled artisan provided by Dr. Phinney. Resp. 20; *see* Mot. 19.

We adopt the definition of an ordinarily skilled artisan provided by Dr. Phinney because it comports with the technology and claims in the ’339 patent as well as the asserted references. *See* 1001, 1:13–6:34, 27:2–30:59; *infra* §§ III.D.1–III.D.2.

C. Claim Construction

1. BACKGROUND

We construe claim terms “using the same claim construction standard” that district courts use to construe claim terms in civil actions under 35 U.S.C. § 282(b). *See* 37 C.F.R. § 42.100(b). Under that standard, claim terms “are given their ordinary and customary meaning, which is the meaning the term would have to a person of ordinary skill in the art at the time of the invention.” *Power Integrations, Inc. v. Fairchild Semiconductor*

Int'l, Inc., 904 F.3d 965, 971 (Fed. Cir. 2018) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc)). The meaning of claim terms may be determined by “look[ing] principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

The “person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Phillips*, 415 F.3d at 1313. “Properly viewed, the ‘ordinary meaning’ of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321.

Petitioner does not propose an explicit construction for any claim term. *See* Pet. 7–69. Dr. Phinney states that “I have been told that the terms in the Challenged Claims do not require construction to evaluate the prior art.” Ex. 1002 ¶ 89. Dr. Phinney explains that he applied “the ordinary and customary meaning of the claim language as it would have been understood by” an ordinarily skilled artisan based on the ’339 patent and its prosecution history. *Id.* ¶ 88.

As explained in more detail below, Patent Owner proposes constructions for the following:

- (1) the term “impedance network” in claims 1 and 3;
- (2) the term “switch network” in claims 1 and 2;
- (3) the language “configured to change impedance of said impedance network and topology of said switch network

to obtain a modified form of said received power” in limitation 1.e; and

- (4) the language “elements that are one of chosen a priori with fixed values and tuned during operation over a range of values” in claim 3.

See Resp. 34–49; Sur-reply 14–25.

2. THE PROPRIETY OF USING THE ’339 PATENT’S SPECIFICATION TO CONSTRUE EACH OF THE ’339 PATENT’S CLAIMS

(a) Patent Owner’s Position

As an initial matter, Patent Owner raises an issue about the propriety of using the ’339 patent’s specification to construe each of the ’339 patent’s claims. *See* Resp. 1, 23–26, 39–41; Sur-reply 1, 15–17. Specifically, citing *Phillips*, Patent Owner asserts that a claim must be construed “as of the effective filing date.” Resp. 23 (citing *Phillips*, 415 F.3d at 1313); *see* Sur-reply 15 (citing *Phillips*, 415 F.3d at 1313). Additionally, citing the following decisions, Patent Owner asserts that disclosures constituting new matter should not be used to construe a claim in a parent application:

Goldenberg v. Cytogen, Inc., 373 F.3d 1158, 1167–68 (Fed. Cir. 2004); *Lightforce USA, Inc. v. Leupold & Stevens, Inc.*, 2019 WL 2146245, at *5–6 (D. Or. May 15, 2019); *iLife Techs. Inc. v. Body Media, Inc.*, 90 F. Supp. 3d 415, 427 (W.D. Pa. 2015). Resp. 25; Sur-reply 16–17.

Patent Owner contends as follows:

- (1) claim 1 has an effective filing date of August 13, 2012, i.e., the filing date of the ’312 provisional;
- (2) the ’070 application includes new matter relative to the ’312 provisional;
- (3) the ’070 application issued as the ’339 patent;

- (4) the '339 patent includes new matter relative to the '312 provisional; and
- (5) the new matter in the '339 patent relative to the '312 provisional should not be used to construe terms and phrases in claim 1.

Resp. 1, 4–5, 25, 27–28, 39–40, 42; *see* Sur-reply 1, 15, 17.

As new matter in the '339 patent relative to the '312 provisional, Patent Owner identifies (1) the disclosures in line 30 of column 17 through line 50 of column 26, (2) Figures 10A–10H, and (3) claim 3. Resp. 25; *see id.* at 1, 15, 27–28, 39–40; Sur-reply 1. According to Patent Owner, claim 3 and the other new matter in the '339 patent should not be used to construe language in claim 1. Resp. 1, 27–28, 39–40, 42; *see* Sur-reply 1, 15, 17. Further, Patent Owner asserts that claim 1 “must be interpreted” using the '312 provisional and claim 3 “must be interpreted” using the '339 patent’s specification. Resp. 41; *see* Sur-reply 1, 3, 15.

(b) Petitioner’s Position

Petitioner contends that the claims in the '339 patent are “linked by their dependency and should be construed holistically as part of the entire patent instrument—not just parts of it.” Reply 6. Further, citing *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1302, 1311 (Fed. Cir. 2008), Petitioner asserts that Federal Circuit precedent instructs that a claim in a patent issuing from a continuation-in-part application should be construed in light of the patent’s entire specification including new matter in the continuation-in-part application. *See id.* at 7.

(c) Analysis

We agree with Petitioner that a claim in a patent issuing from a continuation-in-part application should be construed in light of the patent’s

entire specification including new matter in the continuation-in-part application. *See* Reply 7. In *Phillips*, the Federal Circuit explained that “the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313. Here, “the effective filing date of the patent application” is the filing date of the ’070 application for the ’339 patent. The ’070 application includes disclosures supporting each challenged claim, while the ’312 provisional does not. *See, e.g.*, Resp. 1, 8, 15, 25, 27–28, 41; Sur-reply 1. Additionally, the ’339 patent does not incorporate the ’312 provisional by reference. *See, e.g.*, Ex. 1001, 1:4–11.

The Federal Circuit’s decision in *PowerOasis* indicates that a claim in a patent issuing from a continuation-in-part application should be construed in light of the patent’s entire specification including new matter in the continuation-in-part application. In particular, in *PowerOasis*, the disclosures in an original application supported a claimed “customer interface” located on a vending machine only, and the disclosures in a continuation-in-part application supported the claimed “customer interface” located on either a vending machine or a customer laptop. *See PowerOasis*, 522 F.3d at 1301–02, 1307–11. The district court did not limit the claim to a “customer interface” located on a vending machine only. *See id.* at 1302–03. Instead, the district court relied on new matter in the continuation-in-part application and construed the claim to encompass a “customer interface” located on either a vending machine or a customer laptop. *Id.* The Federal Circuit agreed with the district court and affirmed. *Id.* at 1301, 1307, 1311.

As for Patent Owner’s assertion that disclosures constituting new matter should not be used to construe a claim in a parent application, Petitioner does not ask the Board to use new matter in the ’339 patent to construe a claim in the ’339 patent’s parent, i.e., the ’929 patent. *See* Resp. 25; Reply 5–7; *infra* §§ III.C.3–III.C.6. The cases Patent Owner cites to support that assertion do not involve the circumstances here, i.e., using new matter in a continuation-in-part application to construe a claim in a patent issuing from the continuation-in-part application.

In *Goldenberg*, the Federal Circuit criticized a district court for relying on new matter in a continuation-in-part application to construe claims in a patent issuing from an earlier application lacking that new matter. *See Goldenberg*, 373 F.3d at 1161, 1166–68. In *Lightforce*, the district court decided that new matter in continuation-in-part applications issuing as patents was “irrelevant to the construction” of a claim in an ancestor patent. *See Lightforce*, 2019 WL 2146245, at *1, *8–9. In *iLife*, the district court stated that “[d]isclosures constituting new matter should not be used to construe claim terms appearing in the parent patent.” *See iLife*, 90 F. Supp. 3d at 427. According to the district court, however, that principle was not “currently pertinent” because the disclosures in the parent patent supported the proposed claim constructions. *Id.*

When a patent issues from a continuation-in-part application, different claims in the patent may have different effective filing dates. *Augustine Med., Inc. v. Gaymar Indus., Inc.*, 181 F.3d 1291, 1302 (Fed. Cir. 1999); *Waldemar Link, GmbH v. Osteonics Corp.*, 32 F.3d 556, 558 (Fed. Cir. 1994). The different effective filing dates determine the scope and content of the prior art applicable to the respective claims, e.g., allowing

removal of a reference for a claim with an earlier effective filing date compared to a claim with a later effective filing date. *See Santarus, Inc. v. Par Pharm., Inc.*, 694 F.3d 1344, 1352 (Fed. Cir. 2012); *PowerOasis*, 522 F.3d at 1307. The different effective filing dates should not affect claim construction because a person of ordinary skill in the art would consider a claim “in the context of the entire patent, including the specification,” i.e., the specification for the continuation-in-part application. *See Phillips*, 415 F.3d at 1313; *see also PowerOasis*, 522 F.3d at 1301–02, 1307–11. “Properly viewed, the ‘ordinary meaning’ of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Phillips*, 415 F.3d at 1321.

According to Patent Owner’s position, when a patent issues from a continuation-in-part application, the same term appearing in an independent claim and a claim depending from that independent claim could have different meanings. Patent Owner cites no authority supporting that position. *See, e.g.*, Resp. 8–15, 23–26; Sur-reply 14–17.

To support the assertion that “a dependent claim can have a different effective filing date than its independent claim, and the independent claim may be valid whereas the dependent claim is not,” Patent Owner cites *TurboCare Division of Demag Delaval Turbomachinery Corp. v. General Electric Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001). Resp. 24–25; Sur-reply 16. But *TurboCare* does not address whether a claim in a patent issuing from a continuation-in-part application should be construed in light of the patent’s entire specification including new matter in the continuation-in-part application.

In *TurboCare*, the patentee did not file a continuation-in-part application and instead amended an original application. *TurboCare*, 264 F.3d at 1118–20. When amending the original application, the patentee added dependent claim 2. *Id.* at 1119–20. The district court determined that the amendment added new matter to the specification and that dependent claim 2 was invalid for failing to satisfy § 112’s written-description requirement. *Id.* at 1118. The Federal Circuit agreed with the district court and affirmed. *Id.* at 1113, 1119–20.

Thus, for the reasons discussed above, we use the ’339 patent’s specification in its entirety when construing the ’339 patent’s claims. *See DDR Holdings, LLC v. Priceline.com LLC*, 122 F.4th 911, 916 (Fed. Cir. 2024) (“When construing claims, this court looks to how a skilled artisan would read the claim term ‘in the context of the entire patent,’ including the specification and prosecution history.”).

3. “IMPEDANCE NETWORK”

The term “impedance network” appears in claims 1 and 3. Ex. 1001, 27:2–43, 27:47–51.

(a) Patent Owner’s Position

In the Response, Patent Owner proposes that the Board construe “impedance network” to mean “a collection of two or more electrical components chosen from the list (1) one or more passive components; (2) active components; and (3) switches.” Resp. 36, 48 (citing Ex. 2003 ¶ 110); *see id.* at 52–53; Sur-reply 24.

In the Sur-reply, Patent Owner proposes that the Board construe “impedance network” to mean “a collection of two or more electrical components, one of which must be a passive component and one of which

must be either an active component or switch.” Sur-reply 25. Patent Owner proposes this “alternative construction” in light of Dr. Direen’s deposition testimony. *See id.* at 21–25 (citing Ex. 1019, 71:9–25, 73:1–11, 74:14–75:25, 77:5–79:23).⁴

Patent Owner explains that “one or more passive electronic components alone” and “an active component or switch alone” do not constitute an “impedance network” because “it takes an active component or switch in combination with one or more passive components to allow the impedance to be changed in the receiving power mode as required” by limitation 1.e. Sur-reply 19, 24; *see id.* at 25.

To support the “two or more” components requirement in its proposed constructions, Patent Owner quotes the ’312 provisional’s description in paragraph 24 of an impedance network’s constituents as follows:

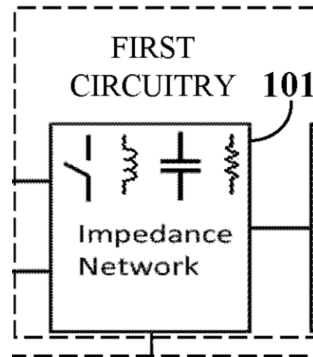
The impedance network 101 comprises ***one or more of passive electronic components***, for example, a resistor, a capacitor, a magnetic device, a transducer, transformer etc.; ***active electronic*** components, for example, a diode, a transistor such as a metal oxide semiconductor field effect transistor (MOSFET), a bipolar transistor, etc., operational amplifiers, an optoelectronic device, etc., and ***electronic switches***. ***These electronic components in combination*** are utilized to vary impedance of the dual mode wireless charging receiver 100 prior to transmitting power to a secondary wireless power receiver 300.

Resp. 34 (emphases by Patent Owner) (quoting Ex. 2004 ¶ 24); *see id.* at 35–36.

⁴ For Exhibit 1019 (Aug. 6, 2024, Direen Dep. Tr.), we cite the transcript page numbers (upper right) instead of the page numbers (lower right) that Petitioner applied to the exhibit.

Patent Owner asserts that the phrase “one or more” in paragraph 24’s first sentence applies only to “passive electronic components” and not to “active electronic components” or “electronic switches.” Resp. 34–35. Further, Patent Owner asserts that the phrase “[t]hese electronic components in combination” in paragraph 24’s second sentence “provides further clarity” and “implies two or more.” *Id.* at 35–36.

Additionally, Patent Owner asserts that an ordinarily skilled artisan “would understand ‘network’ to mean two or more distinct electrical components electrically connected together.” Resp. 35 (citing Ex. 2003 ¶ 96). According to Patent Owner, a skilled artisan’s understanding “would be further informed” by the ’312 provisional’s Figure 1 illustrating a block labeled “Impedance Network” as shown in the excerpt from that figure reproduced below:



The above excerpt from the ’312 provisional’s Figure 1 includes a block labeled “Impedance Network” containing four circuit symbols corresponding to a switch, an inductor, a capacitor, and a resistor. *See* Ex. 2003 ¶ 103; Ex. 2004, Fig. 1.

(b) Petitioner’s Position

Petitioner contends that the ’339 patent’s specification and claims indicate that an “impedance network” encompasses “either a fixed value

component or a variable component that can be tuned during operation.”

Reply 6. As support in the ’339 patent’s claims for that contention, Petitioner cites claim 3, which recites “said impedance network of said first circuitry comprising of elements that are one of chosen a priori with fixed values and tuned during operation over a range of values.” *Id.* at 5.

Petitioner contends that “impedance network” cannot be “construed narrowly for independent claim 1” as requiring only components tunable during operation and “more broadly for dependent claim 3” as encompassing a fixed-value passive component. *Id.* at 6 (citing *Phillips*, 415 F.3d at 1314); *see id.* at 7.

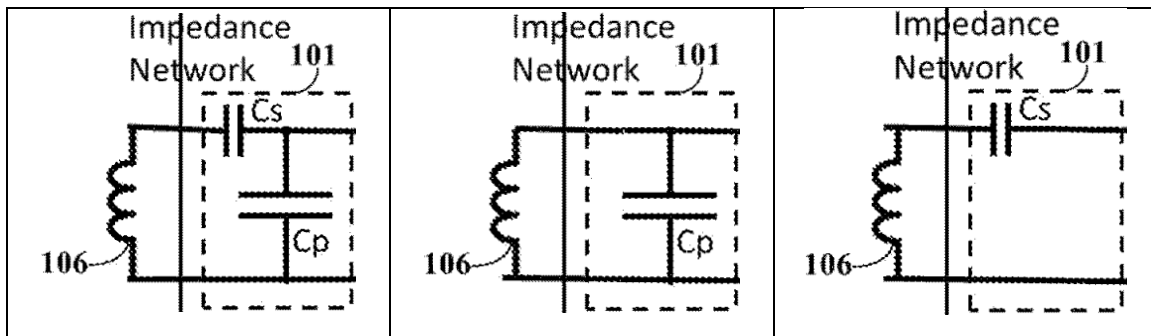
(c) Analysis

We disagree with Patent Owner’s proposed constructions for “impedance network” because they exclude preferred embodiments of the impedance network disclosed in the ’339 patent’s specification by requiring “two or more” components. *See* Ex. 1001, 21:27–26:7, Figs. 10A–10H; Resp. 36, 48; Sur-reply 25. A construction excluding a preferred embodiment is “rarely, if ever correct.” *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 747, 755 (Fed. Cir. 2016); *see Google LLC v. EcoFactor, Inc.*, 92 F.4th 1049, 1058–59 (Fed. Cir. 2024).

In particular, the ’339 patent depicts in Figures 10A–10H eight preferred embodiments of the first circuitry for dual mode wireless power receiver 100. Ex. 1001, 7:52–67, 21:27–26:7, Figs. 10A–10H. Each of the eight preferred embodiments of the first circuitry employs one of three preferred embodiments of impedance network 101. *See id.* at 21:39–40, 22:9–10, 22:53–54, 23:28–29, 24:5–7, 24:44–45, 25:15–17, 25:52–54, Figs. 10A–10H.

In the first preferred embodiment of impedance network 101, i.e., as employed in the first circuitry depicted in four figures (Figures 10A, 10B, 10D, and 10G), impedance network 101 includes two components, i.e., capacitor C_s connected in series with coil 106 and capacitor C_p connected in parallel with coil 106. Ex. 1001, 21:39–40, 22:9–10, 23:28–29, 25:15–17, Figs. 10A–10B, 10D, 10G. In the second preferred embodiment of impedance network 101, i.e., as employed in the first circuitry depicted in one figure (Figure 10C), impedance network 101 includes only one component, i.e., single capacitor C_p connected in parallel with coil 106. *Id.* at 22:53–54, Fig. 10C. In the third preferred embodiment of impedance network 101, i.e., as employed in the first circuitry depicted in three figures (Figures 10E, 10F, and 10H), impedance network 101 includes only one component, i.e., single capacitor C_s connected in series with coil 106. *Id.* at 24:5–7, 24:44–45, 25:52–54, Figs. 10E–10F, 10H; *see* Ex. 1002 ¶ 111.

The excerpts from Figures 10B, 10C, and 10E reproduced below depict the three preferred embodiments of impedance network 101:



Above on the left, the Figure 10B excerpt shows impedance network 101 with capacitor C_s connected in series with coil 106 and capacitor C_p connected in parallel with coil 106 and capacitor C_s . Ex. 1001, 22:9–10, Fig. 10B. Above in the center, the Figure 10C excerpt shows impedance network 101 with single capacitor C_p connected in parallel with coil 106.

Id. at 22:53–54, Fig. 10C. Above on the right, the Figure 10E excerpt shows impedance network 101 with single capacitor C_s connected in series with coil 106. *Id.* at 24:5–7, Fig. 10E.

By requiring that the claimed “impedance network” include “two or more” components, Patent Owner’s proposed constructions exclude two of three preferred embodiments of impedance network 101, i.e., the embodiment with single capacitor C_p connected in parallel with coil 106 and the embodiment with single capacitor C_s connected in series with coil 106. *See* Ex. 1001, 21:27–26:7, Figs. 10A–10H; Ex. 1002 ¶ 111; Resp. 36, 48; Sur-reply 25. Where a reasonable construction encompasses a preferred embodiment, “it is incorrect to construe the claims to exclude that embodiment, absent probative evidence on the contrary.” *Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1277 (Fed. Cir. 2008). Patent Owner identifies no such evidence. *See, e.g.*, Resp. 26–28, 34–36; Sur-reply 14–19; Ex. 2001 ¶¶ 69–97; Ex. 2003 ¶¶ 81–110.

Additionally, as noted above, the ’339 patent describes an impedance network’s constituents as follows:

The impedance network 101 comprises one or more of passive electronic components, for example, a resistor, a capacitor, a magnetic device, a transducer, transformer etc.; active electronic components, for example, a diode, a transistor such as a metal oxide semiconductor field effect transistor (MOSFET), a bipolar transistor, etc., operational amplifiers, an optoelectronic device, etc., and electronic switches.

Ex. 1001, 9:4–11; *see* Ex. 1002 ¶ 111; *supra* § II.D. The ’339 patent describes an impedance network’s constituents the same way as paragraph 24 in the ’312 provisional that Patent Owner quotes. *Compare* Ex. 1001, 9:4–11, *with* Ex. 2004 ¶ 24; *see* Resp. 34.

The '339 patent and the '312 provisional include the following sentence after the above-quoted description of an impedance network's constituents: "These electronic components in combination are utilized to vary impedance of the dual mode wireless charging receiver 100 prior to transmitting power to a secondary wireless power receiver 300." Ex. 1001, 9:11–14; Ex. 2004 ¶ 24. That sentence does not define with "reasonable clarity, deliberateness, and precision" an "impedance network" as requiring "two or more" components. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Additionally, the '339 patent's specification states that (1) "the invention is not limited to the specific methods and components disclosed herein" and (2) the illustrative embodiments "have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention." Ex. 1001, 6:42–44, 26:51–53. Those statements indicate that the phrase "[t]hese electronic components in combination" is illustrative rather than limiting.

Based on the '339 patent's disclosures about the preferred embodiments of impedance network 101, the phrase "one or more of" in above-quoted description of an impedance network's constituents modifies each of the following in that sentence:

- (1) the term "passive electronic components" along with its related list of examples;
- (2) the term "active electronic components" along with its related list of examples; and
- (3) the term "electronic switches."

See Ex. 1001, 9:4–11, 21:27–26:7, Figs. 10A–10H.

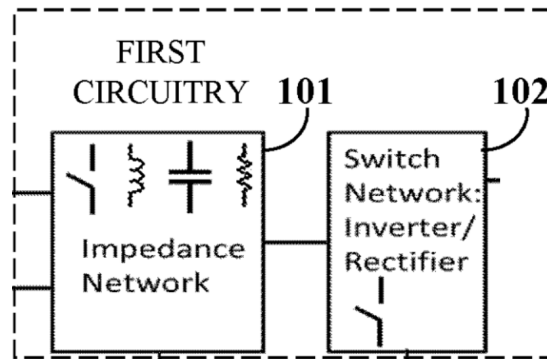
Based on the intrinsic evidence discussed above, the claimed “impedance network” encompasses one or more electronic components. As an example, the claimed “impedance network” may include one or more “passive electronic components,” e.g., a single resistor or a single capacitor. Ex. 1001, 9:4–11, 21:27–26:7, Figs. 10A–10H; *see* Ex. 1002 ¶ 111. As another example, the claimed “impedance network” may include one or more “active electronic components,” e.g., a single diode or a single transistor. Ex. 1001, 9:4–11.

Patent Owner contends that “[t]here is no requirement that all claims be construed to cover all embodiments.” Resp. 27 (citing *PSN Ill., LLC v. Ivoclar Vivadent, Inc.*, 525 F.3d 1159, 1166 (Fed. Cir. 2008); *Tandon Corp. v. U.S. Int’l Trade Comm’n*, 831 F.2d 1017, 1024 (Fed. Cir. 1987)). Further, Patent Owner quotes the Federal Circuit as follows: “It is often the case that different claims are directed to and cover different disclosed embodiments.” *Id.* (quoting *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1883 (Fed. Cir. 2008)).

Here, however, the ’339 patent does not include different independent apparatus claims directed to different disclosed embodiments. *See* Ex. 1001, 27:2–30:60. Instead, the ’339 patent includes just one independent apparatus claim, i.e., claim 1. *Id.* Patent Owner does not identify any apparatus claim that would cover the disclosed single-capacitor embodiments if the claimed “impedance network” required “two or more” components. *See, e.g.*, Resp. 26–28, 34–36; Sur-reply 14–19; Ex. 2001 ¶¶ 69–97; Ex. 2003 ¶¶ 81–110.

As for Patent Owner’s reliance on the block labeled “Impedance Network” in the ’312 provisional’s Figure 1 (Resp. 35), that figure also

includes an adjacent block labeled “Switch Network: Inverter/Rectifier” as shown in the excerpt from that figure reproduced below:



The above excerpt from the '312 provisional's Figure 1 includes a block labeled “Impedance Network” containing four circuit symbols corresponding to a switch, an inductor, a capacitor, and a resistor adjacent to a block labeled “Switch Network: Inverter/Rectifier” containing one circuit symbol corresponding to a switch. *See* Ex. 2003 ¶ 103; Ex. 2004, Fig. 1; Resp. 46.

Using Patent Owner's reasoning, the block labeled “Switch Network: Inverter/Rectifier” indicates that a network may include just one component, e.g., a single switch. The '339 patent includes essentially the same Figure 1 as the '312 provisional. *Compare* Ex. 1001, Fig. 1, *with* Ex. 2004, Fig. 1. The block labeled “Switch Network: Inverter/Rectifier” in those figures undermines Patent Owner's position. In any event, the '312 provisional and the '339 patent describe Figure 1 as an illustrative “schematic diagram” rather than an actual circuit diagram showing individual components and connections between the individual components. *See* Ex. 1001, 6:45–46, 8:4–5; Ex. 2004 ¶¶ 11, 22.

For the reasons discussed above, the claimed “impedance network” encompasses one or more “passive electronic components,” one or more

“active electronic components,” one or more “electronic switches,” or combinations of these components and switches. *See* Ex. 1001, 9:4–11, 21:39–40, 22:9–10, 23:28–29, 22:53–54, 24:5–7, 24:44–45, 25:15–17, 25:52–54, Figs. 10A–10H; Ex. 1002 ¶ 111; Ex. 2004 ¶ 24.

4. “SWITCH NETWORK”

The term “switch network” appears in claims 1 and 2. Ex. 1001, 27:2–46.

(a) Patent Owner’s Position

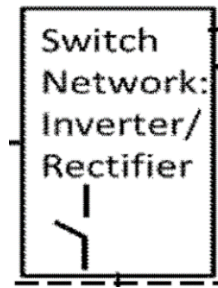
Patent Owner proposes that the Board construe “switch network” to mean “an interconnected combination of two or more switches configured to modify the form of power.” Resp. 47–48 (citing Ex. 2001 ¶ 129).

To support its proposed construction, Patent Owner quotes the ’312 provisional’s description in paragraph 4 of the first circuitry’s operation as an inverter or a rectifier as follows:

The first circuitry is configured as an inverter or a rectifier depending upon the mode of operation of the dual mode wireless charging receiver. In the charging mode, the first circuitry is configured as a rectifier to convert alternating current to direct current (ac-to-dc). In the communications mode, the first circuitry is configured as an inverter to convert direct current to alternating current (dc-to-ac).

Resp. 45–46 (quoting Ex. 2004 ¶ 4) (citing Ex. 2004 ¶¶ 7, 23, 29–30, 33, 36, 39, 41, 43–47, Abstract).

To further support its proposed construction, Patent Owner provides an excerpt from the ’312 provisional’s Figure 1 that illustrates a block labeled “Switch Network: Inverter/Rectifier” as reproduced below:



The above excerpt from the '312 provisional's Figure 1 includes a block labeled "Switch Network: Inverter/Rectifier" containing one circuit symbol corresponding to a switch. *See* Ex. 2004, Fig. 1; Resp. 46. Patent Owner contends that the label "Switch Network: Inverter/Rectifier" comports with "the explanation in the specification (quoted above) that the 'switch network' will be configured as either an inverter or a rectifier." Resp. 47.

Additionally, Patent Owner contends that the claimed "switch network" is separate from the claimed "impedance network" and also separate from the claimed "coil." Resp. 47; *see id.* at 2, 33, 48.

(b) Analysis

We discern no need to provide an explicit construction for "switch network." As explained below, Petitioner identifies Chatterjee's power bridge circuit 610 as disclosing the claimed "switch network." Pet. 30–32; *see infra* § III.D.3(c)(i). As also explained below, power bridge circuit 610 includes six switches (switches 621–626) that configure the circuit as an inverter or a rectifier to modify the form of power depending upon the mode of operation. Ex. 1003 ¶¶ 61–62, 64–65, 81–86, Figs. 6A–6D, 8A–8D; *see* Ex. 1002 ¶¶ 75, 121–126; *infra* § III.D.3(c)(iii).b.

As also explained below, Chatterjee's power bridge circuit 610 is separate from the circuitry corresponding to the claimed "impedance network" and also separate from the circuitry corresponding to the claimed

“coil.” Ex. 1003 ¶¶ 61–66, 68–73, 81–86, Figs. 4, 6A–6D, 8A–8D; *see* Ex. 1002 ¶¶ 113–115, 121–126; Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1021 ¶ 43; *infra* §§ III.D.3(b), III.D.3(c)(iii).a.–b.

Thus, Chatterjee’s power bridge circuit 610 satisfies Patent Owner’s proposed construction for “switch network” as well as a narrower construction requiring configuration as either an inverter or a rectifier.

5. LIMITATION 1.E

Limitation 1.e recites “said first circuitry, based on an input from said control logic circuit, configured to change impedance of said impedance network and topology of said switch network to obtain a modified form of said received power, and apply said modified form of said power to said load device.” Ex. 1001, 27:20–25; *see supra* § II.E.

(a) Patent Owner’s Position

Patent Owner asserts that limitation 1.e requires that “the impedance of the impedance network be capable of being changed” while the dual mode wireless power receiver “is still in the receiving power mode.” Resp. 41–42; *see also id.* at 7, 37–38, 48–49, 56–57; Sur-reply 5, 7–14.

Patent Owner notes that limitation 1.d precedes limitation 1.e and recites “said first circuitry configured to receive said power from a wireless power transmitter.” Resp. 37; *see id.* at 7; Ex. 1001, 27:18–19. Patent Owner then contends that in “view of the fact that the dual mode wireless power receiver is claimed as being in the receiving a charge mode” in limitation 1.d, limitation 1.e “should be interpreted as adding additional limitations related to the dual mode wireless power receiver while in the charging mode.” Resp. 37 (citing Ex. 2003 ¶¶ 113–118). Patent Owner also contends that limitation 1.f “concerns changing between the receiving power

mode to the communication/transmitting power mode.” *Id.*; *see id.* at 7. According to Patent Owner, the claim language surrounding limitation 1.e makes clear that limitation 1.e “requires that the ‘impedance of the impedance network’ be capable of changing while in the receiving power mode.” *Id.* at 37–38 (citing Ex. 2003 ¶ 118); *see id.* at 39 (citing Ex. 2003 ¶ 121); Sur-reply 7.

To support its proposed construction for limitation 1.e, Patent Owner quotes the ’312 provisional’s description in paragraph 4 of the first circuitry’s operation to obtain a modified form of the received power as follows:

In the charging mode, dual mode wireless charging receiver configures the first circuitry to receive the power from a wireless power transmitter. The first circuitry, based on [an] input from the control logic circuit is configured to change the impedance of the impedance network and topology of the switch network to obtain a modified form of the received power, and apply the modified form of the power to the load device, for example, a battery.

Resp. 38 (quoting Ex. 2004 ¶ 4); *see* Sur-reply 3–4 (quoting Ex. 2004 ¶ 4).

To further support its proposed construction for limitation 1.e, Patent Owner quotes the following statements in the ’312 provisional:

- (1) “[t]hese electronic components in combination are utilized to vary impedance of the dual mode wireless power receiver 100 prior to transmitting power to a secondary wireless power receiver 300”; and
- (2) “[t]he dual mode wireless charging receiver 100 powers up and adjusts the impedance network 101 of the first circuitry.”

Resp. 38 (alterations by Patent Owner) (emphasis omitted) (quoting Ex. 2004 ¶¶ 24, 29); *see* Sur-reply 6 (quoting Ex. 2004 ¶ 29).

Patent Owner also provides a highlighted version of Figure 2B in the '312 provisional as reproduced below (Sur-reply 5):

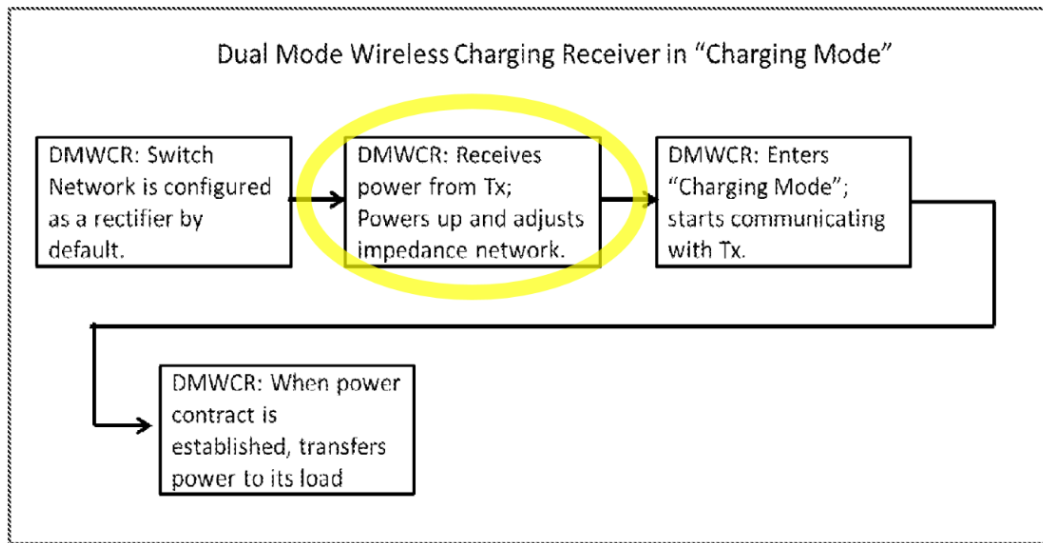


FIG. 2B

Figure 2B illustrates “a flow diagram showing the operation of the dual mode wireless charging receiver in a charging mode.” Ex. 2004 ¶ 13, Fig. 2B. The above highlighted version of Figure 2B includes a yellow oval around the box labeled “DMWCR: Receives power from Tx; Powers up and adjusts impedance network.” *See* Sur-reply 5.

Patent Owner also provides a highlighted version of Figure 2B in both the '929 patent and the '339 patent as reproduced below (Sur-reply 6):

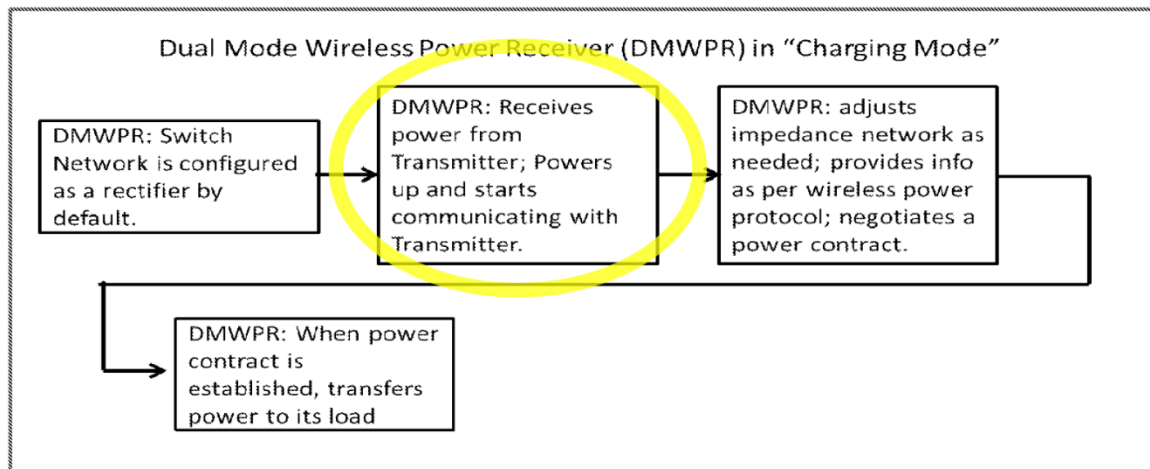


FIG. 2B

Figure 2B illustrates “a flow diagram showing the operation of the dual mode wireless power receiver in a charging mode.” Ex. 1001, 6:53–55, Fig. 2B; Ex. 2002, 5:32–34, Fig. 2B. The above highlighted version of Figure 2B includes a yellow oval around the box labeled “DMWPR: Receives power from Transmitter; Powers up and starts communicating with Transmitter.” See Sur-reply 6.

Patent Owner asserts that both of the above versions of Figure 2B show the dual mode wireless power receiver:

- (1) configured as a rectifier by default;
- (2) receiving power from a transmitter in the receiving power mode; and
- (3) adjusting the impedance of the impedance network while still in the receiving power mode.

Sur-reply 6.

Additionally, Patent Owner quotes the following disclosure in both the '929 patent and the '339 patent about the dual mode wireless power receiver's operation when powering up:

On receiving sufficient level of power from the wireless power transmitter, the dual mode wireless power receiver powers up and starts communicating with the wireless power transmitter. The dual mode wireless power receiver adjusts the impedance of its impedance network. The dual mode wireless power receiver also adjusts the topology of the switch network, for example from the default non-synchronous rectifier to fully synchronous rectifier.

Sur-reply 4 (emphases omitted) (quoting Ex. 1001, 3:66–4:7; Ex. 2002, 3:62–4:3).

Regarding the disclosure in both the '929 patent and the '339 patent about the dual mode wireless power receiver's operation when powering up, Patent Owner asserts that the phrase “[on] receiving sufficient level of power” in the first sentence shows that the dual mode wireless power receiver is in “the receiving power mode” and “sets the context.”

Sur-reply 4. Patent Owner asserts that the second sentence and the third sentence show that the dual mode wireless power receiver may adjust both the impedance of the impedance network and the topology of the switch network while the dual mode wireless power receiver is in “the receiving power mode,” i.e., “the mode in which a rectifier is used.” *Id.* at 4–5.

(b) Petitioner's Position

Petitioner asserts that limitation 1.e does not require real-time modification of “the impedance of the impedance network while in the receiving power mode, but merely that a change of impedance enable the first circuitry to ‘obtain a modified form of said received power.’” Reply 9–10 (emphasis omitted).

(c) Analysis

We disagree with Patent Owner that limitation 1.e “requires that the impedance of the impedance network be capable of being changed” while the dual mode wireless power receiver “is still in the receiving power mode.” *See* Resp. 41–42. Rather, limitation 1.e reflects the dual mode wireless power receiver’s ability to “operate in a charging mode and a communication mode” and change configurations when transitioning between modes. *See* Ex. 1001, 2:37–67, 4:16–23, 12:1–7, 12:58–64, 15:33–39, 27:20–25. For instance, the “switch network of the first circuitry is configured as an inverter or a rectifier depending upon the mode of operation of the dual mode wireless power receiver.” *Id.* at 2:60–62.

To receive power in the charging mode (the receiving power mode), the “dual mode wireless power receiver configures the first circuitry,” based on an input from the control logic circuit, “to change the impedance of the impedance network and topology of the switch network to obtain a modified form of the received power, and apply the modified form of the power to the load device.” Ex. 1001, 2:39–46. In the charging mode (the receiving power mode), the switch network of the first circuitry “is configured as a rectifier to convert alternating current to direct current (ac-to-dc).” *Id.* at 2:62–65.

To transmit power in the communication mode, the “dual mode wireless power receiver configures the first circuitry, based on an input from the control logic circuit, to change the topology of the switch network and the impedance of the impedance network to transmit a part of the stored power to the secondary wireless power receiver.” Ex. 1001, 2:50–57; *see id.* at 4:16–23, 12:1–7, 12:58–64, 15:33–39. In the communication mode, the

switch network of the first circuitry “is configured as an inverter to convert direct current to alternating current (dc-to-ac).” *Id.* at 2:65–67.

Accordingly, when the dual mode wireless power receiver transitions from the charging mode (the receiving power mode) to the communication mode, changes occur in both the switch network and the impedance network to facilitate dc-to-ac conversion (e.g., reconfiguring the switch network to function as an inverter) instead of ac-to-dc conversion as in the charging mode. *See, e.g.*, Ex. 1001, 2:50–57, 2:60–67, 4:14–23, 11:63–12:7, 12:51–64, 15:27–39. Similarly, when the dual mode wireless power receiver transitions from the communication mode to the charging mode (the receiving power mode), changes occur in both the switch network and the impedance network to facilitate ac-to-dc conversion (e.g., reconfiguring the switch network to function as a rectifier) instead of dc-to-ac conversion as in the communication mode. *See, e.g., id.* at 2:37–46, 2:60–67.

In limitation 1.e, the language “configured to change impedance of said impedance network and topology of said switch network to obtain a modified form of said received power” concerns configuration changes that occur when transitioning from the communication mode to the charging mode (the receiving power mode) rather than changes that occur during the charging mode (the receiving power mode). *See* Ex. 1001, 27:20–25.

Patent Owner ignores the objective recited in limitation 1.e, specifically, “obtain a modified form of said received power” and “apply said modified form of said power to said load device.” *See, e.g.*, Resp. 36–42; Sur-reply 3–7; Ex. 1001, 2:39–50; 27:20–25. To “obtain a modified form of said received power” (obtain dc power from received ac power) and “apply said modified form of said power to said load device” (apply dc

power to the load device), the dual mode wireless power receiver transitions from the communication mode to the charging mode (the receiving power mode) to provide dc power to the load device. *See* Ex. 1001, 2:37–50, 2:60–67, 21:33–52, 22:3–25, 22:47–67, 23:22–45, 23:66–24:19, 24:38–55, 25:10–29, 25:47–63. And when transitioning from the communication mode to the charging mode (the receiving power mode), the dual mode wireless power receiver changes both the impedance of the impedance network and the topology of the switch network (from an inverter to a rectifier). *See id.* at 2:37–46, 2:60–67.

Analogous to limitation 1.e, limitation 1.f concerns configuration changes that occur when transitioning from the charging mode (the receiving power mode) to the communication mode rather than changes that occur during the communication mode. Specifically, limitation 1.f recites “said first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and said impedance of said impedance network to transmit at least part of said stored power to said secondary wireless power receiver to power-up said secondary wireless power receiver.” Ex. 1001, 27:26–31. Patent Owner admits that limitation 1.f concerns configuration changes that occur when transitioning from the charging mode (the receiving power mode) to the communication mode. *See* Resp. 7, 41.

Limitations 1.e and 1.f would have no need to require changes in both the “topology of said switch network” and the “impedance of said impedance network” if these limitations did not concern configuration changes that occur when transitioning between modes. *See* Ex. 1001, 27:20–31. Also, if these limitations did not concern configuration changes

that occur when transitioning between modes, claim 1 would cover only transitions from the charging mode (the receiving power mode) to the communication mode according to limitation 1.f and would not cover transitions from the communication mode to the charging mode (the receiving power mode).

Further, referring to the embodiments depicted in Figures 10A–10H, the '339 patent repeatedly explains that the one or more capacitors comprising impedance network 101 are “chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101.” Ex. 1001, 21:39–43, 22:9–14, 22:53–57, 23:28–32, 24:5–9, 24:44–48, 25:15–20, 25:52–56, Figs. 10A–10H. Construing limitation 1.e to require that “the impedance of the impedance network be capable of being changed” while the dual mode wireless power receiver “is still in the receiving power mode,” as Patent Owner proposes, would exclude the fixed-capacitor preferred embodiments of impedance network 101. *See* Resp. 41–42. A construction excluding a preferred embodiment is “rarely, if ever correct.” *PPC Broadband*, 815 F.3d at 755.

Additionally, claim 3 depends directly from claim 1 and recites “said impedance network of said first circuitry comprising of elements that are one of chosen a priori with fixed values and tuned during operation over a range of values.” Ex. 1001, 27:47–51. Hence, claim 3 encompasses an impedance network containing only elements that are “chosen a priori with fixed values.” *See infra* § III.C.6(c). Construing limitation 1.e to require that “the impedance of the impedance network be capable of being changed” while the dual mode wireless power receiver “is still in the receiving power mode,” as Patent Owner proposes, would nullify claim 3’s option for an

impedance network containing only elements that are “chosen a priori with fixed values.” *See* Resp. 41–42. A construction rendering some portion of the claim language “void, meaningless, or superfluous” is “highly disfavored.” *See Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 810 (Fed. Cir. 2021).

As discussed above, Patent Owner quotes the disclosure in both the ’929 patent and the ’339 patent about the dual mode wireless power receiver’s operation when powering up, including the following statements: “The dual mode wireless power receiver adjusts the impedance of its impedance network. The dual mode wireless power receiver also adjusts the topology of the switch network, for example from the default non-synchronous rectifier to fully synchronous rectifier.” Sur-reply 4 (emphases omitted) (quoting Ex. 1001, 4:3–7; Ex. 2002, 3:65–4:3); *see supra* § III.C.5(a). Those statements describe the dual mode wireless power receiver’s operation when powering up, not when transitioning from the communication mode to the charging mode (the receiving power mode). Ex. 1001, 3:66–4:7; Ex. 2002, 3:62–4:3.

The disclosure in both the ’929 patent and the ’339 patent about the dual mode wireless power receiver’s operation when powering up that Patent Owner quotes indicates that the dual mode wireless power receiver may change the impedance of the impedance network while the dual mode wireless power receiver is in the charging mode (the receiving power mode). *See* Ex. 1001, 3:66–4:7; Ex. 2002, 3:62–4:3. That disclosure comports with claim 3’s option for an impedance network containing elements that are “tuned during operation over a range of values.” *See* Ex. 1001, 27:47–51. That disclosure does not limit claim 1’s scope. *See id.* at 6:42–44, 26:51–53.

Federal Circuit case law “counsels against incorporating a feature of a preferred embodiment into the claims.” *Arthrex, Inc. v. Smith & Nephew, Inc.*, 935 F.3d 1319, 1330 (Fed. Cir. 2019).

Similarly, Figure 2B in both the ’929 patent and the ’339 patent indicates that the dual mode wireless power receiver may change the impedance of the impedance network while the dual mode wireless power receiver is in the charging mode (the receiving power mode). *See* Ex. 1001, 10:49–65, Fig. 2B; Ex. 2002, 8:40–58, Fig. 2B. That disclosure does not limit claim 1’s scope. *See* Ex. 1001, 6:42–44, 26:51–53. The “mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration.” *Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1306–07 (Fed. Cir. 2003).

6. CLAIM 3

Claim 3 depends directly from claim 1 and recites “wherein said impedance network of said first circuitry comprising of elements that are one of chosen a priori with fixed values and tuned during operation over a range of values.” Ex. 1001, 27:47–51.

(a) Patent Owner’s Position

Patent Owner contends that claim 3 requires an “impedance network” comprised of plural “elements,” i.e., “two or more.” Resp. 43. Patent Owner also contends that claim 3 uses (1) the verb “are” and (2) the noun “values” to reflect the plural nature of “elements.” *Id.*

Further, Patent Owner asserts that claim 3 “places an additional structural restriction” on the claimed “impedance network” by specifying that the components having values “must be chosen ‘a priori,’ and the

components must be ‘tunable during operation.’” Resp. 43 (citing Ex. 2003 ¶¶ 104–109).

(b) Petitioner’s Position

Petitioner asserts that claim 3 uses the phraseology “one of [A] and [B]” to mean “either [A] or [B].” Reply 2; *see id.* at 4–5. Petitioner also asserts that Patent Owner’s proposed construction requiring “both [A] and [B]” conflicts with the intrinsic evidence. *Id.* at 2–4.

As an example, Petitioner cites claim 1 that recites “one of coil and capacitor electrodes.” Reply 3; *see* Ex. 1001, 27:10. Petitioner asserts that Patent Owner argues that this limitation in claim 1 requires “either [A] a coil or [B] capacitor electrodes.” Reply 3 (citing Resp. 32–33).

As another example, Petitioner cites claim 2 that depends directly from claim 1 and recites “wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier.” Reply 3; *see* Ex. 1001, 27:44–46. Petitioner asserts that an ordinarily skilled artisan would understand that “a circuit cannot simultaneously be both an inverter and a rectifier” and, therefore, “the proper construction of the phrase ‘one of’ in claim 2 is that ‘said first circuitry is configured as’ either ‘an inverter’ or ‘a rectifier.’” Reply 3–4 (emphases omitted).

As yet another example, Petitioner cites claim 20 that depends directly from claim 13 and recites “wherein said dual mode wireless power receiver providing said power to said secondary wireless power receiver on command by user through one of hardware switch and software application.” Reply 4; *see* Ex. 1001, 30:57–60. Petitioner asserts that an ordinarily skilled artisan would understand that “the command by the user would be

implemented by either a hardware switch or a software application.”

Reply 4 (emphases omitted).

(c) Analysis

We agree with Patent Owner that claim 3 requires an “impedance network” comprised of plural “elements,” i.e., “two or more.” *See* Ex. 1001, 27:47–51; Resp. 43. As Patent Owner contends, claim 3 uses the verb “are” to reflect the plural nature of “elements.” *See* Ex. 1001, 27:47–51; Resp. 43.

We agree with Petitioner that claim 3 uses the phraseology “one of [A] and [B]” to mean “either [A] or [B].” *See* Ex. 1001, 27:47–51; Reply 2. The ’339 patent’s specification includes the following disclosures relevant to claim 3:

- “Capacitors Cs’s and Cp’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10A embodiment;
- “Capacitors Cs’s and Cp’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10B embodiment;
- “Capacitors Cp’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10C embodiment;
- “Capacitors Cs’s and Cp’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10D embodiment;
- “Capacitors Cs’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10E embodiment;

- “Capacitors Cs’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10F embodiment;
- “Capacitors Cs’s and Cp’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10G embodiment; and
- “Capacitors Cs’s capacitance value is chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101” in the Figure 10H embodiment.

Ex. 1001, 21:41–43, 22:11–14, 22:54–57, 23:30–32, 24:7–9, 24:45–48, 25:17–20, 25:54–56. Claim 3 captures the patent’s repeated disclosures that the one or more capacitors comprising impedance network 101 are “chosen a priori (fixed) or tuned during operation (variable) to change the impedance of the impedance network 101.” *See id.* at 21:39–43, 22:9–14, 22:53–57, 23:28–32, 24:5–9, 24:44–48, 25:15–20, 25:52–56, 27:47–51.

Based on the intrinsic evidence, claim 3’s language “one of [A] chosen a priori with fixed values and [B] tuned during operation over a range of values” means either [A] “chosen a priori with fixed values” or [B] “tuned during operation over a range of values.” *See id.* at 21:39–43, 22:9–14, 22:53–57, 23:28–32, 24:5–9, 24:44–48, 25:15–20, 25:52–56, 27:47–51.

Further, a construction rendering some portion of the claim language “void, meaningless, or superfluous” is “highly disfavored.” *See Intel*, 21 F.4th at 810. By requiring that each component in an “impedance network” be “tunable during operation,” Patent Owner’s proposed construction renders claim 3’s language “chosen a priori with fixed values”

either “void, meaningless, or superfluous.” *See* Ex. 1001, 27:47–51; Resp. 43.

“Other claims of the patent in question . . . can also be valuable sources of enlightenment as to the meaning of a claim term.” *Phillips*, 415 F.3d at 1314. Here, claims 1 and 2 confirm that claim 3 uses the phraseology “one of [A] and [B]” to mean “either [A] or [B].”

Claim 1 recites “one of coil and capacitor electrodes.” Ex. 1001, 27:10 (limitation 1.a). As Petitioner asserts, Patent Owner argues that limitation 1.a requires “either [A] a coil or [B] capacitor electrodes.” *See* Resp. 31; Reply 3; Ex. 1019, 65:8–12. In particular, Patent Owner contends that “the ‘coil’ (or capacitor) of” limitation 1.a is “separate from the limitations that follow.” Resp. 31; *see id.* at 32. Consistent with that contention, Patent Owner explains that the specification describes the invention “as using either inductive coupling or capacitive coupling.” *Id.* at 32. Thus, claim 1, like claim 3, uses the phraseology “one of [A] and [B]” to mean “either [A] or [B],” i.e., either [A] “coil” or [B] “capacitor electrodes” according to claim 1.

Additionally, claim 2 depends directly from claim 1 and recites “wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier.” Ex. 1001, 27:44–46. As Petitioner asserts, an ordinarily skilled artisan would understand that “a circuit cannot simultaneously be both an inverter and a rectifier.” *See* Ex. 1002 ¶ 179; Ex. 1019, 61:7–11; Reply 3–4. Thus, claim 2, like claim 3, uses the phraseology “one of [A] and [B]” to mean “either [A] or [B],” i.e., either [A] “an inverter” or [B] “a rectifier” according to claim 2.

7. ALLEGED FAILURE TO PROVIDE CLAIM CONSTRUCTION

Patent Owner quotes the Board’s rules requiring that a petition identify “[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable.” Resp. 22 (emphasis omitted) (quoting 37 C.F.R. §§ 42.104(b)(3)–(b)(4)). Patent Owner argues that Petitioner “failed to meet its burden of proof by not providing any claim construction when it should have known that the ‘impedance network’ and ‘switch network’ had no well understood meanings standing alone.” *Id.* at 1; *see id.* at 22. Patent Owner also argues that other Board decisions “have denied institution because the Petitioner failed to provide a construction for one or more key terms material to the validity analysis.” *Id.* at 22 (citing *C&D Zodiac, Inc. v. B/E Aerospace, Inc.*, IPR2017-01274, Paper 12 (PTAB Oct. 31, 2017)).

In the Preliminary Response, Patent Owner similarly argued that Petitioner failed to comply with the Board’s rules regarding the content of a petition by not providing any claim construction. *Compare* Prelim. Resp. 1, 21–23, *with* Resp. 1, 22–23.

In the Institution Decision, we explained that “[u]nder the circumstances here, the absence of proposed constructions in the Petition did not impair Patent Owner’s ability to prepare a Preliminary Response and will not impair Patent Owner’s ability to prepare a Response.” Inst. Dec. 81. Accordingly, we determined that “the circumstances here do not warrant denying institution based on 37 C.F.R. §§ 42.104(b)(3)–(b)(4).” *Id.* at 82.

In the Response, the Reply, and the Sur-reply, the parties fully address the claim-construction issues. *See, e.g.*, Resp. 1, 23–26, 30–49; Reply 2–11; Sur-reply 3–25; *supra* §§ III.C.2–III.C.6. We have resolved those issues.

See supra §§ III.C.2–III.C.6. Even if we have authority to deny the Petition at this stage after institution, the circumstances here do not warrant denying the Petition based on 37 C.F.R. §§ 42.104(b)(3)–(b)(4). *See* Inst. Dec. 80–82; *supra* §§ III.C.2–III.C.6.

8. SUMMARY

“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.” *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Above, we explained the scope of the term “impedance network,” limitation 1.e, and claim 3. *See supra* §§ III.C.3(c), III.C.5(c), III.C.6(c). We determine that no other claim term or limitation requires an explanation of scope or an explicit construction to resolve a controversy in this proceeding.

D. Alleged Obviousness over Chatterjee and Corbridge: Claims 1–3, 5, 7, and 9

Petitioner contends that claims 1–3, 5, 7, and 9 are unpatentable under § 103 because the claims would have been obvious over Chatterjee and Corbridge. *See* Pet. 1, 12–69; Reply 11–24. Patent Owner disputes Petitioner’s contentions. *See* Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

Below, we provide overviews of Chatterjee and Corbridge. Then, we consider the obviousness issues. For the reasons explained below, we agree with Petitioner that claims 1–3, 5, 7, and 9 are unpatentable under § 103 because the claims would have been obvious over Chatterjee and Corbridge.

1. OVERVIEW OF CHATTERJEE (EXHIBIT 1003)

Chatterjee is a U.S. patent application publication titled “Power Bridge Circuit for Bi-Directional Wireless Power Transmission,” filed on December 1, 2009, and published on January 27, 2011. Ex. 1003, codes (12), (22), (43), (54). Chatterjee states that “the disclosed embodiments relate to an inductive signal interface capable of bi-directional inductive signaling.” *Id.* ¶ 2. The inductive signal interface “may be integrated or incorporated into a mobile computing device (such as in a cellular telephony/messaging device), mobile computing device housing or housing accessory (e.g. housing panel for mobile computing device) or docking station.” *Id.* ¶ 34.

The inductive signal interface includes (1) “a coil assembly which has one or more inductive coils” and (2) “a three-legged (or three-branched) structure that uses separate pairs of legs or branches to operate as an inductive power transmitter or an inductive power receiver.” Ex. 1003 ¶¶ 29–30; *see id.* ¶¶ 32–33. Control signals determine “the mode of operation for the inductive signal interface.” *Id.* ¶¶ 36, 39; *see id.* ¶¶ 64–66. The mode of operation may depend on “an identification and/or a status of” a device, e.g., the “status of a rechargeable battery.” *Id.* ¶¶ 42–43; *see id.* ¶¶ 31, 35, 48.

Chatterjee's Figure 4 (reproduced below) depicts an electronic device with an inductive signal interface inductively linked to another electronic device with a similar inductive signal interface:

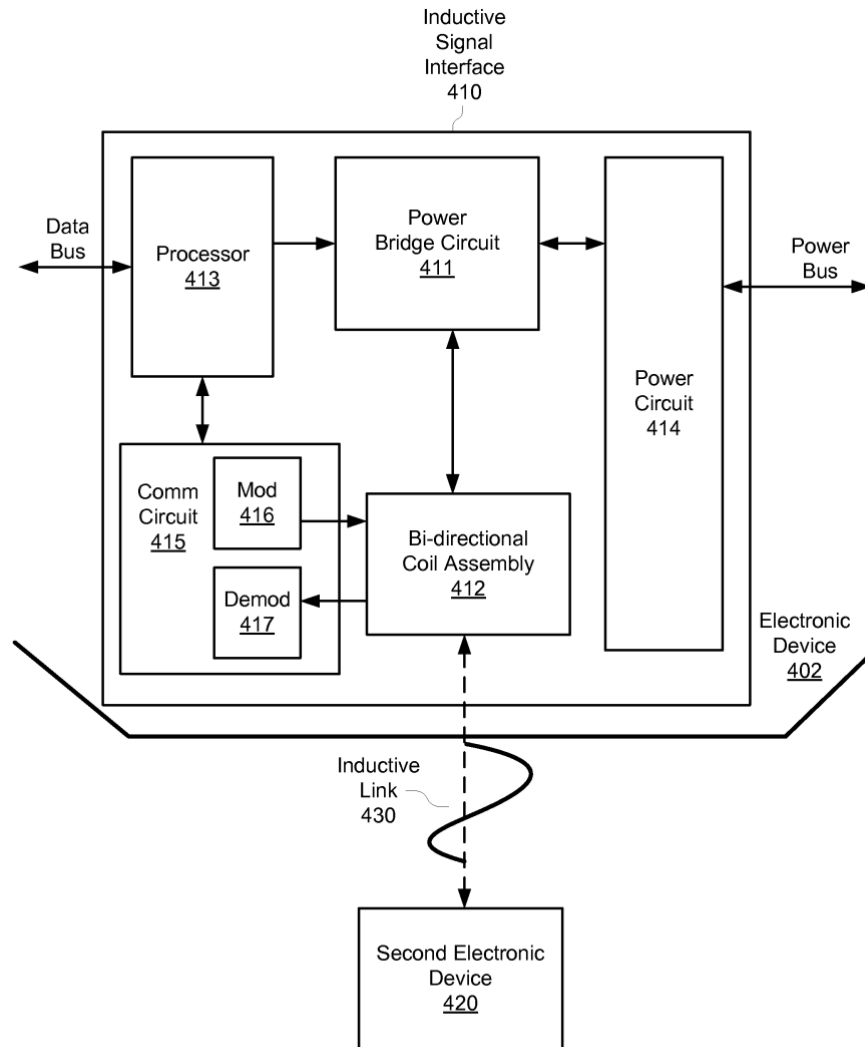


FIG. 4

Figure 4 illustrates electronic device 402 with inductive signal interface 410 including the following components:

- (1) power bridge circuit 411;
- (2) bi-directional coil assembly 412;
- (3) processor 413;

- (4) power circuit 414; and
- (5) communication circuit 415 with modulator 416 and demodulator 417.

Ex. 1003 ¶¶ 41, 51, Fig. 4. Electronic device 402 “uses the inductive signal interface 410 to form an inductive link 430 with a second electronic device 420” that “may also include an embodiment of inductive signal interface 410.” *Id.* ¶ 41, Fig. 4.

Inductive signal interface 410 may “selectively operate in either a power transmit mode or a power receive mode.” Ex. 1003 ¶ 42, code (57). Power bridge circuit 411 “forms separate circuits for when the inductive signal interface” operates “in the power transmit mode and in the power receive mode.” *Id.* ¶¶ 38, 44. For instance, “circuit elements are provided as branches, where two branches combine to route incoming and outgoing current over the inductive link.” *Id.* ¶ 38.

Bi-directional coil assembly 412 “is coupled to the power bridge circuit 411 to transmit and/or receive a power signal.” Ex. 1003 ¶ 45. Bi-directional coil assembly 412 “transmits power via the inductive link 430 to the second electronic device 420.” *Id.* ¶ 47.

Processor 413 determines “a mode of operation of the inductive signal interface 410” based on “identification and status information” transmitted over the inductive link. Ex. 1003 ¶ 55. Processor 413 may also “process communication data received from over the inductive link, or from other communication mediums.” *Id.*

Power circuit 414 handles “current received in either the power transfer mode or the power receive mode” and may include “one or more of: (i) voltage sensors, (ii) current sensors, (iii) voltage regulators, (iv) current

regulators, or (v) current clamps to regulate the voltage and current of the DC power signal.” Ex. 1003 ¶¶ 37, 44, 46. Power circuit 414 may “clamp current levels, regulate voltage levels or perform other treatment functions for incoming (power transmit mode) and outgoing power signal (power receive mode).” *Id.* ¶¶ 37, 44; *see id.* ¶ 46.

In the power transmit mode, “the output power signal of the power circuit 414 to the power bridge circuit 411” is “substantially a DC signal,” and “the power bridge circuit 411 performs DC to high-frequency conversion to output a high-frequency power signal to the bi-directional coil assembly 412.” Ex. 1003 ¶ 47. In the power receive mode, “the resulting power signal is a DC signal and is routed to: (i) charge a rechargeable battery within the electronic device 402, and/or (ii) provide power to circuit elements within the electronic device.” *Id.* ¶ 46.

Inductive signal interface 410 may “transfer data as well as power via the inductive link 430.” Ex. 1003 ¶ 48. The “data transmitted over the inductive link 430 includes data that corresponds to identification or status information of the electronic device 402 and/or the second electronic device 420.” *Id.*

Chatterjee discloses circuit-level embodiments of power bridge circuit 411 and bi-directional coil assembly 412. Ex. 1003 ¶¶ 11–14, 61, 68, 70, 72, Figs. 6A–6D.

Chatterjee's Figure 6A (reproduced below) depicts a circuit-level embodiment of power bridge circuit 411 and bi-directional coil assembly 412:

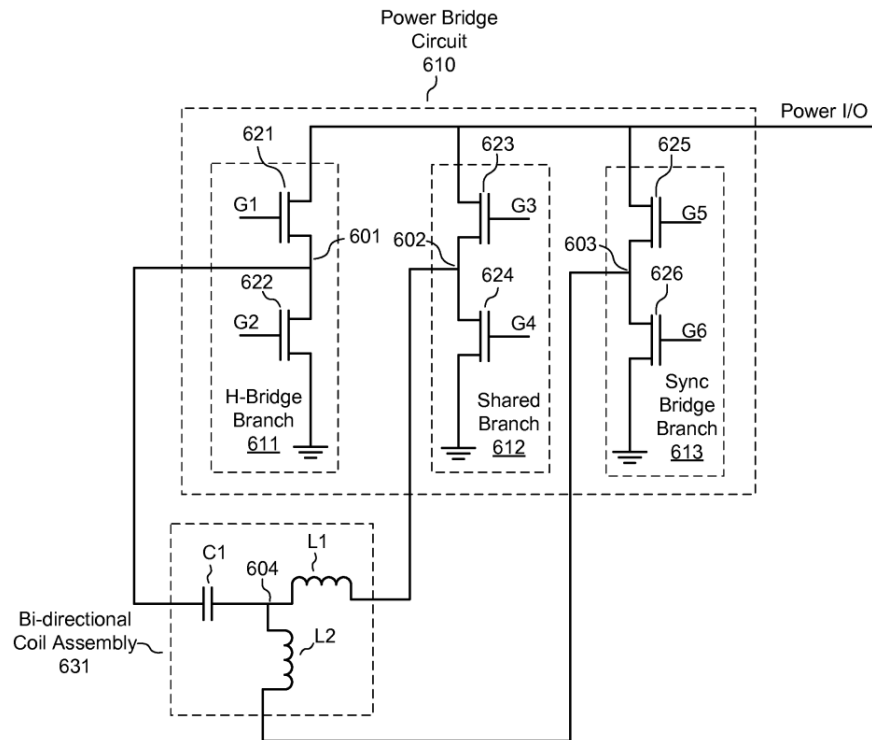


FIG. 6A

Figure 6A illustrates power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil assembly 631 with capacitor C1, inductive coil L1, and inductive coil L2.

Ex. 1003 ¶¶ 61–62, Fig. 6A. The inductive coils “can form an inductive link with an [sic] second electronic device to transfer power and/or data.” *Id.*

¶ 62.

Power bridge circuit 610 “has a power input/output (I/O) to receive or transmit a DC current.” Ex. 1003 ¶ 61, Fig. 6A; *see id.* ¶ 30. “Each of the three branches is coupled to the power I/O and includes two serially-connected switches.” *Id.* ¶ 61, Fig. 6A.

Power bridge circuit 610 includes switches as follows:

- (1) “H-bridge branch 611 includes switches 621 and 622 which are connected at a node 601 and are controlled by signals G1 and G2 respectively”;
- (2) “shared branch 612 includes switches 623 and 624 which are connected at a node 602 and are controlled by signals G3 and G4 respectively”; and
- (3) “sync bridge branch 613 includes switches 625 and 626 which are connected at a node 603 and are controlled by signals G5 and G6 respectively.”

Ex. 1003 ¶ 61, Fig. 6A.

Signals G1–G6 control the operation of power bridge circuit 610 in both the power transmit mode and the power receive mode. Ex. 1003 ¶ 63. In the power transmit mode, “two of the three branches operate to form an H-bridge circuit,” i.e., an H-bridge inverter circuit, and “the power I/O transmits an input DC current to the power bridge circuit 610.” *Id.* ¶ 64, claim 3; *see id.* ¶¶ 3, 6, Fig. 1. In the power receive mode, “two of the three branches operate to form a synchronous bridge rectifier circuit,” and “the power I/O transmits an output DC current from the power bridge circuit 610.” *Id.* ¶ 65, claim 4; *see id.* ¶¶ 4, 7, Fig. 2.

By selectively controlling H-bridge branch 611 and sync bridge branch 613, “the power bridge circuit 610 is configurable to selectively turn off current paths in the bi-directional coil assembly 631 to change the impedance of the bi-directional coil assembly 631 based on the mode of operation of the inductive signal interface.” Ex. 1003 ¶ 66.

Chatterjee's Figure 6B (reproduced below) depicts another circuit-level embodiment of power bridge circuit 411 and bi-directional coil assembly 412:

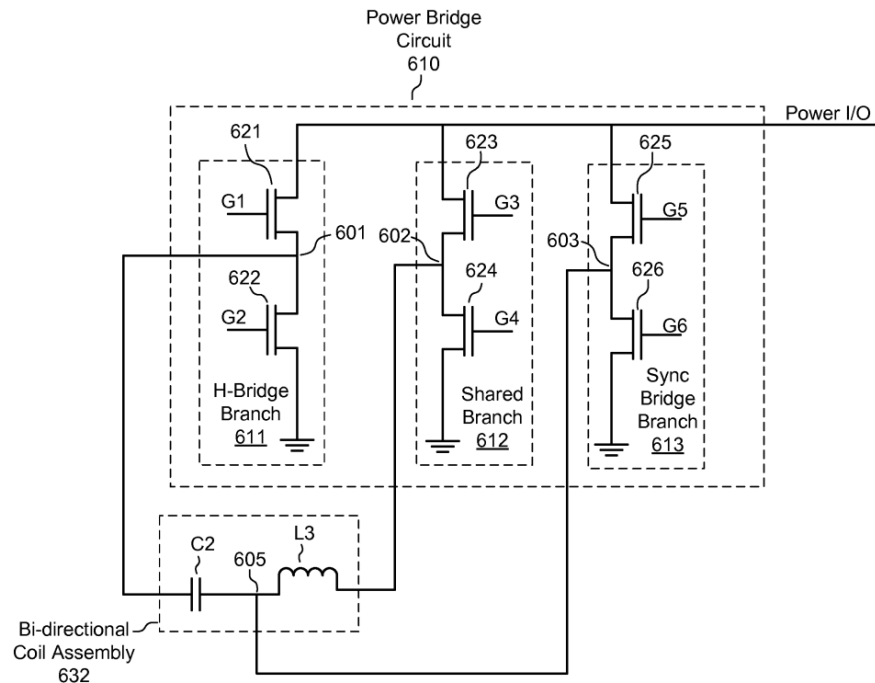


FIG. 6B

Figure 6B illustrates power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil assembly 632 with capacitor C2 and inductive coil L3. Ex. 1003 ¶¶ 68–69, Fig. 6B. Power bridge circuit 610 has the same structure in Figures 6A and 6B. *See id.* ¶¶ 61, 68, Figs. 6A–6B.

In Figure 6B, power bridge circuit 610 selectively controls current paths through bi-directional coil assembly 632 in both the power transmit mode and the power receive mode. Ex. 1003 ¶¶ 68–69, Fig. 6B. “In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 632 is the series combination of the capacitor C2 and the inductive coil L3.” *Id.* ¶ 69. “In

the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 632 is the inductive coil L3.” *Id.*

Chatterjee’s Figure 6D (reproduced below) depicts another circuit-level embodiment of power bridge circuit 411 and bi-directional coil assembly 412:

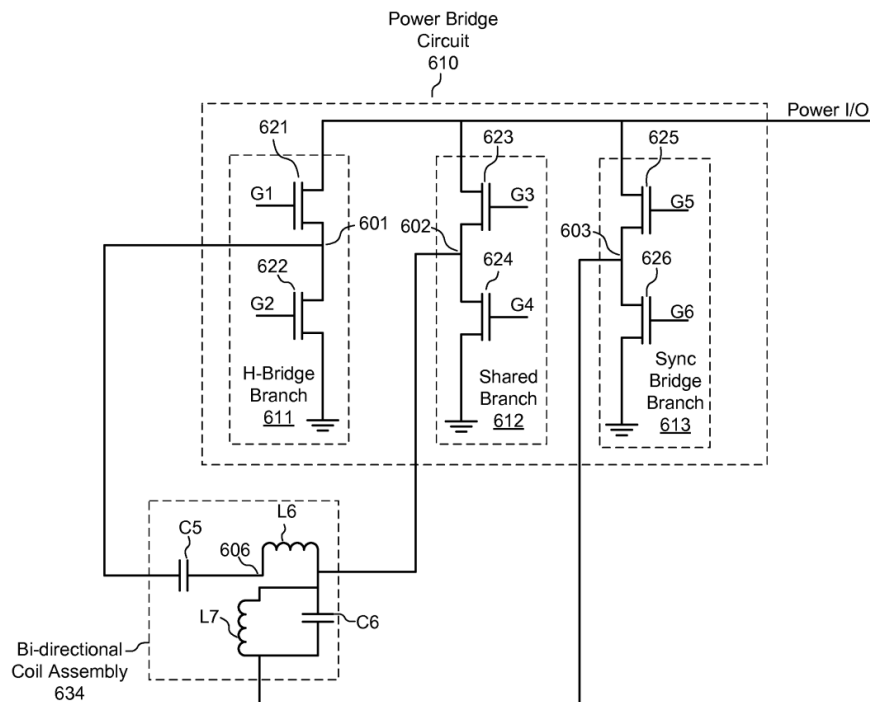


FIG. 6D

Figure 6D illustrates power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil assembly 634 with capacitor C5, capacitor C6, inductive coil L6, and inductive coil L7. Ex. 1003 ¶¶ 72–73, Fig. 6D. Power bridge circuit 610 has the same structure in Figures 6A, 6B, and 6D. *See id.* ¶¶ 61, 68, 72, Figs. 6A–6B, 6D.

In Figure 6D, power bridge circuit 610 selectively controls current paths through bi-directional coil assembly 634 in both the power transmit

mode and the power receive mode. Ex. 1003 ¶¶ 72–73, Fig. 6B. “In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 634 is the series combination of the capacitor C5 and the inductive coil L6.” *Id.* ¶ 73. “In the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 634 is [the] parallel combination of the inductive coil L7 and the capacitor C6.” *Id.*

Chatterjee’s Figure 10 (reproduced below) depicts a power bridge circuit and a bi-directional coil assembly coupled to other circuitry:

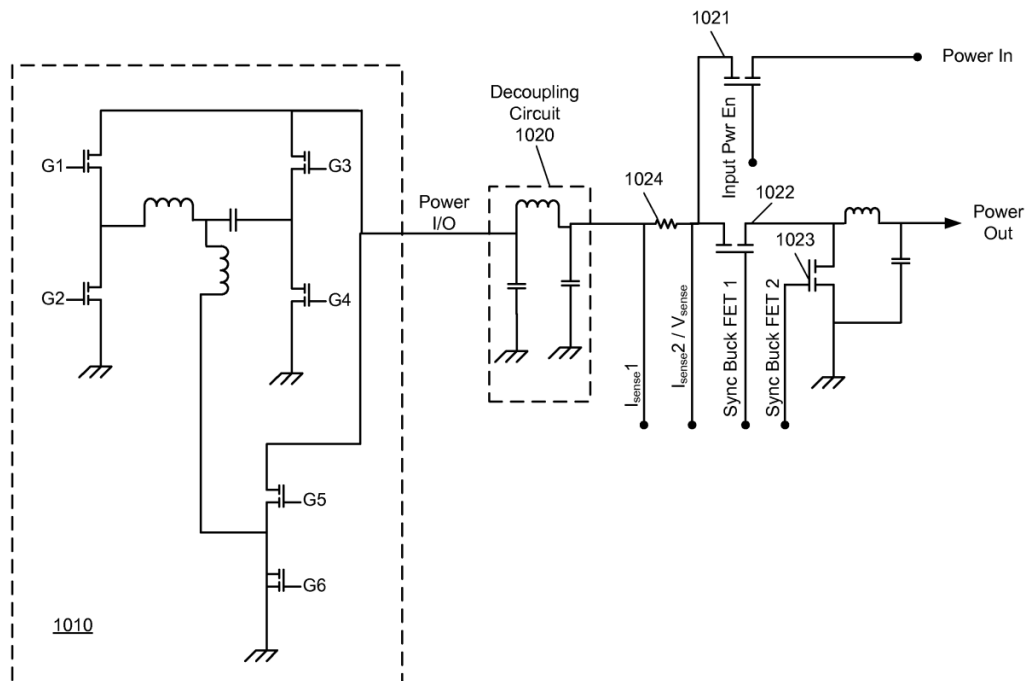


FIG. 10

Figure 10 “illustrates a power bridge circuit and a bi-directional coil assembly” (identified collectively by reference numeral 1010) coupled to a power circuit including decoupling circuit 1020, switch 1021, transistor 1022, transistor 1023, and resistor 1024. Ex. 1003 ¶¶ 27, 89, Fig. 10; *see id.* ¶¶ 37, 44, 46.

Decoupling circuit 1020 “operates to act as a filter for certain signal frequencies and prevents those signals from passing through.” Ex. 1003 ¶ 89. Decoupling circuit 1020 “is coupled to a resistor 1024” arranged between the probe nodes I_{sense1} and $I_{\text{sense2}}/V_{\text{sense}}$. *Id.* ¶ 89, Fig. 10. The probe nodes “are used to measure the current and voltage of the signal carried by the resistor 1024” and “may be used to adjust the operation of the power bridge circuit and bi-directional coil assembly combination 1010.” *Id.* ¶ 89.

Chatterjee states that it incorporates Corbridge by reference “in its entirety.” Ex. 1003 ¶¶ 34, 48. Additionally, Chatterjee discusses Corbridge’s “[s]pecific examples of the type of data that can be communicated over using the inductive signal interface.” *Id.* ¶ 48. As examples of the type of data communicated according to Corbridge, Chatterjee identifies “data to implement parts of the communication protocol, such as detecting presence of the second device, authenticating itself and/or the second device, and enumerating itself.” *Id.*

2. OVERVIEW OF CORBRIDGE (EXHIBIT 1004)

Corbridge is a U.S. patent application publication titled “Inductive Signal Transfer System for Computing Devices,” filed on June 4, 2009, and published on April 1, 2010. Ex. 1004, codes (12), (22), (43), (54). Corbridge identifies deficiencies in conventional “insertive male/female connectors” used with mobile computing devices. *See id.* ¶¶ 4–5.

Corbridge endeavors to address those deficiencies by providing “a framework by which two or more computing devices (e.g. mobile computing device and/or docking station) are enabled to transfer power and/or data signals without use of exterior connectors (i.e. is ‘connector-less’).” Ex. 1004 ¶ 28; *see id.* at code (57). Specific implementations include “two

computing devices being brought into contact or proximity for purpose of at least one device signaling power and/or data to the other device using a ‘connector-less’ signal exchange.” *Id.* ¶ 28.

For instance, “two devices inductively exchange power and data,” with a first device “inductively transmitting a power signal to a second device,” and the first device receiving “feedback from the second device in order to regulate the power signal.” Ex. 1004 ¶ 27, code (57). Additionally, “a communication protocol may be established to enable the real-time regulation of the power signal based on power conditions existing on the device receiving the power signal.” *Id.* ¶ 27.

Corbridge’s Figure 7A (reproduced below) is a simplified block diagram of a mobile computing device having components for implementing an inductive signal transfer system in combination with another device:

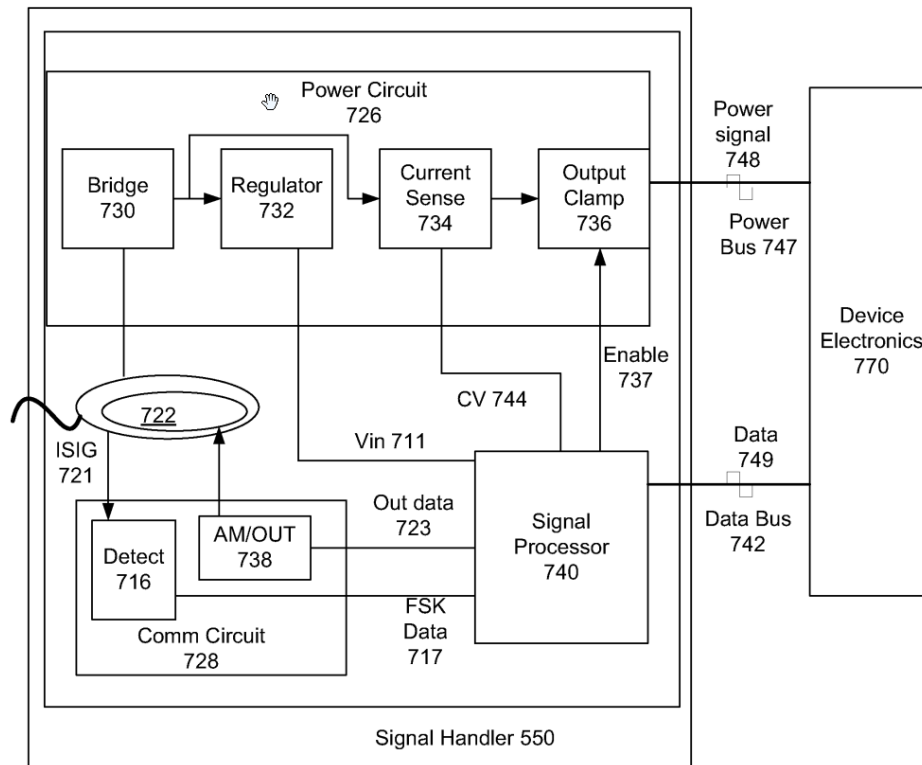


FIG. 7A

Figure 7A illustrates signal handing resource 550 including the following components:

- (1) “one or more coils 722 that form a terminal of a corresponding inductive signal path” and receive incoming inductive signal 721;
- (2) power circuits 726 with bridge 730, regulator 732, current-sense circuit 734, and output clamp 736;
- (3) communication circuits 728 with Frequency Shift Key (FSK) detector 716 and AM modulation 738 (or “alternatively FM modulation”); and
- (4) “signal processor 740 (CPU or processing resources)” programmed to “implement a protocol for controlled use of power and exchange of data across the inductive link.”

Ex. 1004 ¶¶ 80, 83–84, Fig. 7A.

In particular, “signal processor 740 (i) implements a protocol by which data may be communicated and/or interpreted through the inductive signal path, enabled in part through the coil 722; and (ii) controls receiving/communicating power.” Ex. 1004 ¶ 80.

In “one or more embodiments,” a synchronous bridge “outputs unregulated DC signal” to both regulator 732 and current-sense circuit 734. Ex. 1004 ¶ 83. Then, current-sense circuit 734 “signals current values 744 to the processor 740, which switches on or off the output clamp 736.” *Id.* For example, “output clamp 736 may act as a voltage regulator or ‘buck’ converter” to “regulate the voltage to the device electronics.” *Id.*

Corbridge’s Figure 11 (reproduced below) depicts a signaling sequence between a power supply device (PSD) and a power receiving device (PRD) with various steps that enable the two devices to inductively link to one another:

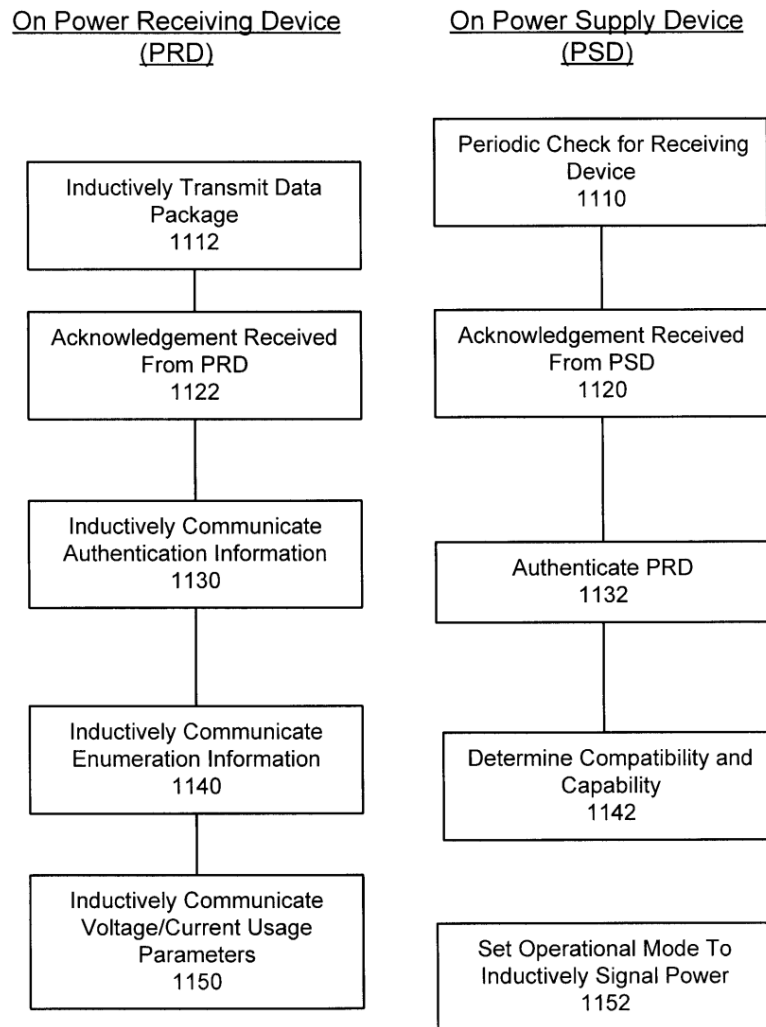


FIG. 11

Figure 11 illustrates steps performed by a power supply device and a power receiving device that enable the two devices to “inductively link to one another under a controlled protocol or process.” Ex. 1004 ¶¶ 23, 109, Fig. 11. Specifically, the power supply device performs steps 1110, 1120, 1132, 1142, and 1152, and the power receiving device performs steps 1112, 1122, 1130, 1140, and 1150. *Id.* ¶¶ 109–113, Fig. 11.

In step 1110, “the power supply device makes a periodic check as to whether the power receiving device is inductively linked.” Ex. 1004 ¶ 110,

Fig. 11. For example, the power supply device “checks to see whether an inductively triggered charge has been triggered on its coil.” *Id.* ¶ 110.

In step 1112, “the power receiving device is placed on or near the power supply device, and the power receiving device triggers an inductive signal on the power supply device.” Ex. 1004 ¶ 110, Fig. 11. In step 1120, “the power supply device acknowledges the other device.” *Id.* ¶ 110, Fig. 11. In step 1122, “the power receiving device processes the acknowledgment.” *Id.* ¶ 110, Fig. 11.

In step 1130, “the power receiving device inductively communicates authentication information to the power supply device.” Ex. 1004 ¶ 111, Fig. 11. In step 1132, “the power supply device signals back corresponding authentication information.” *Id.* ¶ 111, Fig. 11.

In step 1140, “the power receiving device communicates enumeration information using the inductive link,” and “the power supply device communicates its enumeration information.” Ex. 1004 ¶ 112, Fig. 11. The enumeration information may:

- (1) “identify hardware, firmware or software”;
- (2) “identify whether compatibility issues exist between the two devices”;
- (3) “enable one or both devices to identify the other device by type”; and
- (4) “enable [the] devices to select performance level or operations, functionality, communication protocol or other aspects for the two devices to communicate or transfer power.”

Id. ¶ 112.

In step 1150, “the power receiving device communicates information about its voltage/current usage.” Ex. 1004 ¶ 113, Fig. 11. In step 1152, “the

power supply device receives the information and regulates its power output based on identifying the needs or power levels of the power receiving device.” *Id.* ¶ 113, Fig. 11. “The exchange of information forms a feedback loop that enables the power receiving device to signal power across the inductive link under a process that is controlled based on information supplied from the power receiving device.” *Id.* ¶ 113.

3. INDEPENDENT CLAIM 1

(a) Preamble 1.p

Claim 1’s preamble reads as follows:

[a] dual mode wireless power receiver configured to selectively apply a received power to a load device and utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary wireless power receiver to cause an action or transaction or charge said secondary wireless power receiver’s load device, said dual mode wireless power receiver comprising.

Ex. 1001, 27:2–9.

Petitioner contends that claim 1’s preamble limits the claim because “it gives life, meaning, and vitality” to the claim. Pet. 16 (quoting *Bristol-Myers Squibb Co. v. Ben Venue Lab ’ys, Inc.*, 246 F.3d 1368, 1373 (Fed. Cir. 2001)). Petitioner contends that Chatterjee teaches claim 1’s preamble because Chatterjee discloses electronic device 402 including inductive signal interface 410 that corresponds to the claimed “dual mode wireless power receiver.” *See id.* at 16–17 (citing Ex. 1003 ¶¶ 29–30, 41, 46, Fig. 4).

Further, Petitioner asserts that Chatterjee’s inductive signal interface 410:

- (1) “form[s] an inductive link 430 with a second electronic device” having “a similarly structured inductive signal interface”;

- (2) selectively operates “in either a power transmit mode or a power receive mode”;
- (3) “receives power over the inductive link 430 from the second electronic device” in the power receive mode;
- (4) “outputs power received over the inductive link” to a load device, e.g., a rechargeable battery, in the power receive mode;
- (5) handles an “incoming power signal originating from a power source,” e.g., a battery unit, in the power transmit mode;
- (6) uses the incoming power signal to “transmit the power to the second electronic device [] over the inductive link” in the power transmit mode;
- (7) includes bi-directional coil assembly 412 “coupled to the communication circuit 415 to receive and transmit modulated data signals”; and
- (8) includes processor 413 that may “process identification and status information transmitted over the inductive signal [link] 430 to determine a mode of operation of the inductive signal interface 410.”

Pet. 16–21 (alterations by Petitioner) (quoting Ex. 1003 ¶¶ 33, 35, 37, 41, 45–46, 55, code (57)).⁵

Based on those disclosures in Chatterjee, Petitioner asserts that an ordinarily skilled artisan would have understood that Chatterjee’s inductive signal interface 410 is configured to “selectively apply a received power to a load device and utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary

⁵ Petitioner uses various colors to denote various components depicted in the drawings and uses the same colors for the corresponding text. *See, e.g.*, Pet. 15–29. This decision omits Petitioner’s text coloring.

wireless power receiver” to “charge said secondary wireless power receiver’s load device” according to claim 1’s preamble. Pet. 18–21 (emphases omitted) (citing Ex. 1001, 8:11–15; Ex. 1002 ¶¶ 94, 96–97, 100; Ex. 1003 ¶¶ 34, 37, 41, 45, 48, 53, 55).

Patent Owner agrees with Petitioner that claim 1’s preamble limits the claim. Resp. 5. Patent Owner makes no arguments specific to claim 1’s preamble. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches claim 1’s preamble. *See* Pet. 16–21; Ex. 1002 ¶¶ 93–100.

(b) Limitation 1.a

Claim 1 recites “one of coil and capacitor electrodes.” Ex. 1001, 27:10 (limitation 1.a).

Petitioner contends that Chatterjee teaches limitation 1.a because Chatterjee’s inductive signal interface 410 includes bi-directional coil assembly 412 with one or more inductive coils configurable to form “the inductive link 430 with the second electronic device 420 . . . to transmit and/or receive a power signal.” Pet. 22–23 (alteration by Petitioner) (quoting Ex. 1003 ¶¶ 30, 45). Petitioner contends that bi-directional coil assembly 412:

- (1) receives “power over the inductive link 430 from the second electronic device” in the power receive mode; and
- (2) carries “the modulated power signal to the second electronic device” in the power transmit mode.

Id. at 23–24 (quoting Ex. 1003 ¶¶ 46–47).

Further, Petitioner asserts that an ordinarily skilled artisan would have understood that the “coil” in Chatterjee’s bi-directional coil assembly corresponds to a “coil” according to limitation 1.a. Pet. 24 (citing Ex. 1002 ¶¶ 101–106).

Patent Owner asserts that a “coil” according to limitation 1.a is separate from the claimed “impedance network” and also separate from the claimed “switch network.” *See* Resp. 2, 31–33, 47–48.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches limitation 1.a. *See* Pet. 22–24; Ex. 1002 ¶¶ 74–75, 102–106, 113. For instance, Chatterjee discloses several circuit-level embodiments of bi-directional coil assembly 412 that have at least one inductive coil as follows:

- (1) bi-directional coil assembly 631 in Figure 6A with inductive coil L1 and inductive coil L2;
- (2) bi-directional coil assembly 632 in Figure 6B with inductive coil L3;
- (3) bi-directional coil assembly 633 in Figure 6C with inductive coil L4 and inductive coil L5; and
- (4) bi-directional coil assembly 634 in Figure 6D with inductive coil L6 and inductive coil L7.

Ex. 1003 ¶¶ 11–14, 61–62, 68, 70, 72, Figs. 6A–6D; *see* Ex. 1002 ¶¶ 74–75, 113.

Further, as explained in more detail below, Chatterjee’s bi-directional coil assembly includes a “coil” according to limitation 1.a that is separate from the circuitry corresponding to the claimed “impedance network” and also separate from the circuitry corresponding to the claimed “switch network.” Ex. 1003 ¶¶ 61–66, 68–73, 81–86, Figs. 4, 6A–6D, 8A–8D; *see*

Ex. 1002 ¶¶ 113–115, 121–126; Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1021 ¶ 43; *infra* §§ III.D.3(c)(iii).a–b.

(c) Limitation 1.b

Claim 1 recites “a first circuitry comprising: an impedance network; a switch network; a filter capacitor.” Ex. 1001, 27:11–14 (limitation 1.b).

(i) Petitioner’s Contentions

Petitioner contends that Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 1.b obvious because Chatterjee’s inductive signal interface 410 includes circuitry corresponding to the claimed “impedance network,” “switch network,” and “filter capacitor.” *See* Pet. 25–34.

a. “Impedance Network”

First, for the claimed “impedance network,” Petitioner notes that the ’339 patent describes “the impedance network 101 as comprising ‘one or more of passive electronic components, for example, a resistor, a capacitor.’” Pet. 26 (quoting Ex. 1001, 9:4–6). Petitioner also notes that the ’339 patent’s Figure 10E shows impedance network 101 as comprising single capacitor Cs connected in series with coil 106. *Id.* at 26–27.

Petitioner then contends that Chatterjee’s Figure 6B shows bi-directional coil assembly 632 with “a capacitor C2 between node[s] 601 and 605 and a wire between node[s] 603 and 605 that can each be connected with the inductive coil L3 in series for use under different modes.” Pet. 27–28. Petitioner also contends that Chatterjee’s power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 “is configurable to selectively turn off current paths in the bi-directional coil assembly [] to change the impedance of the bi-directional coil assembly.”

Id. at 28 (alteration by Petitioner) (quoting Ex. 1003 ¶ 66). As support, Petitioner quotes Chatterjee’s disclosure about power bridge circuit 610 selectively controlling current paths through bi-directional coil assembly 632 as follows:

In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 632 is the series combination of the capacitor C2 and the inductive coil L3. In the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 632 is the inductive coil L3.

Id. at 28–29 (quoting Ex. 1003 ¶ 69).

Referencing Chatterjee’s Figure 6B, Dr. Phinney explains that “Chatterjee’s bi-directional coil assembly discloses the claimed ‘impedance network’ such as by providing a capacitor C2 with capacitive impedance and a wire with no impedance that can each be selectively connected with the inductive coil under different modes to provide variable impedance under different modes.” Ex. 1002 ¶ 115 (emphasis omitted). Further, referencing Chatterjee’s Figure 6D, Dr. Phinney explains that capacitor C5 and capacitor C6 in bi-directional coil assembly 634 correspond to an “impedance network” comprising “two or more” components. Ex. 1015 ¶ 64; *see id.* ¶¶ 75, 111, 121; Ex. 1021 ¶ 43.

b. “Switch Network”

Second, for the claimed “switch network,” Petitioner notes that the ’339 patent “discloses a switch network that ‘is configured as an inverter’ in the communication mode and ‘is configured as a rectifier’ in the charging mode.” Pet. 29 (citing Ex. 1001, 2:62–67). Petitioner also notes that the ’339 patent’s Figure 10A shows switch network 102 as comprising “four switches S3, S4, S5, and S6.” *Id.*

Petitioner then contends that Chatterjee’s power bridge circuit 610 “operates to form a rectifier circuit in the power receive mode and operates to form an inverter circuit in the power transmit mode.” Pet. 30.

Specifically, Petitioner asserts that:

- (1) in the power transmit mode, the power bridge circuit’s “left two branches 611 and 612 are connected while the rightmost branch 613 is disconnected” with “switches 621–624 (forming an H-bridge circuit) configured to operate as an inverter”; and
- (2) in the power receive mode, the power bridge circuit’s “right two branches 612 and 613 are connected while the leftmost branch 611 is disconnected” with “switches 623–626 configured to operate as a rectifier.”

Id. at 30–31 (citing Ex. 1002 ¶¶ 74–75, 122–125; Ex. 1003 ¶ 69).

Further, Petitioner asserts that an ordinarily skilled artisan “would have understood that Chatterjee’s power bridge circuit 610 discloses the claimed ‘switch network’ because it comprises switches operating as an inverter or a rectifier in the same way as the ‘switch network’ of the ’339 patent.” Pet. 32 (citing Ex. 1002 ¶¶ 117–126).

c. “Filter Capacitor”

Third, for the claimed “filter capacitor,” Petitioner asserts that Chatterjee discloses a power circuit “to handle current received in either the power transfer mode or the power receive mode,” such as “to clamp current levels, regulate voltage levels or perform other treatment functions for incoming (power transmit mode) and outgoing power signal (power receive mode).” Pet. 33 (quoting Ex. 1003 ¶¶ 37, 44). Petitioner asserts that Chatterjee’s Figure 10 shows a power circuit including decoupling circuit 1020 with one inductor and two capacitors. *Id.* at 33–34. According

to Petitioner, decoupling circuit 1020 “operates to act as a filter for certain signal frequencies and prevents those signals from passing through.” *Id.* at 33 (quoting Ex. 1003 ¶ 89).

As support, Petitioner provides a highlighted version of Chatterjee’s Figure 10 as reproduced below (Pet. 34):

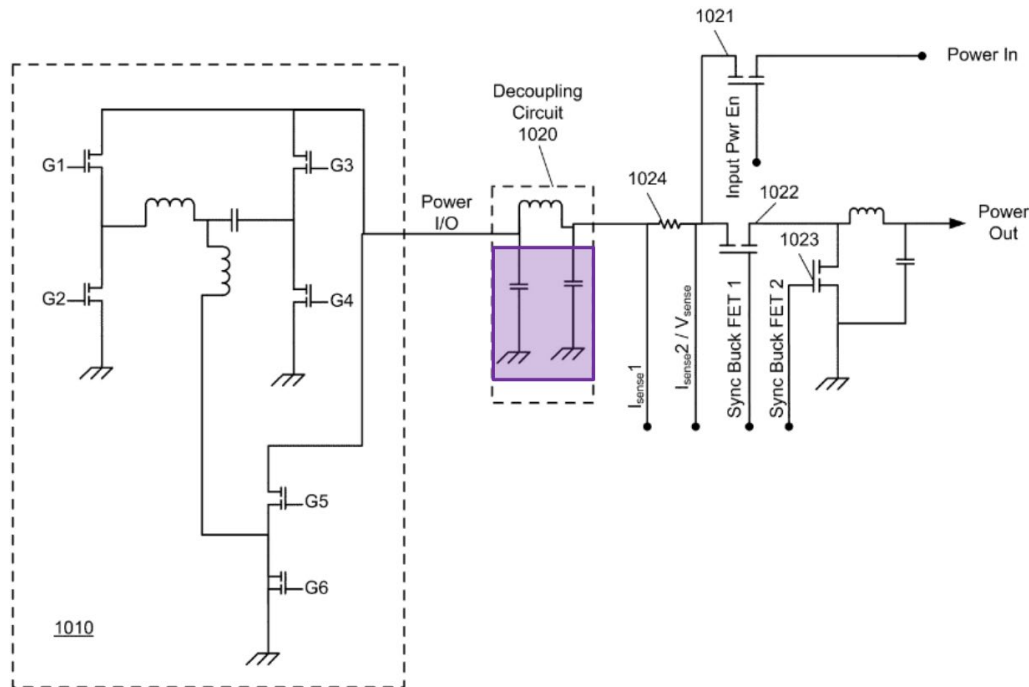


FIG. 10

Figure 10 “illustrates a power bridge circuit and a bi-directional coil assembly” (identified collectively by reference numeral 1010) coupled to a power circuit including decoupling circuit 1020, switch 1021, transistor 1022, transistor 1023, and resistor 1024. Ex. 1003 ¶¶ 27, 89, Fig. 10; *see id.* ¶¶ 37, 44, 46. The above highlighted version of Figure 10 has purple highlighting over the decoupling circuit’s two capacitors. *See* Pet. 34; Ex. 1002 ¶ 128.

Further, Petitioner asserts that an ordinarily skilled artisan “would have understood that the capacitors in the decoupling circuit disclose a filter

capacitor because they operate to filter certain signal frequencies.” Pet. 34 (citing Ex. 1002 ¶ 129).

(ii) Patent Owner’s Contentions

Patent Owner disputes that Chatterjee teaches limitation 1.b. *See* Resp. 2, 51–64. In particular, Patent Owner contends that “neither Chatterjee nor Corbridge alone or in combination disclose an ‘impedance network’ separate from the ‘coil’ and ‘switch network’ that can be ‘configured to change impedance’ during the receiving power mode.” *Id.* at 2. Patent Owner also contends that the inductive coils in Chatterjee’s bi-directional coil assemblies 631–634 in Figures 6A–6D, respectively, “cannot also be counted, in the attempt to apply the claims to the circuits of Chatterjee, as part of the ‘impedance network’ since ‘coil’ and ‘first circuitry’ including ‘impedance network’ are required to be separate elements” in claim 1. *Id.* at 52 (emphases omitted).

Referencing Chatterjee’s Figure 6B, Patent Owner asserts that the single capacitor C2 in bi-directional coil assembly 632 “does not constitute an ‘impedance network’ under” Patent Owner’s proposed construction for that term. Resp. 53; *see id.* at 55; Mot. 22.

Referencing Chatterjee’s Figure 6C, Patent Owner asserts that capacitor C3 and capacitor C4 in bi-directional coil assembly 633 do not alone “provide the functionality” required by limitation 1.e because “at least one additional active element or switch (independent of the ‘switch network’) would be required to change impedance” during the receiving power mode. Resp. 54 (citing Ex. 2003 ¶¶ 150–152). Patent Owner makes a similar assertion about capacitor C5 and capacitor C6 in bi-directional coil assembly 634 in Figure 6D. *Id.*

Additionally, regarding capacitor C3 and capacitor C4 in bi-directional coil assembly 633 in Figure 6C, Patent Owner asserts that in the receiving power mode (1) no current flows through capacitor C3, (2) capacitor C3 does not constitute part of the circuit, (3) only capacitor C4 could be considered part of the “impedance network,” and (4) capacitor C4 is not “configured to have its impedance changed.” Resp. 61 (citing Ex. 2003 ¶ 158). As support, Patent Owner provides a highlighted version of Figure 6C as reproduced below (Resp. 60):

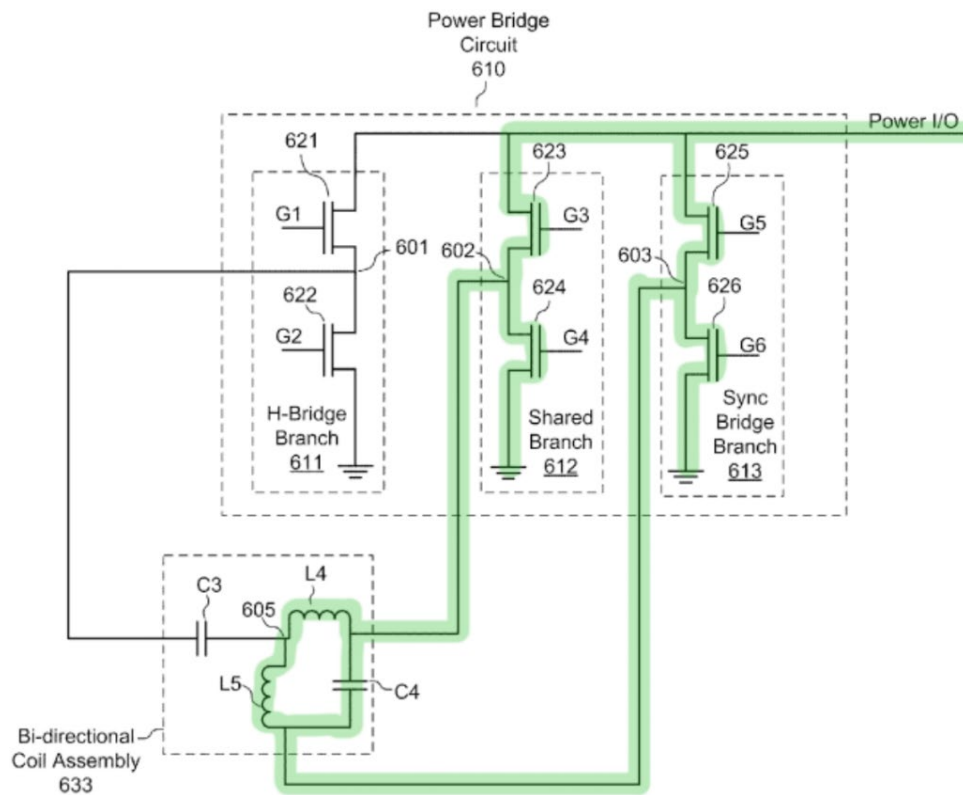


FIG. 6C

Figure 6C illustrates power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil assembly 633 with capacitor C3, capacitor C4, inductive coil L4, and inductive coil L5. Ex. 1003 ¶¶ 70–71, Fig. 6C. The above highlighted version of Figure 6C includes green highlighting over shared branch 612,

sync bridge branch 613, capacitor C4, inductive coil L4, and inductive coil L5. *See* Resp. 60; Ex. 2003 ¶ 158.

Similarly, regarding capacitor C5 and capacitor C6 in bi-directional coil assembly 634 in Figure 6D, Patent Owner asserts that in the receiving power mode (1) no current flows through capacitor C5, (2) capacitor C5 does not constitute part of the circuit, (3) only capacitor C6 could be considered part of the “impedance network,” and (4) capacitor C6 is not “configured to have its impedance changed.” Resp. 62–63 (citing Ex. 2003 ¶ 159). As support, Patent Owner provides a highlighted version of Figure 6D as reproduced below (Resp. 62):

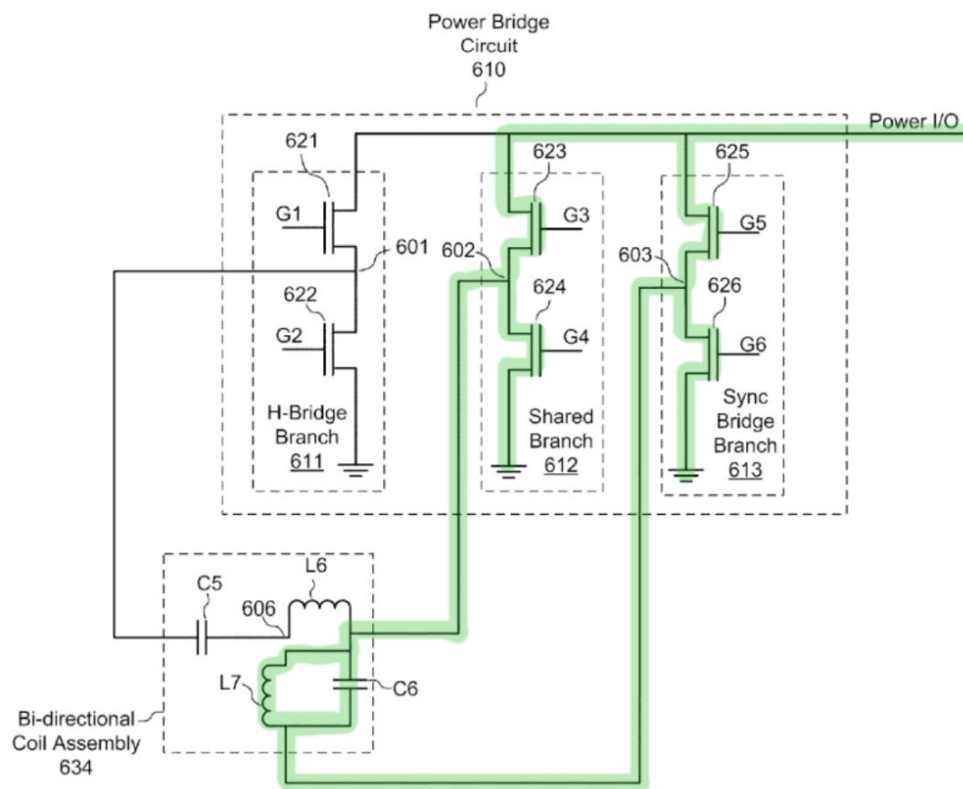


FIG. 6D

Figure 6D illustrates power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil assembly 634 with capacitor C5, capacitor C6, inductive coil L6, and

inductive coil L7. Ex. 1003 ¶¶ 72–73, Fig. 6D. The above highlighted version of Figure 6D includes green highlighting over shared branch 612, sync bridge branch 613, capacitor C6, and inductive coil L7. *See* Resp. 62; Ex. 2003 ¶ 159.

Patent Owner summarizes by asserting that the power bridge circuits and bi-directional coil assemblies in Chatterjee’s Figures 6A–6D do not disclose an “impedance network” as properly construed because those circuits do not include “two or more” passive components. Resp. 63.

(iii) Analysis

For the reasons explained below, we agree with Petitioner that Chatterjee teaches limitation 1.b. *See* Pet. 25–34; Ex. 1002 ¶¶ 69, 75, 99, 104, 107–131; Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1021 ¶ 43.

a. “Impedance Network”

First, for the reasons discussed above, we disagree with Patent Owner’s proposed constructions for “impedance network.” *See* Resp. 36, 48, 52–53; Sur-reply 24; *supra* § III.C.3(c). Further, for the reasons discussed above, the claimed “impedance network” encompasses one or more “passive electronic components,” e.g., a single resistor or a single capacitor. Ex. 1001, 9:4–11, 21:27–26:7, Figs. 10A–10H; *see* Ex. 1002 ¶ 111; *supra* § III.C.3(c).

Chatterjee discloses inductive signal interface 410 including bi-directional coil assembly 412. Ex. 1003 ¶ 41, Fig. 4; *see* Ex. 1002 ¶¶ 69, 99. Bi-directional coil assembly 412 is:

- (1) “configurable to form the inductive link 430 with the second electronic device 420”;
- (2) “coupled to the power bridge circuit 411 to transmit and/or receive a power signal”; and

- (3) “coupled to the communication circuit 415 to receive and transmit modulated data signals.”

Ex. 1003 ¶ 45, Fig. 4; *see* Ex. 1002 ¶¶ 69, 99, 104.

Chatterjee discloses four circuit-level embodiments of bi-directional coil assembly 412, with each embodiment having various components, i.e., assembly 631 in Figure 6A, assembly 632 in Figure 6B, assembly 633 in Figure 6C, and assembly 634 in Figure 6D. Ex. 1003 ¶¶ 11–14, 61–62, 68, 70, 72, Figs. 6A–6D; *see* Ex. 1002 ¶¶ 74–75, 113. For example, bi-directional coil assembly 632 in Figure 6B “includes a capacitor C2 and an inductive coil L3.” Ex. 1003 ¶ 68, Fig. 6B; *see* Ex. 1002 ¶¶ 75, 113.

Chatterjee explains how power bridge circuit 610 selectively controls current paths through bi-directional coil assembly 632 in both the power transmit mode and the power receive mode. Ex. 1003 ¶¶ 68–69, Fig. 6B; *see* Ex. 1002 ¶ 114. “In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 632 is the series combination of the capacitor C2 and the inductive coil L3.” Ex. 1003 ¶ 69; *see* Ex. 1002 ¶ 114. “In the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 632 is the inductive coil L3.” Ex. 1003 ¶ 69; *see* Ex. 1002 ¶ 114. As Dr. Phinney explains, “Chatterjee’s bi-directional coil assembly discloses the claimed ‘impedance network’ such as by providing a capacitor C2 with capacitive impedance and a wire with no impedance that can each be selectively connected with the inductive coil under different modes to provide variable impedance under different modes.” Ex. 1002 ¶ 115 (emphasis omitted).

As noted above, H-bridge branch 611 is turned off in the power receive mode such that no current flows through capacitor C2 in bi-directional coil assembly 632 in that mode. Ex. 1003 ¶ 69; *see* Resp. 59–60; *supra* § III.D.1. The absence of current flow through capacitor C2 in that mode does not matter because claim 1 does not require current flow through any particular part of the “impedance network” during any particular mode. *See* Ex. 1001, 27:2–43. Claim 1 does not specify how the “impedance network” functions in either the communication mode or the charging mode (the power receive mode). *See id.*

Additionally, we discern no material differences among the following with respect to the claimed “impedance network”:

- (1) the “impedance network” with single capacitor C1 in Chatterjee’s bi-directional coil assembly 631 in Figure 6A;
- (2) the “impedance network” with single capacitor C2 in Chatterjee’s bi-directional coil assembly 632 in Figure 6B;
- (3) the “impedance network” with single capacitor C_p in the ’339 patent’s Figure 10C; and
- (4) the “impedance network” with single capacitor C_s in the ’339 patent’s Figures 10E, 10F, and 10H.

See Ex. 1001, 22:53–54, 24:5–7, 24:44–45, 25:52–54, Figs. 10C, 10E–10F, 10H; Ex. 1002 ¶¶ 111, 113–115; Ex. 1003 ¶¶ 61–66, 68–69, Figs. 6A–6B.

Further, in bi-directional coil assembly 632 in Figure 6B, inductive coil L3 is separate from capacitor C2 corresponding to the claimed “impedance network” and also separate from power bridge circuit 610 corresponding to the claimed “switch network.” Ex. 1003 ¶¶ 68–69,

Fig. 6B; *see* Ex. 1002 ¶¶ 113–115, 121–126; *infra* § III.D.3(c)(iii).b.

Among other things, capacitor C2 “is coupled to the H-bridge branch 611” at node 601, and inductor L3 “is coupled to shared branch 612” at node 602.

Ex. 1003 ¶ 68, Fig. 6B; *see* Ex. 1002 ¶¶ 113–115.

Similarly, in bi-directional coil assembly 631 in Figure 6A, inductive coil L1 and inductive coil L2 are separate from capacitor C1 corresponding to the claimed “impedance network” and also separate from power bridge circuit 610 corresponding to the claimed “switch network.” Ex. 1003 ¶¶ 61–66, Fig. 6A; *see* Ex. 1002 ¶¶ 121–126; *infra* § III.D.3(c)(iii).b.

Moreover, even if the claimed “impedance network” requires “two or more” components, as Patent Owner contends, Chatterjee teaches the claimed “impedance network.” *See* Ex. 1003 ¶¶ 70, 72, Figs. 6C–6D; Resp. 36, 48, 52–53; Sur-reply 24; Inst. Dec. 60. Specifically, Chatterjee discloses:

- (1) bi-directional coil assembly 633 in Figure 6C with capacitor C3 and capacitor C4; and
- (2) bi-directional coil assembly 634 in Figure 6D with capacitor C5 and capacitor C6.

Ex. 1003 ¶¶ 70, 72, Figs. 6C–6D; *see* Ex. 1002 ¶¶ 74–75; Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1019, 138:9–15; Ex. 1021 ¶ 43.

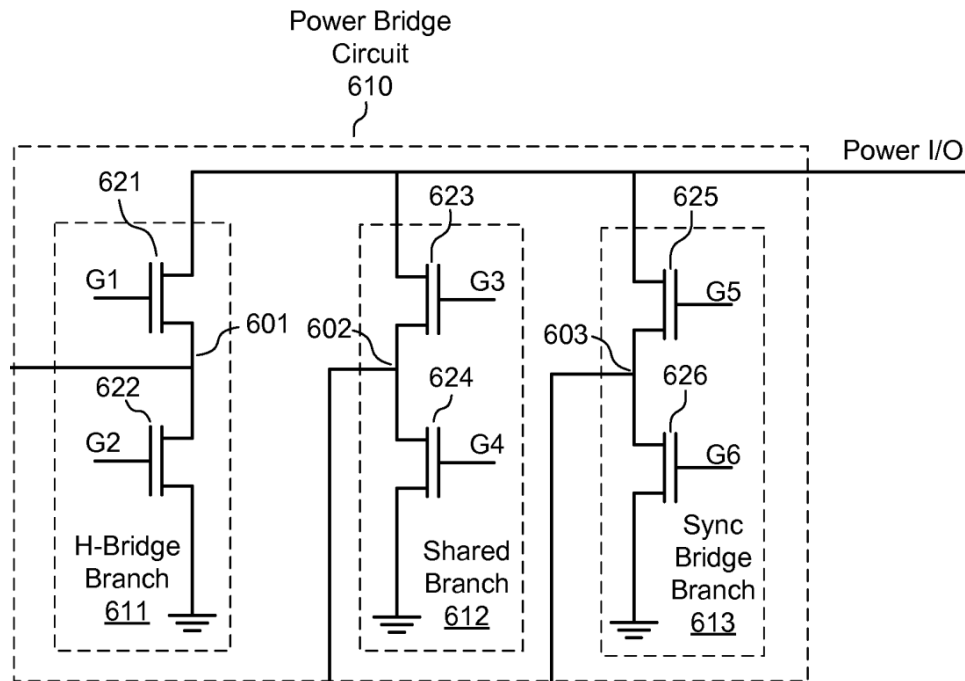
In bi-directional coil assembly 633 in Figure 6C, inductive coil L4 and inductive coil L5 are separate from capacitor C3 and capacitor C4 corresponding to the claimed “impedance network” and also separate from power bridge circuit 610 corresponding to the claimed “switch network.” Ex. 1003 ¶¶ 70–71, Fig. 6C; *see infra* § III.D.3(c)(iii).b. In bi-directional coil assembly 634 in Figure 6D, inductive coil L6 and inductive coil L7 are separate from capacitor C5 and capacitor C6 corresponding to the claimed

“impedance network” and also separate from power bridge circuit 610 corresponding to the claimed “switch network.” Ex. 1003 ¶¶ 72–73, Fig. 6D; *see* Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1021 ¶ 43; *infra* § III.D.3(c)(iii).b.

As noted above, H-bridge branch 611 is turned off in the power receive mode such that no current flows through capacitor C3 in bi-directional coil assembly 633 or through capacitor C5 in bi-directional coil assembly 634 in that mode. Ex. 1003 ¶¶ 71, 73; *see* Resp. 60–62; *supra* § III.D.1. The absence of current flow through those capacitors in that mode does not matter because claim 1 does not require current flow through any particular part of the “impedance network” during any particular mode. *See* Ex. 1001, 27:2–43.

b. “Switch Network”

Second, for the claimed “switch network,” Chatterjee’s inductive signal interface 410 includes power bridge circuit 411. Ex. 1003 ¶ 41, Fig. 4; *see* Ex. 1002 ¶¶ 69–72. Chatterjee’s Figures 6A–6D depict a circuit-level embodiment of power bridge circuit 411, i.e., power bridge circuit 610. Ex. 1003 ¶¶ 11–14, 61–62, 68, 70, 72, Figs. 6A–6D; *see* Ex. 1002 ¶¶ 74–75, 121–125. An excerpt from each of Chatterjee’s Figures 6A–6D depicting power bridge circuit 610 is reproduced below:



The above excerpt from each of Figures 6A–6D illustrates power bridge circuit 610 including “an H-bridge branch 611, a shared branch 612, and a sync bridge branch 613” with each branch “coupled to the power I/O” and having “two serially-connected switches.” Ex. 1003 ¶ 61, Fig. 6A; *see id.* ¶¶ 68, 70, 72, Figs. 6B–6D; Ex. 1002 ¶¶ 75, 113, 122–125.

“The H-bridge branch 611 includes switches 621 and 622 which are connected at a node 601 and are controlled by signals G1 and G2 respectively.” Ex. 1003 ¶ 61, Fig. 6A; *see* Ex. 1002 ¶¶ 75, 113. “The shared branch 612 includes switches 623 and 624 which are connected at a node 602 and are controlled by signals G3 and G4 respectively.” Ex. 1003 ¶ 61, Fig. 6A; *see* Ex. 1002 ¶¶ 75, 115. “The sync bridge branch 613 includes switches 625 and 626 which are connected at a node 603 and are controlled by signals G5 and G6 respectively.” Ex. 1003 ¶ 61, Fig. 6A; *see* Ex. 1002 ¶¶ 75, 113.

Signals G1–G6 control the operation of power bridge circuit 610 in both the power transmit mode and the power receive mode. Ex. 1003 ¶ 63; *see* Ex. 1002 ¶ 135. In the power transmit mode, “two of the three branches operate to form an H-bridge circuit,” i.e., an H-bridge inverter circuit, and “the power I/O transmits an input DC current to the power bridge circuit 610.” Ex. 1003 ¶ 64, claim 3; *see id.* ¶¶ 3, 6, Fig. 1; Ex. 1002 ¶ 121. In the power receive mode, “two of the three branches operate to form a synchronous bridge rectifier circuit,” and “the power I/O transmits an output DC current from the power bridge circuit 610.” Ex. 1003 ¶ 65, claim 4; *see id.* ¶¶ 4, 7, Fig. 2; Ex. 1002 ¶ 121.

For example, power bridge circuit 610 operates with bi-directional coil assembly 632 in Figure 6B as follows:

- (1) in the power transmit mode, (a) “the sync bridge branch 613 is turned off,” (b) “the H-bridge branch 611 and the shared branch 612 are operable to deliver current,” and (c) “the current path through the bi-directional coil assembly 632 is the series combination of the capacitor C2 and the inductive coil L3”; and
- (2) in the power receive mode, (a) “the H-bridge branch 611 is turned off,” (b) “the sync bridge branch 613 and the shared branch 612 are operable to deliver current,” and (c) “the current path through the bi-directional coil assembly 632 is the inductive coil L3.”

Ex. 1003 ¶¶ 69, 81–86, Figs. 6B, 8A–8D; *see id.* ¶ 63; Ex. 1002 ¶¶ 114, 121–125.

Additionally, in Chatterjee’s inductive signal interface, power bridge circuit 610 corresponding to the claimed “switch network” is separate from the circuitry corresponding to the claimed “impedance network” and also separate from the circuitry corresponding to the claimed “coil.” Ex. 1003

¶¶ 61–66, 68–73, 81–86, Figs. 4, 6A–6D, 8A–8D; *see* Ex. 1002 ¶¶ 113–115, 121–126; Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1021 ¶ 43; *supra* §§ III.D.3(b), III.D.3(c)(iii).a.

c. “Filter Capacitor”

Third, for the claimed “filter capacitor,” Chatterjee discloses a power circuit including decoupling circuit 1020 with one inductor and two capacitors. Ex. 1003 ¶ 89, Fig. 10; *see* Ex. 1002 ¶¶ 76, 128. Decoupling circuit 1020 “operates to act as a filter for certain signal frequencies and prevents those signals from passing through.” Ex. 1003 ¶ 89; *see* Ex. 1002 ¶¶ 128–129. Specifically, “the majority of AC current from the coil assembly will be diverted through the decoupling circuit’s left capacitor to ground, rather than pass through the series inductor.” Ex. 1002 ¶ 129.

Further, as Dr. Phinney explains, an ordinarily skilled artisan “would have understood that the capacitors in the decoupling circuit 1020 act as filter capacitors to filter out unwanted frequencies in the power signal” at the power input/output (I/O). Ex. 1002 ¶ 129.

(d) Limitation 1.c

Claim 1 recites “a second circuitry comprising: a control logic circuit; and a modulator/demodulator circuit.” Ex. 1001, 27:15–17 (limitation 1.c).

Petitioner contends that Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 1.c obvious because Chatterjee’s inductive signal interface 410 includes circuitry corresponding to the claimed “control logic circuit” and “modulator/demodulator circuit.” *See* Pet. 35–38.

First, Petitioner asserts that processor 413 in inductive signal interface 410 corresponds to the claimed “control logic circuit” because processor 413:

- (1) is “coupled to the power bridge circuit 411 to control the operation of the power bridge circuit 411 based on [a] determined mode of operation”; and
- (2) produces signals G1–G6 that control the operation of the power bridge circuit.

Pet. 37–38 (alteration by Petitioner) (quoting Ex. 1003 ¶ 55) (citing Ex. 1002 ¶¶ 113–114; Ex. 1003 ¶¶ 63, 69, Fig. 4); *see id.* at 35. Petitioner asserts that an ordinarily skilled artisan “would have understood that processor 413 was enabled to execute software implementing the control logic for receiving and processing digital data such as identification and status information.” *Id.* at 38 (citing Ex. 1002 ¶ 135; Ex. 1003 ¶¶ 63, 94).

Dr. Phinney explains that an ordinarily skilled artisan “would have understood that Chatterjee’s processor 413 teaches the claimed ‘control logic circuit’ because Chatterjee teaches that the processor 413 can be implemented as a microprocessor installed on a circuit board that embodies control logic for controlling the operation of the power bridge circuit.” Ex. 1002 ¶ 135 (emphasis omitted).

Second, Petitioner asserts that modulator 416 and demodulator 417 in inductive signal interface 410 correspond to the claimed “modulator/demodulator circuit.” Pet. 35, 38.

Patent Owner asserts that limitation 1.c is separate from limitation 1.a and also separate from limitation 1.b. Resp. 32.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches limitation 1.c.

See Pet. 35–38; Ex. 1002 ¶¶ 132–137. Additionally, the circuitry in Chatterjee corresponding to limitation 1.c is separate from the circuitry corresponding to limitation 1.a and also separate from the circuitry corresponding to limitation 1.b. Ex. 1003 ¶¶ 51–55, 61–66, 68–73, 81–86, 94, Figs. 4, 6A–6D, 8A–8D; *see* Ex. 1002 ¶¶ 113–115, 121–126, 132, 135–137; Ex. 1015 ¶¶ 64, 75, 111, 121; Ex. 1021 ¶ 43; *infra* §§ III.D.3(b), III.D.3(c)(iii).a.–c.

(e) Limitation 1.d

Claim 1 recites “said first circuitry configured to receive said power from a wireless power transmitter.” Ex. 1001, 27:18–19 (limitation 1.d).

Petitioner contends that Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 1.d obvious because Chatterjee’s inductive signal interface 410 includes power bridge circuit 411 “configured to receive power in the power receive mode that was transmitted over an inductive link.” Pet. 39. As support, Petitioner quotes Chatterjee’s disclosure about inductive signal interface 410 in the power receive mode as follows:

During the power receive mode of the inductive signal interface 410, the bi-directional coil assembly 412 receives power over the inductive link 430 from the second electronic device 420. The power signal is transmitted in modulated form over the power bridge circuit 411, which performs rectification to output a DC current to the power circuit 414.

Id. (quoting Ex. 1003 ¶ 46).

Further, Petitioner asserts that an ordinarily skilled artisan “would have understood that Chatterjee thus teaches that the received power comes ‘from a wireless power transmitter’ because it is transmitted wirelessly.” Pet. 39 (emphasis omitted) (citing Ex. 1002 ¶¶ 94, 139).

Patent Owner makes no arguments specific to limitation 1.d. *See, e.g.,* Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches limitation 1.d. *See* Pet. 39; Ex. 1002 ¶¶ 94, 138–139.

(f) Limitation 1.e

Claim 1 recites “said first circuitry, based on an input from said control logic circuit, configured to change impedance of said impedance network and topology of said switch network to obtain a modified form of said received power, and apply said modified form of said power to said load device.” Ex. 1001, 27:20–25 (limitation 1.e).

(i) Petitioner’s Contentions

Petitioner contends that Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 1.e obvious for several related reasons. *See* Pet. 39–43. First, Petitioner asserts that Chatterjee’s processor 413 produces signals G1–G6 that control the operation of the power bridge circuit to change (1) “the impedance of the bi-directional coil assembly” and (2) “the topology of the power bridge circuit.” *Id.* at 40–42 (citing Ex. 1002 ¶¶ 122–124, 135, 141–143; Ex. 1003 ¶¶ 66, 69, Fig. 6B).

Second, referencing bi-directional coil assembly 632 in Figure 6B with capacitor C2 between nodes 601 and 605 and a wire between nodes 603 and 605, Petitioner asserts that the impedance of the impedance network changes based on the mode of operation as follows:

- (1) in the power transmit mode, the impedance network provides capacitive reactance ($Z_I = -1/j\omega C$); and

- (2) in the power receive mode, the impedance network provides no impedance ($Z_I = 0$) because “capacitor C2 is not used as part of the circuitry.”

Pet. 40–42 (citing Ex. 1002 ¶¶ 135, 141–142; Ex. 1003 ¶¶ 66, 69, Fig. 6B).

Third, referencing power bridge circuit 610 in Figures 6A–6D with H-bridge branch 611, shared branch 612, and sync bridge branch 613, Petitioner asserts that the topology of the switch network changes based on the mode of operation because, among other things, “the H-bridge branch 611 is disconnected and turned off” in the power receive mode. Pet. 42 (citing Ex. 1002 ¶¶ 122–124, 143; Ex. 1003 ¶ 69).

Fourth, Petitioner asserts that power bridge circuit 610 rectifies “alternating current received by the bi-directional coil assembly into a direct current” at the power input/output (I/O) “to charge [a] rechargeable battery of the electronic device 402.” Pet. 42–43 (citing Ex. 1002 ¶¶ 108, 144–145; Ex. 1003 ¶ 46, Fig. 10).

(ii) Patent Owner’s Contentions

Patent Owner disputes that Chatterjee teaches limitation 1.e. *See* Resp. 2, 54–63, 67; Sur-reply 1, 8, 25–26. Specifically, Patent Owner asserts that the power bridge circuits and bi-directional coil assemblies in Chatterjee’s Figures 6A–6D do not teach limitation 1.e because those circuits do not permit impedance changes during the charging mode (the receiving power mode). Resp. 63; *see id.* at 54–63.

(iii) Analysis

For the reasons explained below, we agree with Petitioner that Chatterjee teaches limitation 1.e. *See* Pet. 39–43; Ex. 1002 ¶¶ 114, 140–145. As Petitioner asserts, Chatterjee’s processor 413 produces signals G1–G6 that control the operation of the power bridge circuit to change (1) “the

impedance of the bi-directional coil assembly” and (2) “the topology of the power bridge circuit.” Ex. 1003 ¶¶ 61, 63, 66, 68–69; *see* Ex. 1002 ¶¶ 122–124, 135, 141–143; Pet. 40–42.

When discussing power bridge circuit 610 in Figures 6A–6D, Chatterjee explains that by “selectively turning off the H-bridge branch 611 or the sync bridge branch 613, the power bridge circuit 610 is configurable to selectively turn off current paths in the bi-directional coil assembly” to change “the impedance of the bi-directional coil assembly” based on “the mode of operation of the inductive signal interface.” Ex. 1003 ¶ 66; *see* Ex. 1002 ¶¶ 114, 141–142.

For bi-directional coil assembly 632 in Figure 6B with capacitor C2 between nodes 601 and 605 and a wire between nodes 603 and 605, the impedance of the impedance network changes based on the mode of operation as follows:

- (1) in the power transmit mode, the impedance network provides capacitive reactance ($Z_I = -1/j\omega C$); and
- (2) in the power receive mode, the impedance network provides no impedance ($Z_I = 0$) because “capacitor C2 is not used as part of the circuitry.”

Ex. 1002 ¶ 142; *see id.* ¶ 115; Ex. 1003 ¶¶ 66, 68–69, Fig. 6B. Further, for bi-directional coil assembly 633 in Figure 6C and bi-directional coil assembly 634 in Figure 6D, the impedance of the impedance network also changes based on the mode of operation. *See* Ex. 1003 ¶¶ 70–73, Figs. 6C–6D.

For power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613, the topology of the switch network changes based on the mode of operation as follows:

- (1) in the power transmit mode, “the sync bridge branch 613 is turned off” and “the H-bridge branch 611 and the shared branch 612 are operable to deliver current”; and
- (2) in the power receive mode, “the H-bridge branch 611 is turned off” and “the sync bridge branch 613 and the shared branch 612 are operable to deliver current.”

Ex. 1003 ¶¶ 69, 71, 73, 81–82, 84–85, Figs. 8A–8D; *see id.* ¶¶ 64–65, 83, 86; Ex. 1002 ¶¶ 114, 122, 124, 141–143.

Additionally, Chatterjee’s inductive signal interface 410 includes circuitry configured to “obtain a modified form of said received power” and “apply said modified form of said power to said load device” according to limitation 1.e. Ex. 1002 ¶¶ 144–145. Specifically, Chatterjee discloses that “[d]uring the power receive mode of the inductive signal interface 410, the bi-directional coil assembly 412 receives power over the inductive link 430 from the second electronic device 420.” Ex. 1003 ¶ 46; *see* Ex. 1002 ¶ 144. The “power signal is transmitted in modulated form over the power bridge circuit 411, which performs rectification to output a DC current to the power circuit 414.” Ex. 1003 ¶ 46; *see* Ex. 1002 ¶ 144. The power signal from the power circuit 414 “is a DC signal and is routed to: (i) charge a rechargeable battery within the electronic device 402, and/or (ii) provide power to circuit elements within the electronic device.” Ex. 1003 ¶ 46; *see* Ex. 1002 ¶¶ 144–145.

Patent Owner’s arguments regarding limitation 1.e rest on its proposed construction that limitation 1.e “requires that the impedance of the impedance network be capable of being changed” while the dual mode wireless power receiver “is still in the receiving power mode.” *See* Resp. 2, 7, 37–38, 41–42, 48–49, 54–63, 67; Sur-reply 1, 5, 7–14, 25–26. For

the reasons discussed above, we disagree with Patent Owner's proposed construction for limitation 1.e. *See supra* § III.C.5(c).

(g) Limitation 1.f

Claim 1 recites as follows:

said first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and said impedance of said impedance network to transmit at least part of said stored power to said secondary wireless power receiver to power-up said secondary wireless power receiver.

Ex. 1001, 27:26–31 (limitation 1.f).

Petitioner contends that Chatterjee in view of an ordinarily skilled artisan's knowledge renders limitation 1.f obvious for several related reasons. *See* Pet. 43–46. First, Petitioner asserts that Chatterjee's processor 413 produces signals G1–G6 that control the operation of the power bridge circuit to change (1) “the impedance of the bi-directional coil assembly” and (2) “the topology of the power bridge circuit.” *Id.* at 43–45 (citing Ex. 1002 ¶¶ 122–123, 135, 142, 147, 149; Ex. 1003 ¶¶ 66, 69, Fig. 6B).

Second, referencing power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil assembly 632 in Figure 6B with capacitor C2 and inductive coil L3, Petitioner asserts that the impedance of the impedance network changes based on the mode of operation. Pet. 43–45. Petitioner explains that when “the inductive signal interface is set in a power transmit mode,” processor 413 sends (1) signals G5–G6 to “turn off the sync bridge branch 613” and (2) signals G1–G4 to “turn on the H-bridge branch 611 and the shared branch 612,” such that “inductor L3 and capacitor C2 are both

connected and in series.” *Id.* at 43–44 (citing Ex. 1002 ¶¶ 122–123, 147; Ex. 1003 ¶ 69, Fig. 6B).

Third, referencing power bridge circuit 610, Petitioner asserts that the topology of the switch network changes based on the mode of operation because, among other things, “the sync bridge branch 613 is disconnected and turned off” in the power transmit mode. Pet. 45 (citing Ex. 1002 ¶ 149).

Fourth, Petitioner asserts that Chatterjee’s inductive signal interface 410 handles an “incoming power signal originating from a power source” by converting “DC to high-frequency form” and then transmitting “power to the second electronic device [] over the inductive link.” Pet. 45 (alteration by Petitioner) (quoting Ex. 1003 ¶¶ 37–38).

Patent Owner makes no arguments specific to limitation 1.f. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches limitation 1.f. *See* Pet. 43–46; Ex. 1002 ¶¶ 122–123, 135, 142, 146–151.

(h) Limitation 1.g

Claim 1 recites “said second circuitry, on power-up of said secondary wireless power receiver, configured to identify a type of said secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver.” Ex. 1001, 27:32–36 (limitation 1.g).

Petitioner contends that Chatterjee in view of Corbridge and an ordinarily skilled artisan’s knowledge renders limitation 1.g obvious for several related reasons. *See* Pet. 46–52. First, Petitioner asserts that Chatterjee’s electronic device 402 controls inductive signal interface 410 to operate in a power transmit mode where inductive signal interface 410

“transmits power to ‘power-up’ or charge a second electronic device 420 over an inductive link 430.” *Id.* at 46 (citing Ex. 1002 ¶¶ 97–98, 154; Ex. 1003 ¶¶ 36–37, 43). According to Petitioner, electronic device 402 may place inductive signal interface 410 in the power transmit mode when electronic device 402 has a fully charged battery. *Id.* at 46–47 (citing Ex. 1002 ¶ 155; Ex. 1003 ¶ 43).

Second, Petitioner asserts that inductive signal interface 410 “is configurable to transfer data as well as power via the inductive link 430,” including “data that corresponds to identification or status information of . . . the second electronic device 420,” such as “a type identification of the second electronic device.” Pet. 47–48 (alteration by Petitioner) (emphasis omitted) (quoting Ex. 1003 ¶¶ 35, 48) (citing Ex. 1003 ¶¶ 31, 42, 50). According to Petitioner, “the identification of the second electronic device is received by the demodulator 417 in the communication circuit 415 and sent to the processor 413 for processing.” *Id.* at 48 (citing Ex. 1002 ¶ 156; Ex. 1003 ¶¶ 53, 55).

Third, Petitioner asserts that an ordinarily skilled artisan would have understood the following:

- (1) “inductive signal interface 410 is ‘configured to identify a type of’ the second electronic device 420 based on the type identification information received over the inductive link”; and
- (2) “processor 413 of the inductive signal interface 410, which is a part of the ‘second circuitry,’ must be configured to process data according to a particular ‘wireless power protocol’” because interpreting transmitted data involves a protocol exchange.

Pet. 48–49 (emphases omitted) (citing Ex. 1002 ¶¶ 156–157; Ex. 1003 ¶¶ 35, 48, 55).

Fourth, Petitioner asserts that Corbridge discloses “second circuitry” configured to “identify a wireless power protocol of said secondary wireless power receiver” according to limitation 1.g. Pet. 50 (emphasis omitted) (citing Ex. 1002 ¶¶ 158–170). Specifically, Petitioner points to Corbridge’s disclosure concerning a signaling sequence between a power supply device and a power receiving device that permits the devices to communicate and exchange data over an inductive link. *Id.* at 50–52 (citing Ex. 1004 ¶¶ 109–110, Fig. 11).

Fifth, Petitioner asserts that in Corbridge’s signaling sequence “‘the power receiving device communicates enumeration information’ to the power supply device.” Pet. 52 (emphasis omitted) (quoting Ex. 1004 ¶ 112). Petitioner also asserts that the enumeration information may enable the following actions:

- (1) “one or both devices to identify the other device by type”; and
- (2) the “devices to select . . . communication protocol . . . of the two devices to communicate or transfer power.”

Id. (alterations by Petitioner) (emphasis omitted) (quoting Ex. 1004 ¶ 112).

Patent Owner makes no arguments specific to limitation 1.g. *See, e.g.,* Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that the combined disclosures in Chatterjee and Corbridge teach limitation 1.g. *See* Pet. 46–52; Ex. 1002 ¶¶ 152–162.

(i) Limitation 1.h

Claim 1 recites “said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol.” Ex. 1001, 27:37–39 (limitation 1.h).

Petitioner contends that Chatterjee in view of Corbridge renders limitation 1.h obvious for two related reasons. *See* Pet. 55–57. First, Petitioner asserts that “Chatterjee’s communication circuit 415 is configured to receive data from said secondary wireless power receiver, and Chatterjee’s processor 413 is configured to process that data in accordance with a wireless power protocol.” *Id.* at 55–56 (citing Ex. 1002 ¶ 156; Ex. 1003 ¶¶ 51, 55).

Second, Petitioner asserts that an ordinarily skilled artisan would have understood that “in the proposed combination of Chatterjee and Corbridge, the improved inductive signal interface that implements the sequence of signaling would include a processor 413 that would receive enumeration information from the second electronic device that allows the processor 413 to”:

- (1) “identify the wireless power protocol for communication”; and
- (2) “interpret data in the wireless power protocol about, e.g., the second electronic device’s power needs.”

Pet. 56 (citing Ex. 1003 ¶ 48; Ex. 1004, Fig. 11).

Patent Owner makes no arguments specific to limitation 1.h. *See, e.g.,* Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that the combined disclosures in

Chatterjee and Corbridge teach limitation 1.h. *See* Pet. 55–57; Ex. 1002 ¶¶ 171–173.

(j) Limitation 1.i

Claim 1 recites “said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.” Ex. 1001, 27:40–43 (limitation 1.i).

Petitioner contends that Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 1.i obvious. Pet. 57. Specifically, Petitioner asserts that Chatterjee’s inductive signal interface 410 includes processor 413 that:

- (1) “controls the power bridge circuit such that the first circuitry continues to operate in the power transmit mode and transmit power over the inductive signal interface”; and
- (2) “adjusts the transmitted power level based on power needs information received from [the] power receiver device.”

Id. at 57–58 (citing Ex. 1002 ¶ 176; Ex. 1003 ¶¶ 48, 55).

As support, Petitioner quotes Chatterjee’s disclosure about electronic device 402 with inductive signal interface 410 as follows:

In power receive mode, the electronic device 402 may transmit out its power supply requirements so as to enable the other computing device to adjust the level of the transmitted power signal to fit the needs of the power receiving device. In power transmit mode, the electronic device 402 may signal data to enable a data loop in which the second device (as the power receiver) to signal back real-time information about its power needs.

Pet. 58 (emphases omitted) (quoting Ex. 1003 ¶ 48).

Patent Owner makes no arguments specific to limitation 1.i. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches limitation 1.i. *See* Pet. 57–58; Ex. 1002 ¶¶ 174–177.

(k) Allegedly “Missing” Limitations

Patent Owner argues that Petitioner improperly relies on an ordinarily skilled artisan’s knowledge to supply limitations “missing” from Chatterjee and Corbridge. Sur-reply 25–26; *see* Resp. 16–19, 20 n.2, 67. To support that argument, Patent Owner states that it incorporates portions of the Preliminary Response by reference into both the Response and the Sur-reply. *See* Resp. 20 n.2; Sur-reply 26.

The Board’s rules state, “Arguments must not be incorporated by reference from one document into another document.” 37 C.F.R. § 42.6(a)(3). Patent Owner violates the Board’s rules. *See* Resp. 20 n.2; Sur-reply 26.

In any event, we addressed Patent Owner’s “missing” limitations argument in the Institution Decision and explained as follows:

- (1) “Petitioner identifies disclosures in Chatterjee or Corbridge (or both) that correspond to claim 1’s limitations”; and
- (2) “Petitioner relies on an ordinarily skilled artisan’s knowledge to show how the identified disclosures in the references correspond to claim 1’s limitations.”

Inst. Dec. 82–83 (citing Pet. 22–58; Ex. 1002 ¶¶ 101–177).

Patent Owner’s “missing” limitations argument lacks merit. *See* Resp. 67; Sur-reply 25–26; *supra* §§ III.D.3(a)–(j).

(l) Alleged Reason to Combine the Teachings of the References

(i) Petitioner's Position

Petitioner identifies a reason that would have prompted an ordinarily skilled artisan to combine Corbridge's teachings with Chatterjee's teachings in the way Petitioner proposes, i.e., to improve Chatterjee's inductive signal interface with Corbridge's signaling sequence to permit identification of a wireless power protocol. *See* Pet. 52–56; Reply 22–23. Further, Petitioner asserts that an ordinarily skilled artisan “would have had a reasonable expectation of success” in combining the teachings of the references. Pet. 55. Dr. Phinney's testimony supports Petitioner's position. *See* Ex. 1002 ¶¶ 158, 163–170, 173.

For instance, Dr. Phinney testifies that implementing Corbridge's signaling sequence in Chatterjee's inductive signal interface would have improved the inductive signal interface. Ex. 1002 ¶¶ 158, 163, 167, 173. Dr. Phinney explains that the proposed Chatterjee-Corbridge combination “would result in an improved inductive signal interface 410 having its communication circuit 415 receive enumeration information from the second electronic device 420, and its processor 413 configured to process the enumeration information to be able to identify a wireless power protocol for the two devices to communicate.” *Id.* ¶¶ 163, 167. Dr. Phinney also explains that the proposed Chatterjee-Corbridge combination would permit “the processor 413 to confirm that it supports the same wireless power protocol” as the second electronic device 420. *Id.* ¶ 173.

Further, Dr. Phinney testifies that the proposed Chatterjee-Corbridge combination “would have involved the mere application of a known technique—Corbridge's teachings regarding identifying a wireless power

protocol—to Chatterjee’s inductive signal interface 410 that is ready for improvement.” Ex. 1002 ¶ 168.

Additionally, Dr. Phinney testifies that Chatterjee “expressly teaches” using Corbridge’s signaling technique in an inductive signal interface by:

- (1) discussing Corbridge’s “[s]pecific examples of the type of data that can be communicated over using the inductive signal interface,” including “data to implement parts of the communication protocol, such as detecting presence of the second device, authenticating itself and/or the second device, and enumerating itself”; and
- (2) incorporating Corbridge by reference.

Ex. 1002 ¶ 169 (alteration by Dr. Phinney) (quoting Ex. 1003 ¶ 48).

According to Dr. Phinney, Chatterjee “expressly instructs” an ordinarily skilled artisan “to review Corbridge for ‘examples of the type of data that can be communicated over using the inductive signal interface.’” *Id.* ¶ 158 (quoting Ex. 1003 ¶ 48).

(ii) Patent Owner’s Position

Patent Owner contends that Petitioner “failed to carry its burden of proof as to the motivation to combine” because:

- (1) Petitioner relies on the combined disclosures in Chatterjee and Corbridge for both limitation 1.g and limitation 1.h; and
- (2) the rationale for combining the references provided by Petitioner and Dr. Phinney relates only to limitation 1.g.

Resp. 64–65 (citing *Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 886 (Fed. Cir. 2024)).

(iii) Analysis

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that an ordinarily skilled artisan would

have had a reason to combine Corbridge’s teachings with Chatterjee’s teachings in the way Petitioner proposes. *See* Pet. 52–56; Reply 22–23; Ex. 1002 ¶¶ 158, 163–169, 173. Further, for the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that an ordinarily skilled artisan would have had a reasonable expectation of success in combining the teachings of the references. *See* Pet. 55; Ex. 1002 ¶ 170.

Regarding a reason to combine the teachings of the references, Chatterjee states that it incorporates Corbridge by reference “in its entirety.” Ex. 1003 ¶¶ 34, 48; *see* Ex. 1002 ¶ 169. Patent Owner does not dispute that Chatterjee incorporates Corbridge. *See, e.g.*, Resp. 1–2, 49–67. “When a reference or material from various documents is incorporated, they are ‘effectively part of the host document as if [they] were explicitly contained therein.’” *Arbutus Biopharma Corp. v. ModernaTX, Inc.*, 65 F.4th 656, 662–63 (Fed. Cir. 2023) (alteration in original) (quoting *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000)).

Additionally, Chatterjee “expressly instructs” an ordinarily skilled artisan “to review Corbridge for ‘examples of the type of data that can be communicated over using the inductive signal interface.’” Ex. 1002 ¶ 158 (quoting Ex. 1003 ¶ 48); Ex. 1003 ¶ 48. As examples of the type of data communicated according to Corbridge, Chatterjee identifies “data to implement parts of the communication protocol, such as detecting presence of the second device, authenticating itself and/or the second device, and enumerating itself.” Ex. 1003 ¶ 48; *see* Ex. 1002 ¶ 169.

An ordinarily skilled artisan “would have appreciated that [the] controlled exchange of power needs to be preceded by data communication” including enumeration information “to establish the capabilities of the

primary and secondary” devices. Ex. 1002 ¶ 168. The proposed Chatterjee-Corbridge combination provides an “improved inductive signal interface” implementing Corbridge’s signaling sequence, including communicating enumeration information. *See id.* ¶¶ 163, 167, 173; Ex. 1004 ¶¶ 109–113, Fig. 11.

In that “improved inductive signal interface,” communication circuit 415 would “receive enumeration information from the second electronic device 420,” and processor 413 would “process the enumeration information.” Ex. 1002 ¶¶ 163, 167. When processing that information, processor 413 would “identify a wireless power protocol for the two devices to communicate” according to limitation 1.g and would “confirm that it supports the same wireless power protocol.” *Id.* ¶¶ 163, 167, 173. Further, processor 413 would “interpret data in the wireless power protocol” according to limitation 1.h, such as data about “the second electronic device’s power needs.” *Id.* ¶ 173.

Moreover, “[t]here is a motivation to combine when a known technique ‘has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way,’ using the ‘prior art elements according to their established functions.’” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380–81 (Fed. Cir. 2023) (citations omitted) (quoting *KSR*, 550 U.S. at 417; *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 799–800 (Fed. Cir. 2021)). Here, Petitioner and Dr. Phinney identify Corbridge’s known technique used to improve the inductive exchange of power and data that would improve the similar exchange of power and data in Chatterjee in the same way when used according to Corbridge’s teachings. *See* Pet. 52–56; Reply 22–23; Ex. 1002

¶¶ 158, 163–169, 173; Ex. 1003 ¶¶ 34, 48; Ex. 1004 ¶¶ 23, 27–28, 109–113, Fig. 11.

The rationale for combining the references provided by Petitioner and Dr. Phinney (as summarized above) relates to both limitation 1.g and limitation 1.h and is persuasive. *See* Pet. 52–56; Reply 22–23; Ex. 1002 ¶¶ 158, 163–169, 173. Hence, we disagree with Patent Owner that Petitioner “failed to carry its burden of proof as to the motivation to combine.” *See* Resp. 64–65.

(m) Alleged Failure to Analyze the Claimed Invention as a Whole

Patent Owner asserts that “Petitioner has not carried its burden of proof” because “Petitioner and its expert Dr. Phinney focused on whether each difference standing alone was ‘obvious,’ but never analyzed the claim as a whole in view of the differences identified.” Resp. 65–67 (citing Pet. 25, 35, 39, 43, 46, 52, 55, 57–69; Ex. 1002 ¶ 199); *see id.* at 1–2, 51.

We disagree. As discussed in the preceding sections, Petitioner explains how “the claimed invention as a whole would have been obvious” over the combined disclosures in Chatterjee and Corbridge “to a person having ordinary skill in the art” under § 103. *See* Pet. 15–58; Reply 23; Ex. 1002 ¶¶ 92–177; *supra* §§ III.D.3(a)–(j); 35 U.S.C. § 103.

Specifically, Petitioner explains on a limitation-by-limitation basis how Chatterjee teaches claim 1’s limitations except limitations 1.g and 1.h. *See* Pet. 15–46, 57–58; Ex. 1002 ¶¶ 92–151, 174–177; *supra* §§ III.D.3(a)–(g), III.D.3(j). Patent Owner acknowledges that “Petitioner relies on Corbridge to provide the two limitations that it concedes are missing from Chatterjee,” i.e., limitations 1.g and 1.h. Resp. 64. Hence, according to *Graham*, Petitioner identifies the differences between the

claimed invention and the primary reference. Explaining on a limitation-by-limitation basis how Chatterjee teaches claim 1's limitations does not amount to "focus[ing] on whether each difference standing alone was 'obvious,'" as Patent Owner asserts. *See* Resp. 51, 65.

Additionally, Petitioner explains (1) how Corbridge teaches limitations 1.g and 1.h (the alleged differences between the claimed invention and the primary reference) and (2) why an ordinarily skilled artisan would have been motivated to combine Corbridge's teachings with Chatterjee's teachings to yield "the claimed invention as a whole." *See* Pet. 46–57; Ex. 1002 ¶¶ 152–173; *supra* §§ III.D.3(h)–(i). Petitioner's analysis for claim 1 comports with the *Graham* framework. *See* Pet. 15–58; Ex. 1002 ¶¶ 92–177; *supra* §§ III.D.3(a)–(j), III.D.3(l); *Graham*, 383 U.S. at 17–18.

As for Patent Owner's assertion that Petitioner "never analyzed the claim as a whole in view of the differences identified," Petitioner does not identify any differences between "the claim as a whole" and the combined disclosures in Chatterjee and Corbridge. *See* Pet. 15–58; Ex. 1002 ¶¶ 92–177; Resp. 51, 65. Instead, Petitioner contends that there are no differences between "the claim as a whole" and the combined disclosures in Chatterjee and Corbridge. *See* Pet. 15–58; Ex. 1002 ¶¶ 92–177.

(n) Conclusion About Obviousness/Nonobviousness

For the reasons discussed above, the combined disclosures in Chatterjee and Corbridge teach the invention covered by claim 1. *See supra* §§ III.D.3(a)–(j). Moreover, an ordinarily skilled artisan would have been motivated to combine Corbridge's teachings with Chatterjee's teachings in the way Petitioner proposes and would have had a reasonable expectation of

success. *See supra* § III.D.3(l). Hence, Petitioner has shown by a preponderance of the evidence that claim 1 is unpatentable under § 103 because the claim would have been obvious over Chatterjee and Corbridge.

4. DEPENDENT CLAIMS 2, 3, 5, 7, AND 9

(a) Claim 2

Claim 2 depends directly from claim 1 and recites “wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier.” Ex. 1001, 27:44–46.

Petitioner contends that Chatterjee teaches claim 2’s limitation because “Chatterjee’s power bridge circuit (corresponding to the claimed ‘switch network’) is configured as an inverter in the power transmit mode, and a rectifier in the power receive mode.” Pet. 58–59 (citing Ex. 1002 ¶¶ 121, 179; Ex. 1003 ¶ 3, claims 3–4).

Patent Owner makes no arguments specific to claim 2. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches claim 2’s limitation. *See* Pet. 58–59; Ex. 1002 ¶¶ 121, 178–179.

(b) Claim 3

Claim 3 depends directly from claim 1 and recites “wherein said impedance network of said first circuitry comprising of elements that are one of chosen a priori with fixed values and tuned during operation over a range of values.” Ex. 1001, 27:47–51.

Petitioner contends that Chatterjee teaches claim 3’s limitations. Pet. 59–60; Reply 18–22. Specifically, Petitioner identifies components in bi-directional coil assembly 632 in Figure 6B and bi-directional coil

assembly 634 in Figure 6D. Pet. 59–60; Reply 18–22; *see* Opp. 12–13, 16. For instance, referencing bi-directional coil assembly 632 in Figure 6B, Petitioner asserts that “bi-directional coil assembly 632 relies upon more components that just capacitor C2 to change its impedance” because the assembly interacts “with unswitched H-Bridge Branch 611 or unswitched Synch Bridge Branch 613” to produce impedance changes. Reply 21–22.

Dr. Phinney explains that an ordinarily skilled artisan would have understood that “Chatterjee teaches an impedance network comprising of elements that have fixed values” because Chatterjee does not depict capacitors with arrows, i.e., the “drafting convention” for variable capacitors. Ex. 1002 ¶ 182.

Patent Owner makes no arguments specific to claim 3. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony and the reasons discussed above for the “impedance network” required by claim 1, we agree with Petitioner that Chatterjee teaches claim 3’s limitations. *See* Opp. 12–13, 16; Ex. 1002 ¶ 182; Ex. 1015 ¶ 64; Ex. 1021 ¶ 43; Inst. Dec. 60, 79; *supra* § III.D.3(c)(iii).a.

(c) Claim 5

Claim 5 reads as follows (with formatting added for clarity):

5. The dual mode wireless power receiver of claim 1,
wherein said first circuitry is further comprising

one of switch_configuration_A and switch_
configuration_B:

said switch_configuration_A comprising first
switch and second switch,

said first switch operationally connecting
and disconnecting said dual mode wireless power

receiver with said stored power directly or via intermediate circuitry, and

said second switch operationally connecting and disconnecting said dual mode wireless power receiver with said load;

said switch_configuration_B comprising single switch,

said single switch operationally connecting and disconnecting said dual mode wireless power receiver with said load and said stored power, the connectivity being direct or via intermediate circuitry.

Ex. 1001, 28:14–30.

Petitioner contends that claim 5 uses the language “one of switch_configuration_A and switch_configuration_B” to mean either “switch_configuration_A” or “switch_configuration_B.” Pet. 60. Petitioner contends that Chatterjee teaches “switch_configuration_A.” *Id.* at 61, 64–65 (citing Ex. 1002 ¶¶ 183–190).

Specifically, Petitioner asserts that Chatterjee’s Figure 10 depicts an embodiment of a power circuit where:

- (1) switch 1021 “operates to couple a power signal line Power In to the resistor 1024 in order to deliver power to the power bridge circuit and bi-directional coil assembly combination 1010”;
- (2) switch 1021 corresponds to the “first switch” in “switch_configuration_A”;
- (3) transistor 1022 and transistor 1023 “act as a voltage and current regulator for outgoing current from the power bridge circuit and bi-directional coil assembly combination 1010”; and
- (4) transistor 1022 and transistor 1023 correspond to the “second switch” in “switch_configuration_A.”

Pet. 62–63 (quoting Ex. 1003 ¶ 89).

As support, Petitioner provides an annotated and highlighted version of Chatterjee’s Figure 10 as reproduced below (Pet. 62):

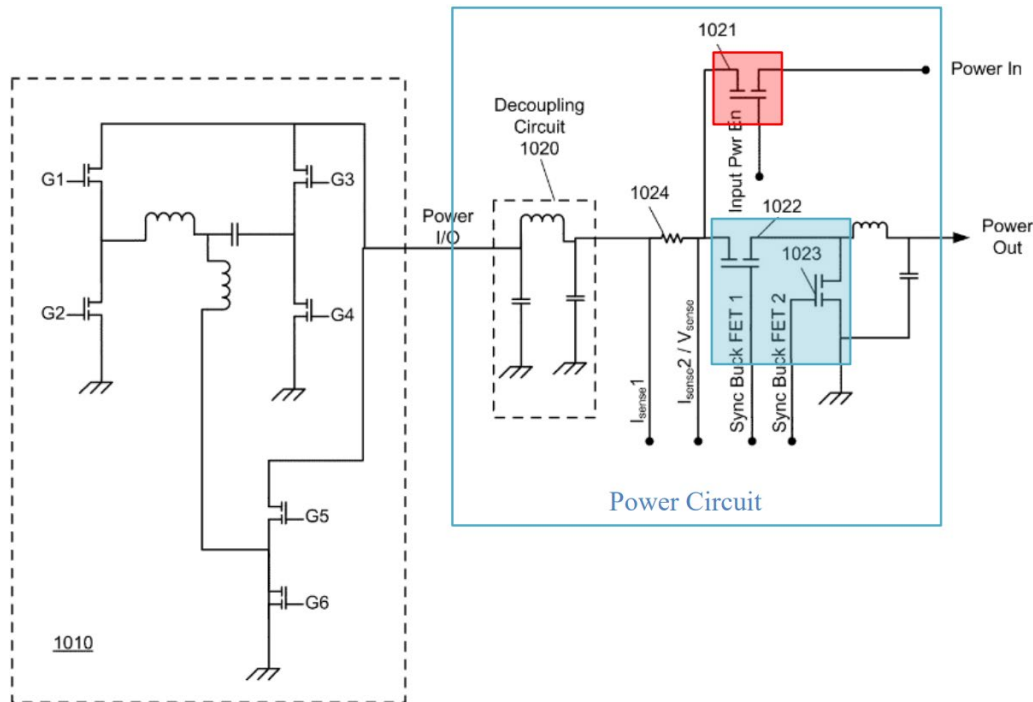


FIG. 10

Figure 10 “illustrates a power bridge circuit and a bi-directional coil assembly” (identified collectively by reference numeral 1010) coupled to a power circuit including decoupling circuit 1020, switch 1021, transistor 1022, transistor 1023, and resistor 1024. Ex. 1003 ¶¶ 27, 89, Fig. 10; *see id.* ¶¶ 37, 44, 46. The above annotated and highlighted version of Figure 10 includes a blue box around the power circuit, the blue label “Power Circuit” inside the blue box, red highlighting over switch 1021, and blue highlighting over transistor 1022 and transistor 1023. *See* Pet. 62; Ex. 1002 ¶ 186.

Additionally, Petitioner asserts that an ordinarily skilled artisan would have understood that:

- (1) “in the power transmit mode, switch 1021 is closed to deliver power from the battery to the power bridge circuit to charge the second electronic device 420, thus ‘connecting . . . said dual mode wireless power receiver with said stored power’”; and
- (2) “in the power receive mode, transistors 1022/1023 operate synchronously as a part of a DC-DC buck converter to lower the voltage out of the power bridge circuit to charge the battery of the electronic device 402, thus ‘connecting . . . said dual mode wireless power receiver with said load.’”

Pet. 63–64 (alterations by Petitioner) (emphases omitted) (citing Ex. 1002 ¶ 188).

Further, Petitioner asserts that an ordinarily skilled artisan “would have found it obvious” that (1) “switch 1021 is disconnected to disconnect the dual mode wireless power receiver from the battery ‘Power In’ node in the power receive mode” and (2) “transistors 1022/1023 are not in operation to disconnect the dual mode wireless power receiver from the battery ‘Power Out’ node in the power transmit mode,” such that “the battery only supplies or receives power in one mode, but not both.” Pet. 64 (citing Ex. 1002 ¶ 190).

Patent Owner makes no arguments specific to claim 5. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that:

- (1) claim 5 uses the language “one of switch_configuration_A and switch_configuration_B” to mean either “switch_configuration_A” or “switch_configuration_B”; and

- (2) Chatterjee teaches “switch_configuration_A” recited in claim 5.

See Pet. 60–65; Ex. 1001, 28:14–30; Ex. 1002 ¶¶ 183–190.

(d) Claim 7

Claim 7 reads as follows (with formatting added for clarity):

7. The dual mode wireless power receiver of claim 1, wherein said first circuitry is further comprising
- a switch that connects and disconnects said dual mode wireless power receiver with said stored power, said connection and disconnection to said stored power being direct or indirect via other intermediate circuitry and
- a power regulation circuitry that connects and disconnects said dual mode wireless power receiver with said load.

Ex. 1001, 28:48–55.

Petitioner contends that Chatterjee teaches claim 7’s limitations because Chatterjee’s Figure 10 depicts an embodiment of a power circuit where:

- (1) switch 1021 corresponds to the “switch” required by claim 7; and
- (2) transistor 1022 and transistor 1023 correspond to the “power regulation circuitry” required by claim 7.

See Pet. 65–67.

Specifically, Petitioner asserts that switch 1021 “operates to connect and disconnect the inductive signal interface 411 with the battery of the electronic device 402, either directly to ‘transmit the power signal received from . . . battery,’ or via intermediate circuitry that can ‘treat the incoming power signal’ from the battery.” Pet. 65 (alteration by Petitioner) (quoting Ex. 1003 ¶¶ 37, 47). Additionally, Petitioner asserts that transistor 1022 and

transistor 1023 “act as a voltage and current regulator for outgoing current from the power bridge circuit and bi-directional coil assembly combination 1010.” *Id.* at 66 (quoting Ex. 1003 ¶ 89). Petitioner explains that transistor 1022 and transistor 1023 “operate synchronously as a DC-to-DC buck converter in the power receive mode to connect the inductive signal interface with the battery of the electronic device 402, and do not operate in the power transmit mode to disconnect the inductive signal interface with the battery.” *Id.* at 67 (citing Ex. 1003 ¶ 89).

Patent Owner makes no arguments specific to claim 7. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches claim 7’s limitations. *See* Pet. 65–67; Ex. 1002 ¶¶ 191–194.

(e) Claim 9

Claim 9 reads as follows (with formatting added for clarity):

9. The dual mode wireless power receiver of claim 1,
wherein said first circuitry is further comprising
- a power regulation circuitry that
 - connects and disconnects said dual mode wireless power receiver with said load and
 - connects and disconnects said dual mode wireless power receiver with said stored power, said connection and disconnection to said stored power being direct or indirect via other intermediate circuitry.

Ex. 1001, 28:64–29:4.

Petitioner contends that Chatterjee teaches claim 9’s limitations. *See* Pet. 67–69. Specifically, Petitioner asserts that Chatterjee discloses power circuit 414 that:

- (1) “may serve to clamp current levels, regulate voltage levels or perform other treatment functions for incoming (power transmit mode) and outgoing power signal (power receive mode)”;
- (2) “outputs power received over the inductive link to another component that is on the first electronic device [], or alternatively connected to the electronic device (e.g. rechargeable battery)” in the power receive mode; and
- (3) “connects . . . said dual mode wireless power receiver with said load” in the power receive mode;
- (4) “transmit[s] the power signal received from a power source (e.g. battery, wall outlet) of the first electronic device” in the power transmit mode; and
- (5) “connects . . . said dual mode wireless power receiver with said stored power” in the power transmit mode.

Pet. 68–69 (alterations by Petitioner) (emphases omitted) (quoting Ex. 1001, 28:66–29:2; Ex. 1003 ¶ 37).

Additionally, Petitioner asserts that “Chatterjee discloses an embodiment of the power circuit in Figure 10” including (1) switch 1021 “that operationally ‘connects and disconnects’ the inductive signal interface with the stored power in the battery ‘directly or via intermediate circuitry’” and (2) a DC-to-DC buck converter with transistors 1022 and 1023 “that operationally ‘connects and disconnects’ the inductive signal interface with the battery as a load.” Pet. 69 (emphases omitted) (citing Ex. 1002 ¶¶ 186–190).

Patent Owner makes no arguments specific to claim 9. *See, e.g.*, Resp. 2, 49–67; Sur-reply 1, 8, 25–26.

For the reasons stated by Petitioner and supported by Dr. Phinney's testimony, we agree with Petitioner that Chatterjee teaches claim 9's limitations. *See* Pet. 67–69; Ex. 1002 ¶¶ 186–190, 195–198.

(f) Summary for Dependent Claims 2, 3, 5, 7, and 9

For the reasons discussed above and in view of the record, the combined disclosures in Chatterjee and Corbridge teach the inventions covered by claims 2, 3, 5, 7, and 9. *See supra* §§ III.D.3(a)–(j), III.D.4(a)–(e). Moreover, an ordinarily skilled artisan would have been motivated to combine Corbridge's teachings with Chatterjee's teachings in the way Petitioner proposes and would have had a reasonable expectation of success. *See supra* § III.D.3(l). Hence, Petitioner has shown by a preponderance of the evidence that claims 2, 3, 5, 7, and 9 are unpatentable under § 103 because the claims would have been obvious over Chatterjee and Corbridge.

IV. PATENT OWNER'S REVISED CONTINGENT MOTION TO AMEND

In its Revised Contingent Motion to Amend, Patent Owner proposes to amend the '339 patent by adding new claims 21 and 22 as substitutes for original claims 1 and 2, respectively. *See* Mot. 30–32. Patent Owner requests that the Board substitute proposed claims 21 and 22 for original claims 1 and 2 in “the event the Board finds” original claims 1 and 2 are unpatentable. *Id.* at 1, 25.

For the reasons discussed above, we determine that original claims 1 and 2 are unpatentable under § 103 because the claims would have been obvious over Chatterjee and Corbridge. *See supra* §§ III.D.3(n), III.D.4(f). Hence, we address Patent Owner's Revised Contingent Motion to Amend.

A. The Proposed Substitute Claims

Proposed substitute claims 21 and 22 read as follows with underlined material in the claim body added relative to the original claim and bracketed material in the claim body deleted relative to the original claim (and with bracketed numbers and letters added for reference purposes):⁶

21. [21.p] A dual mode wireless power receiver configured to selectively apply a received power to a load device and utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary wireless power receiver to cause an action or transaction or charge said secondary wireless power receiver's load device, said dual mode wireless power receiver comprising:

[21.a] one of coil and capacitor electrodes;

[21.b] a first circuitry comprising:

an impedance network comprising a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch;

a switch network;

a filter capacitor;

[21.c] a second circuitry comprising:

a control logic circuit; and

a modulator/demodulator circuit;

[21.d] said first circuitry configured to receive said power from a wireless power transmitter;

[21.e] said first circuitry, based on an input from said control logic circuit, configured to change, while configured to receive said power, the impedance of said impedance network

⁶ The bracketed numbers and letters in proposed substitute claim 21 parallel the bracketed numbers and letters in original claim 1 reproduced above. *See supra* § II.E.

and topology of said switch network to obtain a modified form of said received power, and apply said modified form of said power to said load device;

[21.f] said first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and said impedance of said impedance network to transmit at least part of said stored power to said secondary wireless power receiver to power-up said secondary wireless power receiver;

[21.g] said second circuitry, on power-up of said secondary wireless power receiver, configured to identify a type of said secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver;

[21.h] said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;

[21.i] said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.

22. The dual mode wireless power receiver of claim [1] 21, wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier.

Mot. 30–32 (App. A).

B. The Applicable Statutory and Regulatory Requirements

When considering a motion to amend, the Board “must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.” *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential). A “patent owner bears the burden of persuasion to show, by a preponderance of the evidence, that the motion to

amend complies with” the applicable statutory and regulatory requirements.
37 C.F.R. § 42.121(d)(1).

Specifically, a patent owner must provide a claim listing reproducing each proposed substitute claim and must make an initial showing to demonstrate the following:

- (1) the amendment proposes a reasonable number of substitute claims;
- (2) the amendment responds to a ground of unpatentability involved in the trial;
- (3) the amendment does not seek to enlarge the scope of the claims of the patent; and
- (4) the amendment does not introduce new matter.

See 35 U.S.C. § 316(d); 37 C.F.R. § 42.121(a)–(b).

For the reasons explained below, Patent Owner satisfies its burden of persuasion to show that the amendments comply with the applicable statutory and regulatory requirements. *See infra* §§ IV.B.1–IV.B.4.

1. REASONABLE NUMBER OF SUBSTITUTE CLAIMS

In a motion to amend, a patent owner may propose “a reasonable number of substitute claims” for “each challenged claim.” 35 U.S.C. § 316(d)(1)(B); 37 C.F.R. § 42.121(a)(3); *see Lectrosonics*, IPR2018-01129, Paper 15 at 4. There is a rebuttable presumption that “only one substitute claim would be needed to replace each challenged claim.” 37 C.F.R. § 42.121(a)(3); *see Lectrosonics*, IPR2018-01129, Paper 15 at 4.

Patent Owner proposes only one substitute claim for each of challenged claims 1 and 2. *See* Mot. 30–32. Petitioner does not contend that Patent Owner presents an unreasonable number of proposed substitute claims. *See, e.g.,* Opp. 1–7.

Patent Owner satisfies this requirement for a motion to amend.

2. AMENDMENTS RESPONSIVE TO A GROUND OF UNPATENTABILITY

A motion to amend must “respond to a ground of unpatentability involved in the trial.” 37 C.F.R. § 42.121(a)(2)(i); *see Lectrosonics*, IPR2018-01129, Paper 15 at 5.

Petitioner contends that claims 1 and 2 are unpatentable under § 103 because the claims would have been obvious over Chatterjee and Corbridge. *See* Pet. 1, 12–59; Reply 11–24; *supra* §§ III.D.3–III.D.4. In the Institution Decision, the Board determined that Petitioner demonstrated a reasonable likelihood of proving that the combined disclosures in Chatterjee and Corbridge teach the inventions covered by claims 1 and 2. *See* Inst. Dec. 36–79.

Patent Owner’s claim amendments add limitations and attempt to distinguish the proposed substitute claims from Chatterjee and Corbridge. *See* Mot. 30–32. Petitioner does not argue otherwise. *See, e.g.,* Opp. 1–7. Additionally, Patent Owner expressly addresses Chatterjee and Corbridge and urges patentability based on the added limitations. Mot. 21–22; Mot. Reply 11–12.

Patent Owner satisfies this requirement for a motion to amend.

3. SCOPE OF THE CLAIMS

A motion to amend may not “enlarge the scope of the claims of the patent.” 35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii); *see Lectrosonics*, IPR2018-01129, Paper 15 at 6–7. For example, “a proposed substitute claim adding a novel and nonobvious feature or combination to avoid the prior art in an instituted ground of unpatentability will not enlarge

the scope of the claims of the patent.” *Lectrosonics*, IPR2018-01129, Paper 15 at 7.

Patent Owner asserts that the proposed substitute claims do not “enlarge the scope of the claims of the patent” because claim 21 “further limits its corresponding original independent claim 1 by adding two limitations.” Mot. 4. Petitioner does not dispute that proposed substitute claim 21 adds limitations relative to original claim 1. *See, e.g.*, Opp. 1–7.

Patent Owner’s claim amendments add limitations and narrow claim scope. *See* Mot. 30–32. Patent Owner satisfies this requirement for a motion to amend.

4. NEW MATTER

A motion to amend may not “introduce new matter.” 35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii); *see Lectrosonics*, IPR2018-01129, Paper 15 at 7. “New matter is any addition to the claims without support in the original disclosure.” *Lectrosonics*, IPR2018-01129, Paper 15 at 7. Moreover, a motion to amend must show (1) “support in the original disclosure of the patent for each claim that is added or amended” and (2) “support in an earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought.” 37 C.F.R. § 42.121(b)(1)–(2).

(a) Limitation 21.b

Limitation 21.b reads as follows with underlining indicating the language added relative to limitation 1.b: “a first circuitry comprising: an impedance network comprising a collection of two or more electrical components, one of which must be a passive component and one of which

must be either an active component or switch; a switch network; a filter capacitor.” Mot. 30.

(i) Patent Owner’s Position

For limitation 21.b, Patent Owner cites support in (1) the ’312 provisional, (2) the ’310 application for the ’929 patent, and (3) the ’070 application for the ’339 patent. Mot. 5, 10–11. For example, Patent Owner quotes the following disclosure in each application:

The impedance network 101 comprises one or more of passive electronic components, for example, a resistor, a capacitor, a magnetic device, a transducer, transformer etc.; active electronic components, for example, a diode, a transistor such as a metal oxide semiconductor field effect transistor (MOSFET), a bipolar transistor, etc., operational amplifiers, an optoelectronic device, etc., and electronic switches. These electronic components in combination are utilized to vary impedance of the [DMWPR] 100 prior to transmitting power to a secondary wireless power receiver 300.

Id. at 11 (alteration by Patent Owner) (emphases omitted) (quoting Ex. 1006, 14, i.e., ¶ 44;⁷ Ex. 1007, 12, i.e., ¶ 28;⁸ Ex. 2004, 9, i.e., ¶ 24).

(ii) Petitioner’s Position

Petitioner does not contend that limitation 21.b adds new matter or lacks support in each cited application. *See, e.g.*, Opp. 1–7.

(iii) Analysis

Patent Owner identifies sufficient support in each cited application for limitation 21.b. *See* Mot. 5, 10–11; 37 C.F.R. § 42.121(b)(1)–(2).

⁷ For Exhibit 1006 (the ’339 patent’s prosecution history), we cite the page numbers that Petitioner applied to the exhibit.

⁸ For Exhibit 1007 (the ’929 patent’s prosecution history), we cite the page numbers that Petitioner applied to the exhibit.

(b) Limitation 21.e

Limitation 21.e reads as follows with underlining indicating the language added relative to limitation 1.e:

said first circuitry, based on an input from said control logic circuit, configured to change, while configured to receive said power, the impedance of said impedance network and topology of said switch network to obtain a modified form of said received power, and apply said modified form of said power to said load device.

Mot. 31.

(i) Patent Owner's Position

For limitation 21.e, Patent Owner cites support in (1) the '312 provisional, (2) the '310 application for the '929 patent, and (3) the '070 application for the '339 patent. Mot. 6–8, 14–16; *see* Mot. Reply 6–7. For example, Patent Owner quotes the following disclosure in both the '310 application and the '070 application about the dual mode wireless power receiver's operation when powering up:

On receiving sufficient level of power from the wireless power transmitter, the [DMWPR] powers up and starts communicating with the wireless power transmitter. The [DMWPR] adjusts the impedance of its impedance network. The [DMWPR] also adjusts the topology of the switch network, for example from the default non-synchronous rectifier to fully synchronous rectifier.

Mot. 16 (alterations by Patent Owner) (quoting Ex. 1006, 7, i.e., ¶ 9; Ex. 1007, 6, i.e., ¶ 10).

(ii) Petitioner's Position

For limitation 21.e, Petitioner contends that the '312 provisional does not disclose the example included in both the '310 application and the '070 application that describes changing from “the default non-synchronous

rectifier to fully synchronous rectifier.” Opp. 2; *see* Mot. Sur-reply 6–7. Petitioner contends that Dr. Direen admitted that the ’312 provisional does not disclose that example. Opp. 2 (citing Ex. 1020, 70:7–13;⁹ Ex. 2008 ¶ 46); *see* Mot. Sur-reply 7. Therefore, according to Petitioner, the proposed substitute claims do not have an effective filing date of August 13, 2012 (the ’312 provisional’s filing date), contrary to Patent Owner’s position. *See* Opp. 2; Mot. Sur-reply 4.

(iii) Analysis

Patent Owner identifies sufficient support in both the ’310 application and the ’070 application for limitation 21.e. *See* Mot. 6–8, 14–16; *supra* § III.C.5(c); 37 C.F.R. § 42.121(b)(1)–(2). Even if the ’312 provisional lacks support for limitation 21.e, that does not matter. Patent Owner argues in the alternative that if the proposed substitute claims do not have an effective filing date of August 13, 2012 (the ’312 provisional’s filing date), the claims at least have an effective filing date of August 12, 2013 (the ’310 application’s filing date). Mot. Reply 6; *see* Tr. 62:25–63:16.

Further, Chatterjee, Corbridge, and Cook¹⁰ qualify as prior art regardless whether the proposed substitute claims have an effective filing date of August 13, 2012 (the ’312 provisional’s filing date) or an effective filing date of August 12, 2013 (the ’310 application’s filing date). Chatterjee was published on January 27, 2011. Ex. 1003, code (43).

⁹ For Exhibit 1020 (Nov. 14, 2024, Direen Dep. Tr.), we cite the transcript page numbers (upper right) instead of the page numbers (lower right) that Petitioner applied to the exhibit.

¹⁰ US 2009/0243397 A1, published October 1, 2009 (based on an application filed March 4, 2009) (Ex. 1017, “Cook”).

Corbridge was published on April 1, 2010. Ex. 1004, code (43). And Cook was published on October 1, 2009. Ex. 1017, code (43).

For the reasons discussed above, Patent Owner satisfies this requirement for a motion to amend.

5. CONCLUSION CONCERNING THE APPLICABLE STATUTORY AND REGULATORY REQUIREMENTS

For the reasons discussed above, Patent Owner satisfies its burden of persuasion to show that the amendments comply with the applicable statutory and regulatory requirements. *See supra* §§ IV.B.1–IV.B.4; 35 U.S.C. § 316(d); 37 C.F.R. § 42.121(a)–(b).

C. Patentability Analysis of the Proposed Substitute Claims

A “petitioner bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.” 37 C.F.R. § 42.121(d)(2).

Petitioner contends that the proposed substitute claims are unpatentable for the following reasons:

- nonenablement under § 112(a);
- indefiniteness under § 112(b); and
- obviousness under § 103.

See Opp. 5–25; Mot. Sur-reply 4–12. Patent Owner disputes Petitioner’s contentions. *See* Mot. 21–25; Mot. Reply 1–12.

1. CLAIM CONSTRUCTION

Patent Owner’s motion to amend raises claim-construction issues concerning the term “topology” and the phrase “change . . . topology of said switch network.” *See* Mot. 19–20; Opp. 1–7; Mot. Reply 4–10; Mot. Sur-reply 4–8.

(a) Patent Owner's Position

Patent Owner proposes that the Board construe “topology” to mean “a collection of circuit components that perform a type of rectification or a type of power inversion.” Mot. 19 (citing Ex. 2008 ¶ 22); Mot. Reply 4 (citing Ex. 2008 ¶ 22). Patent Owner proposes that the Board construe “change . . . topology of said switch network” to mean “configured to change the topology in a way that changes the type of rectifier or the type of inverter or a rectifier to an inverter or an inverter to a rectifier of the switch network circuit.” Mot. 19–20 (citing Ex. 2008 ¶ 42); Mot. Reply 4 (citing Ex. 2008 ¶ 42).

Patent Owner asserts that both the '929 patent's specification and the '339 patent's specification support its proposed construction for “topology” because each specification “describes at least five switch network ‘topologies’” as follows:

- (1) “a non-synchronous full-bridge rectifier”;
- (2) “a half-synchronous full-bridge rectifier”;
- (3) “a fully-synchronous full-bridge rectifier”;
- (4) “a half-bridge inverter”; and
- (5) “a full-bridge inverter.”

Mot. 20 (citing Ex. 1001, 4:4–7, 4:14–23, 16:49–61; Ex. 2002, 3:67–4:3, 4:9–18, 14:41–58, Figs. 6A–6B, 7A–7B; Ex. 2008 ¶¶ 23–25).

As an example of different rectifier types, Patent Owner quotes the following disclosure: “The dual mode wireless power receiver also adjusts the topology of the switch network, for example from the default non-synchronous rectifier to fully synchronous rectifier.” Mot. 20 (quoting Ex. 1001, 4:4–7; Ex. 2002, 3:66–4:3) (citing Ex. 2008 ¶¶ 26–55).

Further, referencing Figures 6B, 7A, and 7B in both the '929 patent and the '339 patent, Patent Owner asserts as follows:

- (1) certain switches in each figure are identified as “always ON” or “always OFF” and those switches “change the topology between rectification and inversion”; and
- (2) other switches in each figure “with attendant wave forms” are “cycling on and off.”

Mot. 20–21 (citing Ex. 2008 ¶¶ 38–39, 53).

Patent Owner asserts that by changing the “always ON” and “always OFF” switches, “the switch network can be configured as, for example, a non-synchronous full-bridge rectifier, a half-synchronous full-bridge rectifier, or a fully-synchronous full-bridge rectifier.” Mot. 21 (citing Ex. 2008 ¶¶ 38–39, 53); *see* Mot. Reply 8. According to Patent Owner, “[e]ach of these ‘topologies’ differs in functionality based on factors such as the direction of power transfer, the efficiency of power transfer, and the amount of power transferred.” Mot. 21 (citing Ex. 2008 ¶ 53).

Referencing Figure 6A in both the '929 patent and the '339 patent, Patent Owner asserts that Dr. Direen “explained how the four switches shown S3, S4, S5, and S6 are utilized in three different topologies, non-synchronous, half-synchronous, and fully synchronous rectifiers.” Mot. Reply 8. According to Patent Owner, Dr. Direen (1) used the word “fixed” when describing switch operation to mean “open or closed” within “a particular topology” and (2) used the word “cycling” when describing switch operation to mean “rapidly turn on and off” in sync with the incoming alternating signal. *Id.* (citing Ex. 2008 ¶¶ 37–39, 54). Patent Owner asserts that Dr. Direen described three rectifier “topologies” using Figure 6A as follows:

- (1) in “the non-synchronous topology, the four switches (S3 - S6) are disabled, that is fixed and not cycled”;
- (2) in “the half-synchronous rectifier topology, switches S3 and S5 are left open, that is fixed and not cycled, and switches S4 and S5 [sic] are cycled”;¹¹ and
- (3) in “the fully synchronous topology, all four switches are cycled in pairs, and the diodes are in effect out of the circuit.”

Mot. Reply 9–10 (citing Ex. 2002, 14:41–58; Ex. 2008 ¶¶ 30–35).

Additionally, Patent Owner asserts that “rapidly cycling switches within a single topology, such as the fully synchronous rectifier topology, does not meet the limitation ‘topology’ or ‘change . . . topology of the switch network’ as correctly construed.” Mot. Reply 10 (citing Ex. 2008 ¶¶ 35, 54). Patent Owner explains that “simply changing of MOSFETs in an H-Bridge, for example, at a rapid rate” within “a particular topology (e.g., non-synchronous, half-synchronous, and full synchronous) does not constitute a ‘change’ in ‘topology.’” *Id.* at 5 (emphases omitted) (citation omitted) (citing Ex. 2008 ¶¶ 31–32); *see id.* at 5–6.

(b) Petitioner’s Position

Petitioner notes that in the Preliminary Guidance the Board determined that “the claim language ‘change . . . topology of said switch network’ appears to encompass changing the connected/disconnected states of the switches and changing from an inverter to a rectifier (or the opposite).” Opp. 3 (emphasis omitted) (quoting Prelim. Guid. 17); *see* Mot. Sur-reply 4. Petitioner contends that the Board’s preliminary determination

¹¹ Dr. Direen testifies that in the half-synchronous rectifier topology, “S3 and S5 are open and S4 and S6 are cycled.” Ex. 2008 ¶ 32.

comports with “the plain and ordinary meaning of the term ‘topology.’”
Mot. Sur-reply 4; *see id.* at 5.

Petitioner contends that Patent Owner’s proposed construction for “change . . . topology of said switch network” (1) deviates from “the plain and ordinary meaning of the term ‘topology’” and (2) contradicts Patent Owner’s infringement contentions in the Texas case by excluding “changing the connected/disconnected states of the switches.” Opp. 3; Mot. Sur-reply 4; *see supra* § II.C. As support, Petitioner quotes Patent Owner’s infringement contentions as follows: “the switch network is constantly changing its topology while operating in . . . rectification mode” because “the MOSFET switches of the ‘switch network’ . . . change their configuration at a rapid rate” such that “in one instance two of the MOSFETS are on while the other two are off and at another instant the MOSFETs that were on turn off and the ones that were off turn on.” Opp. 3 (alterations by Petitioner) (emphases omitted) (quoting Ex. 1016, 34–35, 37). Petitioner asserts that Patent Owner offers “no persuasive rationale for its position that changing the connected/disconnected state of the switches at a high frequency while ‘cycling’ would not change topology.” Mot. Sur-reply 5 (citing Prelim. Guid. 17).

Referencing Figure 6A in both the ’929 patent and the ’339 patent, Petitioner asserts that “the configuration of the switches in the switch network 102 determines the topology of the switch network 102.” Opp. 3–4. As support, Petitioner quotes Dr. Direen’s testimony as follows: “I would say that the way that the switches are being used in the switch network determines how they -- the -- the topology of the switch network.” *Id.* at 4 (emphasis omitted) (quoting Ex. 1020, 70:10–13). According to Petitioner,

“Dr. Direen confirmed on cross examination, alternating the switches between connected and disconnected states changes the ‘topology’ of the switch network and provides a fully-synchronous rectifier.” *Id.* (emphasis omitted) (citing Ex. 1020, 72:21–73:3).

(c) Analysis

We need not decide whether Patent Owner’s proposed constructions for “topology” and “change . . . topology of said switch network” apply because the combined disclosures in Chatterjee, Corbridge, and Cook teach the inventions covered by proposed substitute claims 21 and 22 regardless whether they apply. *See infra* §§ IV.C.4(b)–(c); *Vivid Techs.*, 200 F.3d at 803.

2. ALLEGED NONENABLEMENT UNDER § 112(a)

(a) Legal Principles

A patent’s specification “must enable the full scope of the invention as defined by its claims.” *Amgen Inc. v. Sanofi*, 143 S. Ct. 1243, 1254 (2023); *see* 35 U.S.C. § 112(a). “The more one claims, the more one must enable.” *Amgen*, 143 S. Ct. at 1254. The enablement requirement “enforces the essential ‘*quid pro quo* of the patent bargain’ by requiring a patentee to teach the public how ‘to practice the full scope of the claimed invention.’” *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 959 F.3d 1091, 1099–100 (Fed. Cir. 2020) (quoting *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244 (Fed. Cir. 2003)).

“To be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without ‘undue experimentation.’” *Genentech, Inc. v. Novo Nordisk, A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997) (quoting *In re Wright*, 999 F.2d 1557,

1561 (Fed. Cir. 1993)). Determining the need for “undue experimentation” is not “a single, simple factual determination, but rather is a conclusion reached by weighing many” factors. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). Those factors (the *Wands* factors) include:

(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

Id. (citing *In re Forman*, 230 USPQ 546, 547 (BPAI 1986)).

The Federal Circuit did not “interpret *Amgen* to have disturbed [its] prior enablement case law, including *Wands* and its factors.” *Baxalta Inc. v. Genentech, Inc.*, 81 F.4th 1362, 1367 (Fed. Cir. 2023). The Office “will continue to use the *Wands* factors to ascertain whether the experimentation required to enable the full scope of the claimed invention is reasonable” because “Federal Circuit precedent applying the *Wands* factors prior to *Amgen* is still informative.” 89 Fed. Reg. 1,563, 1,565–66 (Jan. 10, 2024).

(b) Petitioner’s Position

Petitioner quotes Patent Owner’s contention that proposed substitute claim 21 “requires at least additional control logic that is able to monitor the power delivered to a ‘load device’ such as the battery in order to manage the ‘change in topology of the switch network to obtain a modified form of’ received power.” Opp. 5 (quoting Mot. 24); *see* Mot. Sur-reply 8. Petitioner notes Patent Owner’s contention that Chatterjee, Corbridge, and Cook do not disclose that “additional control logic.” Opp. 5 (citing Mot. 24–25); *see* Mot. Sur-reply 8.

Petitioner contends that the '339 patent does not teach that “additional control logic,” i.e., “control logic” that “manage[s] the change in topology of the switch network to obtain a modified form of received power.” Opp. 5; *see* Mot. Sur-reply 8–9. Petitioner also contends that the '339 patent's description of “control logic circuit 105” as “a state machine, a microcontroller, etc.” does not suffice to enable “control logic” that “manage[s] the change in topology of the switch network to obtain a modified form of received power.” Opp. 6 (quoting Ex. 1001, 19:2) (citing Ex. 1020, 97:10–20; Ex. 1021 ¶ 20); *see* Mot. Sur-reply 8–9.

Further, Petitioner asserts that “Dr. Direen argues that the control logic is not within” an ordinarily skilled artisan's knowledge. Opp. 6 (citing Ex. 2008 ¶ 72); *see* Mot. Sur-reply 8.

(c) Patent Owner's Position

Patent Owner contends that “the claim language pertaining to the ‘control logic’ is disclosed in sufficient detail” to satisfy the enablement requirement. Mot. Reply 3. Specifically, Patent Owner identifies the disclosure that “control logic circuit 105” makes “two adjustments, one to impedance and one to the ‘topology of the switch network 102’ based on two different inputs, (1) the type of wireless transmitter that is sending the power and (2) ‘the level of wireless power being received.’” *Id.* (citing Ex. 1001, 10:63–11:2; Ex. 2002, 8:55–61). Patent Owner also identifies the description of “control logic circuit 105” as “a state machine, a microcontroller, etc.” *Id.* (citing Ex. 1001, 19:1–2; Ex. 2002, 7:8–9). Then, Patent Owner asserts that a state machine may produce an “output” based on one or more inputs that “is a control signal that causes the impedance and topology to change” and corresponds to the claimed “input” to “said first

circuitry” required by limitation 21.e. *Id.* at 3–4 (citing Ex. 2010, 4; Ex. 2011 ¶ 11).

Further, Patent Owner asserts that Petitioner fails to apply enablement principles to the facts, including failing to provide “any evidence regarding experimentation.” Mot. Reply 1, 3.

(d) Analysis

Petitioner has not established by a preponderance of the evidence unpatentability due to nonenablement under § 112(a). *See* Opp. 5–6; Mot. Sur-reply 8–9. Among other things, Petitioner did not address the experimentation needed “to practice the full scope of the claimed invention” or even discuss the *Wands* factors. *See* Opp. 5–6; Mot. Sur-reply 8–9; *AK Steel*, 344 F.3d at 1244. Moreover, Petitioner’s nonenablement argument rests on an erroneous analysis of what proposed substitute claim 21 requires.

Like limitation 1.c, limitation 21.c recites “a second circuitry comprising: a control logic circuit; and a modulator/demodulator circuit.” Mot. 31; *see* Ex. 1001, 27:15–17 (limitation 1.c). Like limitation 1.e, limitation 21.e recites “said first circuitry” receiving “an input from said control logic circuit.” Mot. 31; *see* Ex. 1001, 27:20–21 (limitation 1.e). Then, according to limitation 21.e, “said first circuitry” causes “the impedance of said impedance network and topology of said switch network” to change “while configured to receive said power.” Mot. 31.

Contrary to Patent Owner’s contention, proposed substitute claim 21 does not “require[] at least additional control logic that is able to monitor the power delivered to a ‘load device’ such as the battery in order to manage the ‘change in topology of the switch network to obtain a modified form of

received power.” *See* Mot. 24, 30–32. Rather, claim 21 requires that limitation 21.c’s “control logic circuit” provide an “input” to “said first circuitry” that causes “the impedance of said impedance network and topology of said switch network” to change “while configured to receive said power” as recited in limitation 21.e. *Id.* at 30–32.

A patent’s specification “must only enable the *claimed* invention.” *In re Entresto (Sacubitril/Valsartan)*, 125 F.4th 1090, 1099 (Fed. Cir. 2025) (emphasis in original). For the reasons stated by Patent Owner and supported by Dr. Direen’s testimony, the ’339 patent’s specification enables the feature “said first circuitry” receiving “an input from said control logic circuit” and the other limitations in proposed substitute claim 21. *See* Mot. Reply 3–4; Ex. 1001, 3:66–4:7, 9:15–16, 10:63–11:1, 19:1–2, 19:36–37, 20:30–31, 20:62–63; Ex. 2011 ¶¶ 10–11. For instance, as Patent Owner asserts, a state machine may produce an “output” based on one or more inputs that “is a control signal that causes the impedance and topology to change” and corresponds to the claimed “input” to “said first circuitry” required by limitation 21.e. *See* Mot. Reply 3–4; Ex. 2010, 4; Ex. 2011 ¶ 11.

3. ALLEGED INDEFINITENESS UNDER § 112(b)

(a) Legal Principles

A patent’s specification must “conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.” 35 U.S.C. § 112(b). In particular, “a patent’s claims, viewed in light of the specification and prosecution history, [must] inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instr., Inc.*, 572 U.S. 898, 910 (2014). The definiteness requirement “strikes a ‘delicate

balance’ between ‘the inherent limitations of language’ and providing ‘clear notice of what is claimed.’” *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017) (quoting *Nautilus*, 572 U.S. at 909).

(b) Petitioner’s Position

Petitioner contends that Patent Owner’s proposed constructions for “topology” and “change . . . topology of said switch network” are “unsupported by the specification” and “indefinite.” *See* Opp. 6–7; Mot. Sur-reply 4–5, 7–8. Specifically, Petitioner notes that (1) Patent Owner’s proposed construction for “topology” includes the language “a type of rectification or a type of power inversion” and (2) Patent Owner’s proposed construction for “change . . . topology of said switch network” includes the language “the type of rectifier or the type of inverter.” Opp. 6 (emphasis omitted); Mot. Sur-reply 4–5 (emphases omitted). Petitioner asserts that the ’339 patent’s specification does not use the word “type” to describe an inverter or rectifier category and instead “refers to ‘classes’ of inverter or rectifiers.” Mot. Sur-reply 5 (citing Ex. 1001, 4:20–21). As support, Petitioner quotes the specification’s disclosure about “a class D half bridge inverter, class E half bridge inverter, [and] class D full bridge inverter.” Opp. 7 (quoting Ex. 1001, 4:20–21).

Petitioner asserts that Patent Owner’s proposed constructions render the proposed substitute claims “indefinite” because it is “unclear” to an ordinarily skilled artisan “what constitutes a ‘type’ of a rectifier or inverter.” Opp. 7 (citing Ex. 1021 ¶ 25); Mot. Sur-reply 4–5.

(c) Patent Owner’s Position

Patent Owner contends that Petitioner has not “pointed to any indefiniteness” in the proposed substitute claims or provided any evidence of

indefiniteness. Mot. Reply 10–11. Further, Patent Owner asserts that the proposed substitute claims satisfy the “requirement of reasonable notice” to an ordinarily skilled artisan. *Id.* at 11.

(d) Analysis

Petitioner has not established by a preponderance of the evidence unpatentability due to indefiniteness under § 112(b). *See* Opp. 6–7; Mot. Sur-reply 4–5. In light of the ’339 patent’s specification, “those skilled in the art” would understand the scope of the proposed substitute claims with “reasonable certainty.” *See* Ex. 1001, 4:4–7, 4:16–21, 16:36–56; Ex. 2011 ¶ 17; *Nautilus*, 572 U.S. at 910. The specification discloses different types of rectifiers and different types of inverters. *See* Ex. 1001, 4:4–7, 4:16–23, 16:36–56, 16:62–17:1, 17:11–23, Figs. 6A–6B, 7A–7B; Ex. 2008 ¶¶ 23–25, 38–39; Ex. 2011 ¶ 16.

As examples of different types of rectifiers, the specification describes a “non-synchronous rectifier” and a “fully synchronous rectifier.” Ex. 1001, 4:4–7; *see* Ex. 2008 ¶¶ 23–24; Ex. 2011 ¶ 16. Further, referencing switch network 102 with switches S1a, S3, S4, S5, and S6 shown in Figures 6A and 6B, the specification explains that switches S3, S4, S5, and S6 may:

- (1) operate in a “half synchronous full wave rectification mode”;
- (2) operate in a “full synchronous full wave rectification mode”; or
- (3) remain off so that “full wave rectification happens through the substrate body diodes of switches S3, S4, S5, and S6.”

Ex. 1001, 16:49–56; *see id.* at 16:30–49, Figs. 6A–6B; Ex. 2008 ¶¶ 23–24, 38; Ex. 2011 ¶ 16.

Consistent with the specification's explanation about the "half synchronous full wave rectification mode" and the "full synchronous full wave rectification mode," Dr. Phinney testifies that an ordinarily skilled artisan would recognize that a "synchronous rectifier" results from controlling the switches "to reverse the connection polarity whenever the AC source has a negative value" so that "the AC voltage source is continuously re-connected to deliver a positive (e.g., rectified) voltage at the DC terminals." Ex. 1002 ¶¶ 120, 144.

Additionally, Dr. Direen testifies that a "non-synchronous full-bridge rectifier" results from keeping off or disabling switches S3, S4, S5, and S6 in Figure 6B so that "full wave rectification happens through the substrate body diodes of switches S3, S4, S5, and S6." Ex. 2008 ¶ 38 (citing Ex. 1001, 16:36–62); *see id.* ¶ 31; Ex. 1001, 16:53–56; Ex. 1020, 57:21–59:7. Dr. Phinney similarly testifies that an ordinarily skilled artisan would recognize that a "rectifier formed by diodes" is a "nonsynchronous rectifier." Ex. 1021 ¶ 84; *see id.* ¶ 76 (explaining that a "diode rectifier" corresponds to a "nonsynchronous rectifier").

As examples of different types of inverters, the specification describes a "Class D half bridge inverter," a "Class E half bridge inverter," and a "Class D full bridge inverter." Ex. 1001, 4:20–21; *see id.* at 16:62–17:1, 17:11–23, Figs. 7A–7B; Ex. 2008 ¶¶ 23, 25, 39; Ex. 2011 ¶ 16. That the specification uses the common terminology "Class D" and "Class E" to describe different types of inverters does not make the claim language unclear to an ordinarily skilled artisan. *See* Ex. 2011 ¶ 17.

4. ALLEGED OBVIOUSNESS UNDER § 103
BASED ON CHATTERJEE, CORBRIDGE, AND COOK

Petitioner contends that proposed substitute claims 21 and 22 are unpatentable under § 103 because the claims would have been obvious over Chatterjee, Corbridge, and Cook. *See* Opp. 7–25; Mot. Sur-reply 9–12. Patent Owner disputes Petitioner’s contentions. *See* Mot. 21–25; Mot. Reply 11–12.

Above, we provided overviews of Chatterjee and Corbridge. *See supra* §§ III.D.1–III.D.2. Below, we provide an overview of Cook. Then, we consider the obviousness issues. For the reasons explained below, we agree with Petitioner that proposed substitute claims 21 and 22 are unpatentable under § 103 because the claims would have been obvious over Chatterjee, Corbridge, and Cook.

(a) Overview of Cook (Exhibit 1017)

Cook is a U.S. patent application publication titled “Packaging and Details of a Wireless Power Device,” filed on March 4, 2009, and published on October 1, 2009. Ex. 1017, codes (12), (22), (43), (54). Cook discloses a wireless power system with “a power source, power receiver, and components thereof.” *Id.* at code (57). The wireless power system may include “a parasitic antenna that can improve the coupling” between the power source and the power receiver “in various modes.” *Id.* The antenna may include “both a variable capacitor and a variable inductor, and both of those can be changed in order to change characteristics of the matching.” *Id.*; *see id.* ¶ 103.

Cook explains that transmitting and receiving antennas for wireless power transfer are “preferably resonant antennas, which are substantially

resonant, e.g., within 10% of resonance, 15% of resonance, or 20% of resonance.” Ex. 1017 ¶ 16. Also, in “a magnetically/inductively coupled system,” the antenna is generally “a multi-turn loop of wire” or coil. *Id.* ¶¶ 92, 130.

Cook also explains that tuning an antenna’s resonance frequency may “compensate for detuning effects caused by” the following:

- (1) “extraneous objects (metallic objects at [low frequency] LF and metallic and dielectric objects at [high frequency] HF)”;
- (2) “detuned power receivers in close proximity”;
- (3) “variation of load impedance”; and
- (4) “component tolerances, aging, etc.”

Ex. 1017 ¶¶ 96–100; *see id.* ¶¶ 63–67.

Cook’s Figure 1 (reproduced below) depicts a block diagram for a wireless power transmitter:

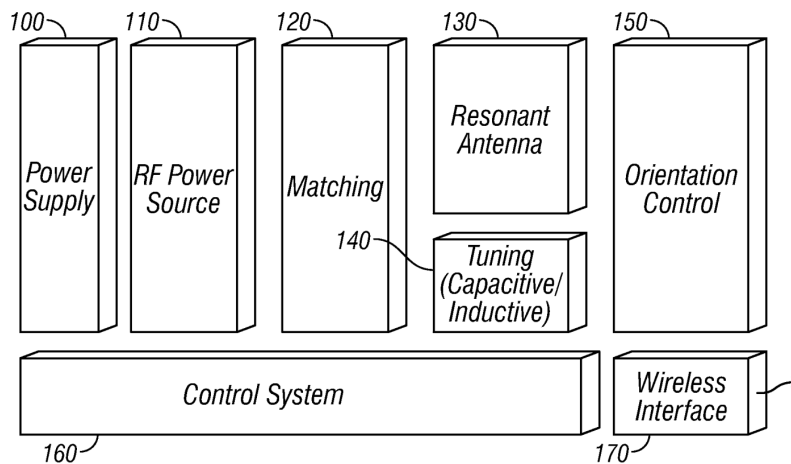


FIG. 1

Figure 1 illustrates a wireless power transmitter including power supply 100, RF power source 110, matching circuit 120, resonant antenna 130, antenna tuning 140, orientation control 150, control system 160, and wireless interface 170. Ex. 1017 ¶¶ 21, 44–45, Fig. 1. Among other things, control

system 160 handles “antenna tuning control” and “power and efficiency control.” *Id.* ¶¶ 76–78.

Cook’s Figure 2 (reproduced below) depicts a block diagram for a wireless power receiver:

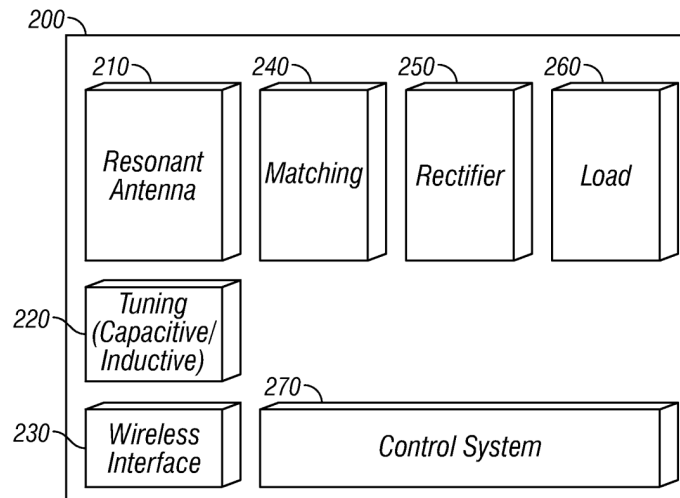


FIG. 2

Figure 2 illustrates a wireless power receiver including resonant antenna 210, antenna tuning 220, wireless interface 230, matching circuit 240, rectifier 250, load 260, and control system 270. Ex. 1017

¶¶ 22, 91, Fig. 2. Among other things, control system 270 handles “antenna tuning control” and “power and efficiency control.” *Id.* ¶¶ 119–121.

“Tuning can be automatically executed by the receiver’s control system according to a defined procedure,” e.g., with a fractional tuning range “in the order of +/-10%.” *Id.* ¶¶ 101–102.

Cook discloses capacitive tuning using (1) “mechanically tuneable capacitors (driven by mini-motor/actuator),” (2) “electrically tuneable capacitors (dielectric permittivity tuning),” and (3) a capacitor bank or library along with “electronic or mechanical switches (RF relays).”

Ex. 1017 ¶¶ 104–107; *see id.* ¶ 239. For example, a capacitor bank may

include “a set of capacitors” in “a series or parallel arrangement with RF switches that may be opened or closed to adjust the effective capacitance.” *Id.* ¶ 239.

Cook’s Figure 16 (reproduced below) depicts an antenna tuning circuit including a set of capacitors in a series arrangement with RF switches:

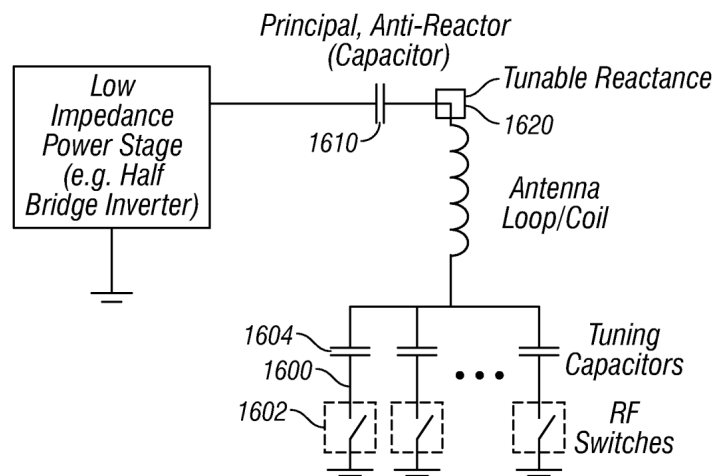


FIG. 16

Figure 16 illustrates an antenna tuning circuit including principal capacitor 1610 and capacitor bank 1600 with “switching elements 1602 to add or remove individual capacitors 1604.” Ex. 1017 ¶¶ 34, 240, Fig. 16.

(b) Independent Claim 21

(i) Preamble and Limitations 21.a, 21.d, and 21.f–21.i

For claim 21’s preamble and limitations 21.a, 21.d, and 21.f–21.i, Petitioner relies on the arguments regarding claim 1’s preamble and limitations 1.a, 1.d, and 1.f–1.i in the challenge based on Chatterjee and Corbridge. *See* Opp. 12, 15, 17, 20–21, 24–25; *supra* §§ III.D.3(a)–(b), III.D.3(e), III.D.3(g)–(j).

Patent Owner makes no arguments specific to claim 21's preamble or limitations 21.a, 21.d, and 21.f–21.i. *See, e.g.*, Mot. 21–25; Mot. Reply 11–12.

For the reasons discussed above for claim 1's preamble and limitations 1.a, 1.d, and 1.f–1.i in the challenge based on Chatterjee and Corbridge, these references teach claim 21's preamble and limitations 21.a, 21.d, and 21.f–21.i. *See supra* §§ III.D.3(a)–(b), III.D.3(e), III.D.3(g)–(j).

(ii) Limitation 21.b

Limitation 21.b reads as follows with underlining indicating the language added relative to limitation 1.b: “a first circuitry comprising: an impedance network comprising a collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch; a switch network; a filter capacitor.” Mot. 30.

a. Petitioner's Contentions

Petitioner contends that Chatterjee in view of Corbridge, Cook, and an ordinarily skilled artisan's knowledge renders limitation 21.b obvious for several related reasons. *See* Opp. 12–15, 20–21. First, for the claimed “switch network” and the claimed “filter capacitor,” Petitioner relies on the arguments regarding limitation 1.b in the challenge based on Chatterjee and Corbridge. *Id.* at 15, 21; *see supra* §§ III.D.3(c)(i).b–c.

Second, for the claimed “impedance network,” Petitioner contends that Chatterjee's Figure 6D depicts capacitor C5 and capacitor C6 in bi-directional coil assembly 634 corresponding to “two or more” components of an “impedance network.” Opp. 12–13, 16. As support, Petitioner quotes Chatterjee's disclosures about bi-directional coil

assembly 634 and power circuit bridge 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 as follows:

In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 634 is the series combination of the capacitor C5 and the inductive coil L6. In the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 634 is parallel combination of the inductive coil L7 and the capacitor C6.

Id. at 12–13 (quoting Ex. 1003 ¶ 73).

Third, for the claimed “impedance network,” Petitioner contends that Cook discloses:

- (1) a wireless power receiver with a resonant antenna comprising “a multi-turn loop of wire” or coil;
- (2) “tuning the antenna’s resonance frequency” to compensate for “variation of load impedance” using capacitive tuning; and
- (3) capacitive tuning using a capacitor bank including “a set of capacitors” in “a series or parallel arrangement with RF switches that may be opened or closed to adjust the effective capacitance.”

Opp. 13–14 (citing Ex. 1017 ¶¶ 46, 91–92, 103–107, 130, 239, Figs. 2, 13, 15–16). As support, Petitioner provides a highlighted version of Cook’s Figure 16 as reproduced below:

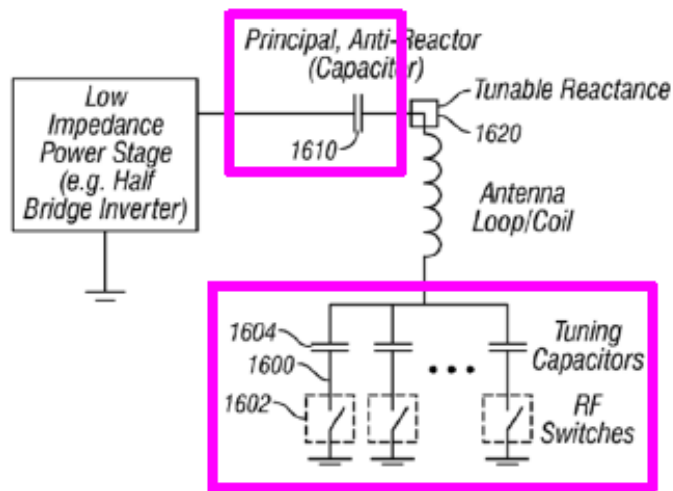


Figure 16 illustrates an antenna tuning circuit including principal capacitor 1610 and capacitor bank 1600 with “switching elements 1602 to add or remove individual capacitors 1604.” Ex. 1017 ¶¶ 34, 240, Fig. 16. The above highlighted version of Figure 16 includes a pink rectangle around principal capacitor 1610 and another pink rectangle around capacitor bank 1600 with multiple switching elements 1602 and multiple capacitors 1604. See Opp. 14; Ex. 1021 ¶ 47.

According to Petitioner, Cook’s capacitor bank 1600 with multiple switching elements 1602 and multiple capacitors 1604 corresponds to the “collection of two or more electrical components, one of which must be a passive component and one of which must be either an active component or switch,” required by limitation 21.b. Opp. 14.

b. Patent Owner’s Contentions

Patent Owner contends that neither Chatterjee nor Corbridge discloses an “impedance network” according to limitation 21.b. Mot. 22.

c. Analysis

For the reasons stated by Petitioner and supported by Dr. Phinney's testimony, we agree with Petitioner that the combined disclosures in Chatterjee and Cook teach limitation 21.b. *See* Pet. 25–34; Opp. 12–15, 20; Ex. 1002 ¶¶ 69, 75, 99, 104, 107–131; Ex. 1015 ¶¶ 64–68; Ex. 1021 ¶¶ 41–50.

For limitation 21.b, Patent Owner addresses Chatterjee and Corbridge but does not address the combined disclosures in Chatterjee and Cook. *See, e.g.,* Mot. 21–23; Mot. Reply 11–12. Where obviousness rests on a combination of references, a patentee cannot establish nonobviousness by attacking the references individually. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

(iii) Limitation 21.c

Like limitation 1.c, limitation 21.c reads as follows: “a second circuitry comprising: a control logic circuit; and a modulator/demodulator circuit.” Mot. 31; *see* Ex. 1001, 27:15–17 (limitation 1.c).

a. Petitioner's Contentions

Petitioner contends that Chatterjee in view of Corbridge, Cook, and an ordinarily skilled artisan's knowledge renders limitation 21.c obvious under Patent Owner's proposed constructions for “topology” and “change . . . topology of said switch network.” *See* Opp. 21–24; Mot. Sur-reply 9–12. Specifically, Petitioner asserts that Chatterjee discloses inductive signal interface 410 with:

- (1) processor 413 corresponding to the claimed “control logic circuit”; and
- (2) modulator 416 and demodulator 417 corresponding to the claimed “modulator/demodulator circuit.”

Opp. 21; *see* Pet. 35, 37–38.

Petitioner asserts that Corbridge “similarly discloses a control logic circuit that controls the switch network, including whether certain switches of the switch network operate as transistors or diodes while in rectification mode,” i.e., “while configured to receive said power” as recited in limitation 21.e. Opp. 21; *see* Mot. Sur-reply 9–12. Petitioner identifies transistor-diode pairs 753, 754, 755, and 756 shown in Corbridge’s Figure 7B that “can selectively operate as ‘a rectifier formed by diodes’ (i.e. nonsynchronous), ‘a synchronous bridge’ (i.e. full synchronous), or a ‘half-synchronous bridge.’” Opp. 21–22 (quoting Ex. 1004 ¶ 85); *see* Mot. Sur-reply 10–12.

As support, Petitioner provides an annotated and highlighted version of Corbridge’s Figure 7B as reproduced below:

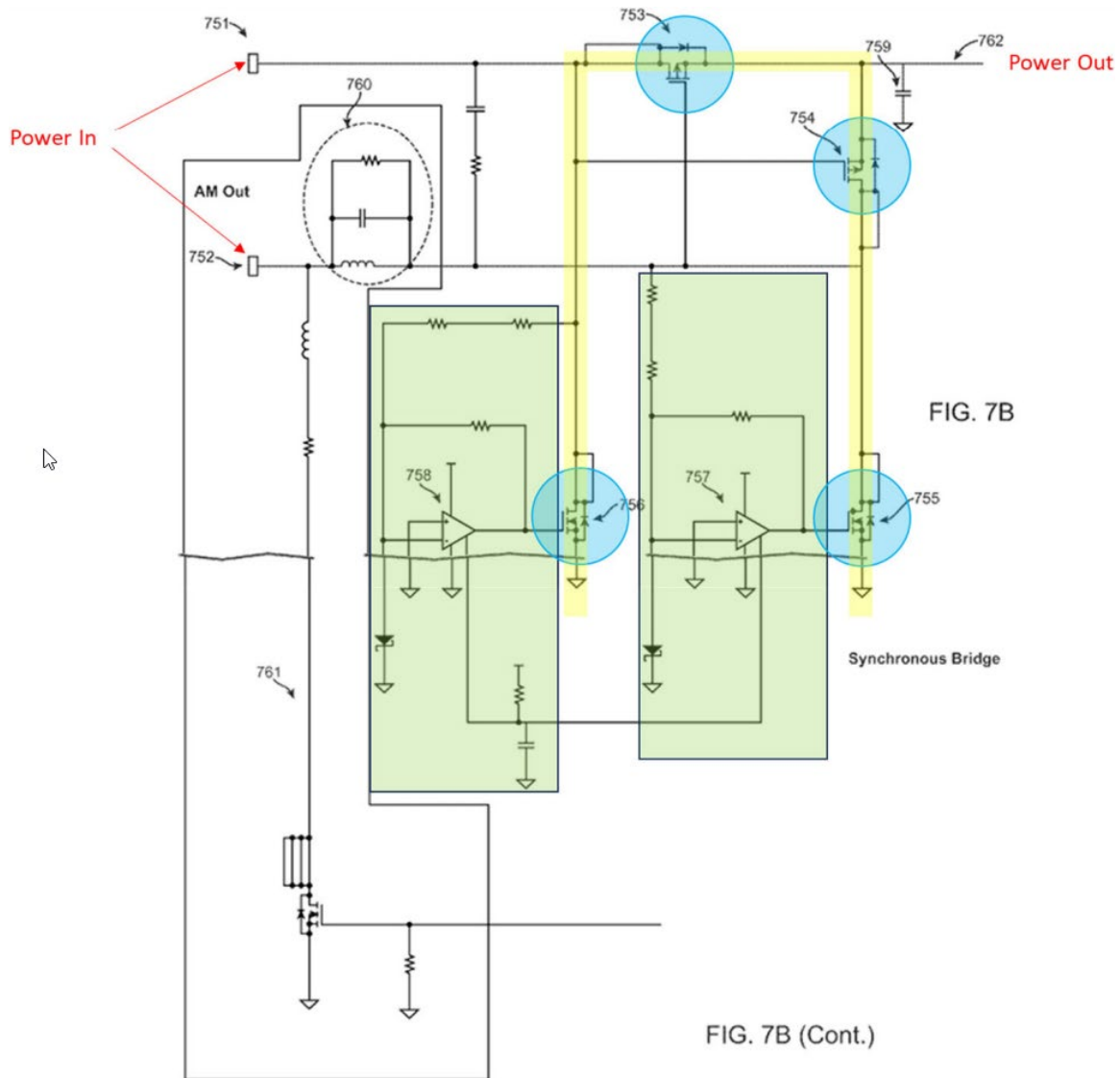


Figure 7B is “a circuit-level diagram illustrating exemplary circuit configurations of a portion of the system shown” in Figure 7A and depicts input/output (I/O) ports 751 and 752, transistor-diode pairs 753, 754, 755, and 756, Op Amps 757 and 758, smoothing capacitor 759, decoupling elements 760, output data signal line 761, and DC power line 762. Ex. 1004 ¶¶ 15, 85, Fig. 7B. The above annotated and highlighted version of Figure 7B includes:

- (1) the red annotation “Power In” identifying I/O ports 751 and 752;

- (2) blue highlighting over transistor-diode pairs 753, 754, 755, and 756;
- (3) yellow highlighting indicating the H-bridge arrangement of transistor-diode pairs 753, 754, 755, and 756;
- (4) green highlighting over Op Amps 757 and 758 and associated circuitry, e.g., resistors and Zener diodes; and
- (5) the red annotation “Power Out” identifying DC power line 762.

See Opp. 22; Ex. 1021 ¶ 83.

Additionally, Petitioner quotes Corbridge’s disclosures that (1) “Op Amp 757 is configured and coupled to output a voltage level to turn on the transistor of transistor diode pair 755 when the diode of transistor diode pair 755 becomes forward-biased” and (2) “Op Amp 758 is similarly configured to perform the same function on transistor diode pair 756.” Opp. 22–23 (emphasis omitted) (quoting Ex. 1004 ¶ 86); *see* Mot. Sur-reply 10–11 (quoting Ex. 1004 ¶ 86). Petitioner asserts that an ordinarily skilled artisan would have understood from those disclosures that “switches 755 and 756 first operate with their switches as diodes rather than transistors, before the transistors get ‘turn[ed] on’ by Op Amp 757 and 758 which are driven by the input voltage.” Opp. 23 (alteration by Petitioner) (quoting Ex. 1004 ¶ 86) (citing Ex. 1021 ¶ 85); *see* Mot. Sur-reply 10–11.

Petitioner explains that “transistors 755 and 756 would only actively switch on and off when the incoming voltage is above a certain threshold, such that the rectifier operates as a synchronous rectifier; and before that, transistors 755 and 756 would operate as diodes to provide nonsynchronous rectification.” Opp. 23 (citing Ex. 1021 ¶ 85); *see* Mot. Sur-reply 11–12. Further, Petitioner asserts that Op Amps 757 and 758 “would be superfluous

if the circuitry was unable to change between the non-synchronous rectifier and synchronous rectifier.” Mot. Sur-reply 12.

If Patent Owner’s proposed constructions for “topology” and “change . . . topology of said switch network” do not apply and “change . . . topology of said switch network” encompasses changing the connected/disconnected states of the switches, Petitioner contends that Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 21.c obvious for the reasons Chatterjee in view of an ordinarily skilled artisan’s knowledge renders limitation 1.c obvious. Opp. 15; *see* Pet. 35–38; *supra* § III.D.3(d).

b. Patent Owner’s Contentions

Patent Owner disputes that the combined disclosures in Chatterjee, Corbridge, and Cook teach limitation 21.c. *See* Mot. 22–25; Mot. Reply 1, 11–12. In particular, Patent Owner contends that proposed substitute claim 21 “requires at least additional control logic that is able to monitor the power delivered to a ‘load device’ such as the battery in order to manage the ‘change in topology of the switch network to obtain a modified form of’ received power.” Mot. 24 (citing Ex. 2008 ¶¶ 57, 72–77, 94); *see* Mot. Reply 1 (quoting Ex. 2008 ¶ 73). Patent Owner also contends that Chatterjee, Corbridge, and Cook do not “disclose such logic, much less disclose such logic connected to a switch network capable of changing topology.” Mot. 24–25 (citing Ex. 2008 ¶¶ 72–77); *see* Mot. Reply 1, 12 (citing Ex. 2008 ¶¶ 72–77). According to Patent Owner, Corbridge’s Figure 7B lacks such logic. Mot. Reply 12 (citing Ex. 1021 ¶¶ 82–86, 88–89; Ex. 2011 ¶¶ 19–21).

Further, Patent Owner asserts that Corbridge “merely provides alternative configurations of a rectifier, but nowhere does it discuss changing

between two types of rectifiers much less for control logic to cause such a change.” Mot. Reply 12 (citing Ex. 2011 ¶¶ 18–27); *see* Mot. 22 (citing Ex. 2008 ¶ 62).

c. Analysis

For the reasons explained below, we agree with Petitioner that the combined disclosures in Chatterjee, Corbridge, and Cook teach limitation 21.c. *See* Opp. 21–24; Mot. Sur-reply 9–12; Ex. 1021 ¶¶ 70–78, 82–86.

Contrary to Patent Owner’s contention, proposed substitute claim 21 does not “require[] at least additional control logic that is able to monitor the power delivered to a ‘load device’ such as the battery in order to manage the ‘change in topology of the switch network to obtain a modified form of’ received power.” *See* Mot. 24, 30–32; *supra* § IV.C.2(d). Rather, claim 21 requires that limitation 21.c’s “control logic circuit” provide an “input” to “said first circuitry” that causes “the impedance of said impedance network and topology of said switch network” to change “while configured to receive said power” as recited in limitation 21.e. Mot. 30–32; *supra* § IV.C.2(d).

Under Patent Owner’s proposed constructions for “topology” and “change . . . topology of said switch network,” the combined disclosures in Chatterjee, Corbridge, and Cook teach limitation 21.c. Specifically, Chatterjee’s processor 413 corresponds to the claimed “control logic circuit,” and Chatterjee’s modulator 416 and demodulator 417 correspond to the claimed “modulator/demodulator circuit.” *See* Ex. 1002 ¶¶ 132–137; Ex. 1003 ¶¶ 41, 51, 55, Fig. 4; Ex. 1021 ¶¶ 51, 82.

Further, for the reasons discussed above for limitation 21.b, Cook discloses using a capacitor bank including “a set of capacitors” in “a series

or parallel arrangement with RF switches” to tune a wireless device’s resonant antenna and change the “impedance of said impedance network” while receiving power. *See* Ex. 1015 ¶¶ 49–50, 66–68; Ex. 1017 ¶¶ 101–107, 239–240, Fig. 16; Ex. 1021 ¶¶ 29–30, 45–47; Opp. 12–15, 17, 25; *supra* § IV.C.4(b)(ii). Cook also discloses that “[t]uning can be automatically executed by the receiver’s control system according to a defined procedure,” i.e., while receiving power. Ex. 1017 ¶ 101; *see* Ex. 1015 ¶¶ 50, 82; Ex. 1021 ¶¶ 30, 62.

Accordingly, Cook teaches providing an “input” to “said first circuitry” that causes the “impedance of said impedance network” to change “while configured to receive said power” as required by proposed substitute claim 21. *See* Ex. 1015 ¶¶ 50, 78–82; Ex. 1017 ¶¶ 101–107, 239–240, Fig. 16; Ex. 1021 ¶¶ 30, 58–62.

Additionally, Corbridge discloses a wireless device with driver circuitry and transistor-diode pairs that change from a nonsynchronous diode-based rectifier to a synchronous transistor-based rectifier while receiving power. *See* Ex. 1004 ¶¶ 80, 83, 85–86, Figs. 7A–7B; Ex. 1021 ¶¶ 71, 75, 83–86. In particular, Corbridge discloses implementing synchronous bridge 730 in Figure 7A with transistor-diode pairs 753, 754, 755, and 756 in Figure 7B. Ex. 1004 ¶¶ 83, 85, Figs. 7A–7B; *see* Ex. 1021 ¶¶ 83–84.

When implementing synchronous bridge 730 with transistor-diode pairs 753, 754, 755, and 756, the “power component of the received AC signal is converted to a DC power signal using a synchronous bridge or rectifier formed by diodes 753, 754, 755, and 756.” Ex. 1004 ¶ 85; *see*

Ex. 1020, 105:1–6; Ex. 1021 ¶ 84. An ordinarily skilled artisan would have recognized that:

- (1) Corbridge’s “rectifier formed by diodes” corresponds to a “nonsynchronous rectifier”; and
- (2) Corbridge’s “synchronous bridge” corresponds to a “fully synchronous rectifier” where “all four transistor[s] operate as part of the rectifier.”

Ex. 1021 ¶ 84; *see id.* ¶ 76 (explaining that a “diode rectifier” corresponds to a “nonsynchronous rectifier”); Ex. 1002 ¶¶ 120, 144 (explaining how a “synchronous rectifier” operates). During the oral hearing, Patent Owner’s counsel acknowledged that a “nonsynchronous rectifier” results from “just using diodes.” Tr. 40:6–7; *see id.* at 41:14–20.

Further, Corbridge explains how Op Amps 757 and 758 control transistors in transistor-diode pairs as follows: “Op Amp 757 is configured and coupled to output a voltage level to turn on the transistor of transistor diode pair 755 when the diode of transistor diode pair 755 becomes forward-biased. Op Amp 758 is similarly configured to perform the same function on transistor diode pair 756.” Ex. 1004 ¶ 86; *see* Ex. 1021 ¶ 85. In light of that explanation, an ordinarily skilled artisan would have understood that:

- (1) “the two switches 755 and 756 first operate with their switches as diodes rather than transistors because when the diode ‘becomes forward-biased,’ that means the diodes are conducting current thus functioning as a rectifier,” i.e., a “nonsynchronous rectifier”; and
- (2) “after the diodes becomes [sic] forward biased, the transistors get ‘turn[ed] on’ by Op Amp 757 and 758 which means the Op Amp 757 and 758 outputs a voltage that is sufficient to drive the transistor to cycle at the frequency of the AC signal” such that the rectifier operates as a “synchronous rectifier.”

Ex. 1021 ¶¶ 84–85; *see* Ex. 1002 ¶¶ 120, 144 (explaining how a “synchronous rectifier” operates).

Accordingly, Corbridge teaches providing an “input” to “said first circuitry” that causes the “topology of said switch network” to change “while configured to receive said power” as required by proposed substitute claim 21. *See* Ex. 1004 ¶¶ 85–86, Fig. 7B; Ex. 1021 ¶¶ 71, 83–85, 88–89.

Together with Chatterjee’s processor 413, Corbridge’s driver circuitry for the transistor-diode pairs corresponds to the claimed “control logic circuit.” *See* Ex. 1002 ¶ 132; Ex. 1021 ¶¶ 71, 75, 82–86. Proposed substitute claim 21 does not limit the claimed “control logic circuit” to a single component. *See* Mot. 30–32.

Consistent with Corbridge’s disclosure about implementing a synchronous bridge with transistor-diode pairs, Dr. Direen testifies that “[w]ithin the context of the patent, the synchronous version will actually switch out the diodes” and “toggle the transistors on and off synchronously with the signal coming in so that you can eliminate that voltage drop” and “boost the efficiency.” Ex. 1020, 29:1–3, 33:18–21. Dr. Direen explains that “what you could do is, is you could wait in a nonsynchronous version for some power to get stored,” and “then once that power’s stored, you could be using that power that came from that source to run the -- the fully synchronous version of the rectifier.” *Id.* at 35:3–8.

Consistent with Corbridge’s disclosure about implementing a synchronous bridge with transistor-diode pairs and Dr. Direen’s testimony, “various wireless power receiver chips available at the time” initially operated in a nonsynchronous mode using diodes for rectification and later transitioned to a synchronous mode using transistors for rectification, e.g.,

after “exceeding a certain power input.” Ex. 1021 ¶ 76; *see* Ex. 1022, 18; Ex. 1023, 36–38; Ex. 1024, 11.

For instance, an October 2011 data sheet for the Texas Instruments UCC28950 full-bridge controller discloses transitioning between nonsynchronous diode-based rectification and synchronous transistor-based rectification as follows:

Synchronous rectification using MOSFETs requires some electrical energy to drive the MOSFETs. There is a condition below some light-load threshold when the MOSFET drive related losses exceed the saving provided by the synchronous rectification. At such light load, it is best to disable the drive circuit and use the internal body diodes of rectifier MOSFETs, or external diodes in parallel with the MOSFETs, for more efficient rectification.

Ex. 1023, 38.

An August 2011 data sheet for the Texas Instruments bq51010/bq51011/bq51013 devices includes a similar disclosure about transitioning between nonsynchronous diode-based rectification and synchronous transistor-based rectification. Ex. 1022, 18. In particular, the data sheet explains that during initial startup (1) “the synchronous rectifier is not enabled” and (2) “the DC rectifier voltage is provided by the diode rectifier.” *Id.*

An ordinarily skilled artisan would have known about “wireless power receiver chips available at the time” that operated in either a nonsynchronous mode using diodes for rectification or a synchronous mode using transistors for rectification. Ex. 1021 ¶ 76 (citing Ex. 1022; Ex. 1023; Ex. 1024); *see id.* ¶ 85.

If Patent Owner’s proposed constructions for “topology” and “change . . . topology of said switch network” do not apply and “change . . . topology of said switch network” encompasses changing the connected/disconnected states of the switches, Chatterjee teaches limitation 21.c. for the reasons Chatterjee teaches limitation 1.c. *See* Pet. 35–38; Opp. 15; Ex. 1002 ¶¶ 132–137, 141–144, 147–149; Ex. 1021 ¶¶ 15, 51, 55–57; *supra* § III.D.3(d).

Regarding changing the connected/disconnected states of the switches, for example, Chatterjee’s processor 413 corresponding to the claimed “control logic circuit” produces signals G1–G6 that control the power bridge circuit’s operation by controlling switches 621–626, respectively, to turn on and off. Ex. 1003 ¶¶ 61, 63; *see* Ex. 1002 ¶¶ 135, 141–144, 147–149; Ex. 1021 ¶ 15. In the power receive mode with the power bridge circuit acting as an rectifier, switches 623–626 controlled by signals G3–G6 rapidly turn on and off and change the circuit’s topology when doing so. *See* Ex. 1002 ¶ 141; Ex. 1003 ¶¶ 65, 69, 71, 73; Ex. 1016, 34–35; Ex. 1021 ¶ 15. In the power transmit mode with the power bridge circuit acting as an inverter, switches 621–624 controlled by signals G1–G4 rapidly turn on and off and change the circuit’s topology when doing so. *See* Ex. 1002 ¶ 147; Ex. 1003 ¶¶ 64, 69, 71, 73; Ex. 1016, 37; Ex. 1021 ¶ 15.

(iv) Limitation 21.e

Limitation 21.e reads as follows with underlining indicating the language added relative to limitation 1.e:

said first circuitry, based on an input from said control logic circuit, configured to change, while configured to receive said power, the impedance of said impedance network and topology of said switch network to obtain a modified form of said

received power, and apply said modified form of said power to said load device.

Mot. 31.

a. Petitioner's Contentions

Petitioner contends that Chatterjee in view of Corbridge, Cook, and an ordinarily skilled artisan's knowledge renders limitation 21.e obvious under Patent Owner's proposed constructions for "topology" and "change . . . topology of said switch network." *See* Opp. 12–15, 24–25. Specifically, Petitioner asserts that "it would have been obvious to configure Chatterjee's power bridge circuit 610" such that switches 623–626 include transistor-diode pairs according to Corbridge to provide the "ability to alternate" between a nonsynchronous diode-based rectifier and a synchronous transistor-based rectifier while receiving power. *Id.* at 24–25 (citing Ex. 1021 ¶ 88). Additionally, Petitioner asserts that Cook discloses using a capacitor bank including "a set of capacitors" in "a series or parallel arrangement with RF switches" to tune a wireless device's resonant antenna and change the "impedance of said impedance network" while receiving power. *Id.* at 12–15, 17, 25.

If Patent Owner's proposed constructions for "topology" and "change . . . topology of said switch network" do not apply and "change . . . topology of said switch network" encompasses changing the connected/disconnected states of the switches, Petitioner contends that Chatterjee in view of an ordinarily skilled artisan's knowledge renders limitation 21.e obvious. *See* Opp. 15–17. Specifically, Petitioner asserts that Chatterjee's Figure 6D illustrates power bridge circuit 610 with H-bridge branch 611, shared branch 612, and sync bridge branch 613 coupled to bi-directional coil

assembly 634 with capacitor C5 and capacitor C6. *Id.* at 16 (citing Ex. 1003 ¶ 72, Fig. 6D). Petitioner maps the claimed “impedance network” to capacitor C5 and capacitor C6. *Id.* Petitioner maps the claimed “switch network” to power bridge circuit 610 including switches 621–626 controlled by signals G1–G6, respectively. *Id.*

Petitioner asserts that Chatterjee’s processor “sends signals G3–G6 to operate the shared branch 612 and sync bridge branch 613 so that the switches 623–626 operate synchronously as a rectifier” such that “each switch alternates between the connected and disconnected states to change the topology of the power bridge circuit.” Opp. 16 (citing Ex. 1003 ¶¶ 4, 65, Fig. 2; Ex. 1021 ¶ 55). Petitioner explains that switches 623–626 “continually” switch on and off while operating synchronously as a rectifier and receiving power. *Id.* (citing Ex. 1003 ¶ 4, Fig. 2; Ex. 1021 ¶ 55).

Further, Petitioner asserts that an ordinarily skilled artisan would have understood that switches 623–626 operating synchronously as a rectifier “obtain a modified form of said received power” (obtain dc power from received ac power) and “apply said modified form of said power to said load device” (apply dc power to the load device, e.g., a rechargeable battery) as required by limitation 21.e. Opp. 16–17 (citing Ex. 1003 ¶ 37; Ex. 1021 ¶ 56).

b. Patent Owner’s Contentions

Patent Owner disputes that the combined disclosures in Chatterjee, Corbridge, and Cook teach limitation 21.e for essentially the same reasons Patent Owner disputes that the combined disclosures teach limitation 21.c. *See* Mot. 22–25; Mot. Reply 1, 11–12.

c. Analysis

For (1) the reasons stated by Petitioner and supported by Dr. Phinney’s testimony and (2) the reasons discussed above for limitation 21.c, we agree with Petitioner that the combined disclosures in Chatterjee, Corbridge, and Cook teach limitation 21.e regardless whether Patent Owner’s proposed constructions for “topology” and “change . . . topology of said switch network” apply. *See* Opp. 12–17, 21–25; Mot. Sur-reply 9–12; Ex. 1015 ¶¶ 49–50, 66–68, 74–83; Ex. 1021 ¶¶ 15, 29–30, 45–47, 51, 53–63, 70–78, 82–86, 88–89; *supra* § IV.C.4(b)(iii).c.

(v) Alleged Reasons to Combine the Teachings of the References

a. Petitioner’s Position

Petitioner identifies reasons that would have prompted an ordinarily skilled artisan to combine the teachings of Chatterjee, Corbridge, and Cook in the way Petitioner proposes, e.g., to improve Chatterjee’s inductive signal interface with Cook’s antenna tuning circuit and permit better performance while receiving power. *See* Pet. 52–56; Reply 22–23; Opp. 8–12, 18–20; *supra* § III.D.3(l)(i). Further, Petitioner asserts that an ordinarily skilled artisan “would have had a reasonable expectation of success” in combining the teachings of the references. *See* Pet. 55; Opp. 11–12, 19–20; *supra* § III.D.3(l)(i). Dr. Phinney’s testimony supports Petitioner’s position. *See* Ex. 1002 ¶¶ 158, 163–170, 173; Ex. 1015 ¶¶ 52–57; Ex. 1021 ¶¶ 32–37, 70–77, 86.

For instance, Dr. Phinney testifies that Cook discloses “a wireless antenna that ‘can have both a variable capacitor and a variable inductor, and both of those can be changed in order to change characteristic[s] of the matching,’ thus ‘improv[ing] the coupling to the power source in various

modes.” Ex. 1015 ¶ 53 (quoting Ex. 1017, code (57)); Ex. 1021 ¶ 33 (quoting Ex. 1017, code (57)). Dr. Phinney testifies that an ordinarily skilled artisan “would have understood that tuning the impedance network during receive mode can ‘compensate for detuning effects caused by extraneous objects (metallic objects at LF and metallic and dielectric objects at HF),’ ‘detuned power receivers in close proximity,’ and ‘variation of load impedance,’ as well as ‘component tolerances, aging, etc.’” Ex. 1015 ¶ 54 (quoting Ex. 1017 ¶¶ 96–100); Ex. 1021 ¶ 34 (quoting Ex. 1017 ¶¶ 96–100); *see* Ex. 1015 ¶ 56 (citing Ex. 1017 ¶¶ 16, 96–100); Ex. 1021 ¶ 36 (citing Ex. 1017 ¶¶ 16, 96–100). Dr. Phinney explains that tuning an antenna according to Cook’s teachings would “improve antenna resonance matching and ‘maximize receiver efficiency.’” Ex. 1015 ¶ 56 (quoting Ex. 1017 ¶ 124); Ex. 1021 ¶ 36 (quoting Ex. 1017 ¶ 124).

Further, Dr. Phinney testifies that the proposed Chatterjee-Cook combination “would have involved ‘the mere application of a known technique’—Cook’s teachings regarding capacitive tuning using a capacitor bank and switches—to a piece of prior art”—Chatterjee’s inductive signal interface 410—that is ‘ready for the improvement.’” Ex. 1015 ¶ 55 (citing Ex. 1017 ¶¶ 104–107); Ex. 1021 ¶ 35 (citing Ex. 1017 ¶¶ 104–107). Dr. Phinney also testifies that the proposed Chatterjee-Cook combination “would have resulted in simply applying Cook’s teaching about capacitive tuning in Chatterjee’s inductive signal interface in the same way as it functions in Cook.” Ex. 1015 ¶ 55; Ex. 1021 ¶ 35.

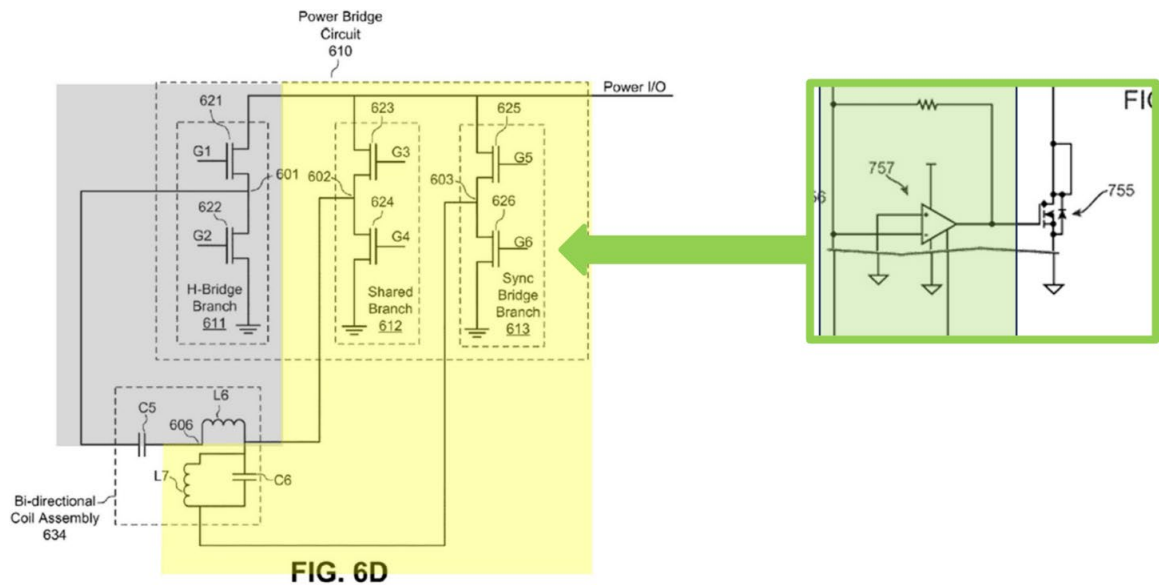
More particularly, Dr. Phinney explains that an ordinarily skilled artisan “would have understood that such a combination could be implemented” by adding Cook’s capacitor bank 1600 as shown in Cook’s

Figure 16 “in series with Chatterjee’s capacitor C6” as shown in Chatterjee’s Figure 6D. Ex. 1015 ¶ 57 (citing Ex. 1017 ¶ 240, Fig. 16); Ex. 1021 ¶ 37 (citing Ex. 1017 ¶ 240, Fig. 16).

Additionally, Dr. Phinney testifies that Corbridge discloses using (1) transistor-diode pairs for the switches in a full-bridge rectifier and (2) “driver circuitry that drives the switches such that certain switches first operate as diodes, before activating transistors that can [be] actively turned on and off to provide synchronous rectification.” Ex. 1021 ¶ 71 (citing Ex. 1004 ¶¶ 80, 85). Dr. Phinney also testifies that an ordinarily skilled artisan would have employed Corbridge’s transistor-diode pairs in Chatterjee’s power bridge circuit to improve performance by providing both a nonsynchronous diode-based rectifier and a synchronous transistor-based rectifier. *Id.* ¶¶ 72, 77, 86.

Further, Dr. Phinney testifies that the proposed Chatterjee-Corbridge combination “would have involved ‘the mere application of a known technique’—Corbridge’s teaching regarding using transistor diode pairs to provide different types of rectifiers—‘to a piece of prior art’—Chatterjee’s power bridge circuit—that is ‘ready for the improvement.’” Ex. 1021 ¶ 72 (citing Ex. 1004 ¶¶ 80, 85).

More particularly, Dr. Phinney explains that an ordinarily skilled artisan would have replaced switches 623–626 in Chatterjee’s power bridge circuit 610 with Corbridge’s transistor-diode pairs and driver circuitry to implement both a nonsynchronous diode-based rectifier and a synchronous transistor-based rectifier. Ex. 1021 ¶¶ 73, 86; *see id.* ¶¶ 74, 77. Dr. Phinney provides the composite figure reproduced below to further explain the proposed Chatterjee-Corbridge combination:



(Power Receive Mode)

Above on the left, the composite figure includes Chatterjee's Figure 6D with the following:

- (1) the annotation "Power Receive Mode";
- (2) yellow highlighting over (a) shared branch 612 with switches 623 and 624, (b) sync bridge branch 613 with switches 625 and 626, and (c) the parallel connection of capacitor C6 and inductive coil L7; and
- (3) gray highlighting over (a) H-bridge branch 611 with switches 621 and 622 and (b) the series connection of capacitor C5 and inductive coil L6.

See id. ¶ 86. Above on the right, the composite figure includes an excerpt from Corbridge's Figure 7B depicting transistor-diode pair 755 and driver circuitry with green highlighting over the driver circuitry. *Id.* The composite figure also shows a green arrow pointing from the figure on the right to the figure on the left. *Id.*

Also, Dr. Phinney explains why an ordinarily skilled artisan would have had a reasonable expectation of success in combining the teachings of

Chatterjee, Corbridge, and Cook. *See* Ex. 1015 ¶ 57; Ex. 1021 ¶¶ 37, 74–77. As an example, Dr. Phinney explains for the proposed Chatterjee-Cook combination that an ordinarily skilled artisan “would have been familiar with how to use [Chatterjee’s] processor 413 to also control the switches for capacitive tuning pursuant to Cook’s teaching.” Ex. 1015 ¶ 57; Ex. 1021 ¶ 37. As another example, Dr. Phinney explains for the proposed Chatterjee-Corbridge combination that an ordinarily skilled artisan would have known about “wireless power receiver chips available at the time” that operated in either a nonsynchronous mode using diodes for rectification or a synchronous mode using transistors for rectification. Ex. 1021 ¶ 76 (citing Ex. 1022; Ex. 1023; Ex. 1024); *see id.* ¶ 85.

b. Patent Owner’s Position

Patent Owner contends that “Dr. Phinney’s conclusory statements are inadequate” to demonstrate a motivation to combine the teachings of Chatterjee, Corbridge, and Cook in the way Petitioner proposes. Mot. 23 (citation omitted) (citing Ex. 1015 ¶ 54; Ex. 2008 ¶¶ 74–77). Patent Owner also contends that “Dr. Phinney does not offer any detailed explanation of how these references could be modified to implement” the “additional control logic that is able to monitor the power delivered to a ‘load device’ such as the battery in order to manage the ‘change in topology of the switch network to obtain a modified form of’ received power.” *Id.* at 24–25 (citing Ex. 2008 ¶¶ 60, 72–77).

c. Analysis

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that an ordinarily skilled artisan would have had reasons to combine the teachings of Chatterjee, Corbridge, and

Cook in the way Petitioner proposes. *See* Pet. 52–56; Reply 22–23; Opp. 8–12, 18–20; Ex. 1002 ¶¶ 158, 163–169, 173; Ex. 1015 ¶¶ 52–56; Ex. 1021 ¶¶ 32–36, 70–73, 86; *supra* § III.D.3(l)(iii). Further, for the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that an ordinarily skilled artisan would have had a reasonable expectation of success in combining the teachings of the references. *See* Pet. 55; Opp. 11–12, 19–20; Ex. 1002 ¶ 170; Ex. 1015 ¶ 57; Ex. 1021 ¶¶ 37, 74–77; *supra* § III.D.3(l)(iii).

“There is a motivation to combine when a known technique ‘has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way,’ using the ‘prior art elements according to their established functions.’” *Intel*, 61 F.4th at 1380–81 (quoting *KSR*, 550 U.S. at 417; *Intel*, 21 F.4th at 799–800). Here, Petitioner and Dr. Phinney identify known techniques taught by Corbridge and Cook used to improve one device that would improve Chatterjee’s similar device in the same way when used according to the teachings of Corbridge and Cook. *See* Pet. 52–56; Reply 22–23; Opp. 8–12, 18–20; Ex. 1002 ¶¶ 158, 163–169, 173; Ex. 1003 ¶¶ 34, 48; Ex. 1004 ¶¶ 23, 27–28, 80, 85–86, 109–113, Figs. 7A–7B, 11; Ex. 1015 ¶¶ 52–56; Ex. 1017 ¶¶ 101–107, 239–240, Fig. 16; Ex. 1021 ¶¶ 32–36, 70–73, 75–76, 86; *supra* § III.D.3(l)(iii).

Patent Owner’s contention that “Dr. Phinney’s conclusory statements are inadequate” to demonstrate a motivation to combine lacks merit. *See* Mot. 23. Dr. Phinney provides detailed explanations why an ordinarily skilled artisan would have been motivated to combine the teachings of Chatterjee, Corbridge, and Cook in the way Petitioner proposes. *See*

Ex. 1002 ¶¶ 158, 163–169, 173; Ex. 1015 ¶¶ 52–56; Ex. 1021 ¶¶ 32–36, 70–73, 86.

As for Patent Owner’s contention concerning the “additional control logic that is able to monitor the power delivered to a ‘load device’ such as the battery in order to manage the ‘change in topology of the switch network to obtain a modified form of’ received power,” we previously explained that proposed substitute claim 21 does not require that “additional control logic.” *See* Mot. 24–25; *supra* §§ IV.C.2(d), IV.C.4(b)(iii).c.

(vi) Conclusion About Obviousness/Nonobviousness

For the reasons discussed above, the combined disclosures in Chatterjee, Corbridge, and Cook teach the invention covered by proposed substitute claim 21. *See supra* §§ IV.C.4(b)(i)–(b)(iv). Moreover, an ordinarily skilled artisan would have been motivated to combine the teachings of Chatterjee, Corbridge, and Cook in the way Petitioner proposes and would have had a reasonable expectation of success. *See supra* §§ III.D.3(l)(iii), IV.C.4(b)(v).c. Hence, Petitioner has shown by a preponderance of the evidence that proposed substitute claim 21 is unpatentable under § 103 because the claim would have been obvious over Chatterjee, Corbridge, and Cook.

(c) Dependent Claim 22

Like claim 2, claim 22 recites “wherein said switch network of said first circuitry is configured as one of an inverter and a rectifier.” Mot. 32; *see* Ex. 1001, 27:44–46 (claim 2).

For claim 22, Petitioner relies on the arguments regarding claim 2 in the challenge based on Chatterjee and Corbridge. *See* Opp. 17, 25; *supra* § III.D.4(a).

Patent Owner makes no arguments specific to claim 22. *See, e.g.*, Mot. 21–25; Mot. Reply 11–12.

For the reasons stated by Petitioner and supported by Dr. Phinney’s testimony, we agree with Petitioner that Chatterjee teaches claim 22’s limitation. *See* Pet. 58–59; Opp. 17, 25; Ex. 1002 ¶¶ 121, 178–179; Ex. 1021 ¶¶ 68, 94; *supra* § III.D.4(a). Moreover, an ordinarily skilled artisan would have been motivated to combine the teachings of Chatterjee, Corbridge, and Cook in the way Petitioner proposes and would have had a reasonable expectation of success. *See supra* §§ III.D.3(l)(iii), IV.C.4(b)(v).c. Hence, Petitioner has shown by a preponderance of the evidence that proposed substitute claim 22 is unpatentable under § 103 because the claim would have been obvious over Chatterjee, Corbridge, and Cook.

V. CONCLUSION

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner has shown by a preponderance of the evidence that claims 1–3, 5, 7, and 9 in the ’339 patent are unpatentable under § 103 because the claims would have been obvious over Chatterjee and Corbridge.¹²

¹² Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding after the issuance of this Final Written Decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–3, 5, 7, 9	103	Chatterjee, Corbridge	1–3, 5, 7, 9	

Further, we reach the following conclusions concerning Patent Owner’s Revised Contingent Motion to Amend:

Motion to Amend Outcome	Claim(s)
Original Claims Canceled by Amendment	
Substitute Claims Proposed in the Amendment	21, 22
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21, 22
Substitute Claims: Not Reached	

VI. ORDER

Accordingly, it is

ORDERED that claims 1–3, 5, 7, and 9 in the ’339 patent are determined to be unpatentable;

FURTHER ORDERED that Patent Owner’s Revised Contingent Motion to Amend (Paper 17) is denied; and

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

any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

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