

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner,

v.

WIPQTUS, INC.
Patent Owner.

Case IPR2024-00023
Patent No. 10,038,339

**PETITIONER'S OPPOSITION TO PATENT OWNER'S
REVISED MOTION TO AMEND**

TABLE OF CONTENTS

I.	CLAIM CONSTRUCTION	1
II.	SUBSTITUTE CLAIMS 21 and 22 ARE INVALID UNDER 35 U.S.C. 112 FOR INDEFINITENESS AND/OR LACK OF ENABLEMENT	5
A.	Lack of Enablement.....	5
B.	Indefiniteness.....	6
III.	SUBSTITUTE CLAIMS 21 and 22 ARE INVALID UNDER 35 U.S.C. 103.....	7
A.	GROUND 1: Chatterjee in view of Corbridge, Cook, and the Knowledge of a POSA	7
1.	Motivation to Combine	8
2.	Claim 21	12
3.	Claims 22	17
B.	GROUND 2: Chatterjee in view of Corbridge, Cook, and the Knowledge of a POSA	17
1.	Motivation to Combine	18
2.	Claim 21	20
3.	Claim 22	25
	CERTIFICATE OF SERVICE	27

LIST OF EXHIBITS

Exhibit	Description
Ex. 1001	U.S. Patent No. 10,038,339 to Sankar et al. (“the ’339 patent”)
Ex. 1002	Declaration of Dr. Joshua Phinney (“Phinney”)
Ex. 1003	U.S. Patent Publication No. US2011/0018356 (“Chatterjee”)
Ex. 1004	U.S. Patent Publication No. US2010/0083012 (“Corbridge”)
Ex. 1005	CV of Dr. Joshua Phinney
Ex. 1006	Prosecution History of the ’339 patent
Ex. 1007	Prosecution History of U.S. Patent No. 9,343,929
Ex. 1008	System Description, Wireless Power Transfer, Volume I: Low Power, Part 1: Interface Definition, Version 1.0.3, September 2011 (“WPT”)
Ex. 1009	<i>Hulu LLC v. SITO Mobile R&D IP, LLC et al.</i> , IPR2021-00298, Paper 11 (P.T.A.B. May 19, 2021)
Ex. 1010	<i>WiPQTUS Inc. v. Samsung Elec. Co., Ltd. at al.</i> , Case No. 2:23-cv-00054, Dkt. 28 (Docket Control Order) (E.D. Tex.)
Ex. 1011	<i>Verizon Business Network Services, Inc. v. Huawei Techs. Co.</i> , IPR2020-01141, Paper 12 (Jan. 14, 2021)
Ex. 1012	<i>Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC</i> , IPR2019-01393, Paper 24 (P.T.A.B. June 16, 2020)
Ex. 1013	<i>Samsung Elecs. Co. Ltd. v. Dynamics Inc.</i> , IPR2020-00505, Paper 11 (P.T.A.B. Aug. 12, 2020)
Ex. 1014	Deposition Transcript of Dr. Randell Direen (“Direen-Depo”)
Ex. 1015	Supplemental Declaration of Dr. Joshua Phinney (“Phinney-Supp”)
Ex. 1016	Exhibit 2 of WiPQTUS’ Infringement Contentions

Ex. 1017	U.S. Patent Publication No. 2009/0243397 (“Cook”)
Ex. 1018	U.S. Patent Publication No. 2013/0062959 (“Lee”)
Ex. 1020	Deposition Transcript of Dr. Randell Direen of Nov. 14, 2024 (“Direen-Depo-2”)
Ex. 1021	Second Supplemental Declaration of Dr. Joshua Phinney (“Phinney-Supp-2”)
Ex. 1022	Integrated Wireless Power Supply Receiver, Qi (Wireless Power Consortium) Compliant (“bq51013”)
Ex. 1023	Green Phase-Shifted Full-Bridge Controller With Synchronous Rectification (“UCC28950”)
Ex. 1024	IDTP9020 Product Datasheet (“IDTP9020”)
Ex. 1025	Screenshot of https://web.archive.org/web/20120131194013/http://www.ti.com:80/lit/ds/symlink/bq51013.pdf visited on November 19, 2024

Patent Owner's Revised Motion to Amend ("Revised Motion") provides only two proposed amendments: one is very similar to an amendment in the original motion to amend, and the other is the same as in the original motion to amend. The Board determined in its Preliminary Guidance (Paper 15, "Guidance") that the first proposed amendments would likely fail for several reasons, including under §§112 and 103. Proposed revised substitute Claims 21 and 22 should similarly be denied here. In an attempt to overcome the deficiencies in its proposed substitute claims, Patent Owner introduces a claim construction for the first time for the terms "*topology*" and "*change ... topology of said switch network.*" As shown below, these proposed constructions are not supported by the intrinsic record and do not provide a basis for patentability for the substitute claims.

I. CLAIM CONSTRUCTION

Patent Owner proposes that the claim term "*topology*"¹ should be construed as "a collection of circuit components that perform a type of rectification or a type of power inversion." Revised Motion, 19. Furthermore, Patent Owner proposes that the claim phrase "*change ... topology of said switch network*" should be construed as "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." *Id.*, 19-20. In support of its proposed claim construction,

¹ Quoted and italicized text herein provides language from the substitute claims.

Patent Owner argues that the “specifications discuss changing the topology during power receiving mode, for example when it explains that ‘[t]he 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.’” Revised Motion, 20. Yet, Patent Owner’s expert Dr. Direen admitted during cross-examination that this example of changing from non-synchronous rectifier to fully-synchronous rectifier is not disclosed in the ’312 Provisional Application (Ex. 2004) to which Patent Owner claims priority for the ’339 patent. Direen-Depo-2(EX1020), 70:7-13. In fact, Dr. Direen concedes in his Declaration that the entire passage in the specification cited by Patent Owner as supporting is proposed construction of “*topology*,” “**does not appear in the ’312 Provisional Application.**” Declaration of Dr. Direen in Support of Patent Owner’s Revised Motion to Amend (EX2008, “Direen-Decl-2”), ¶46.

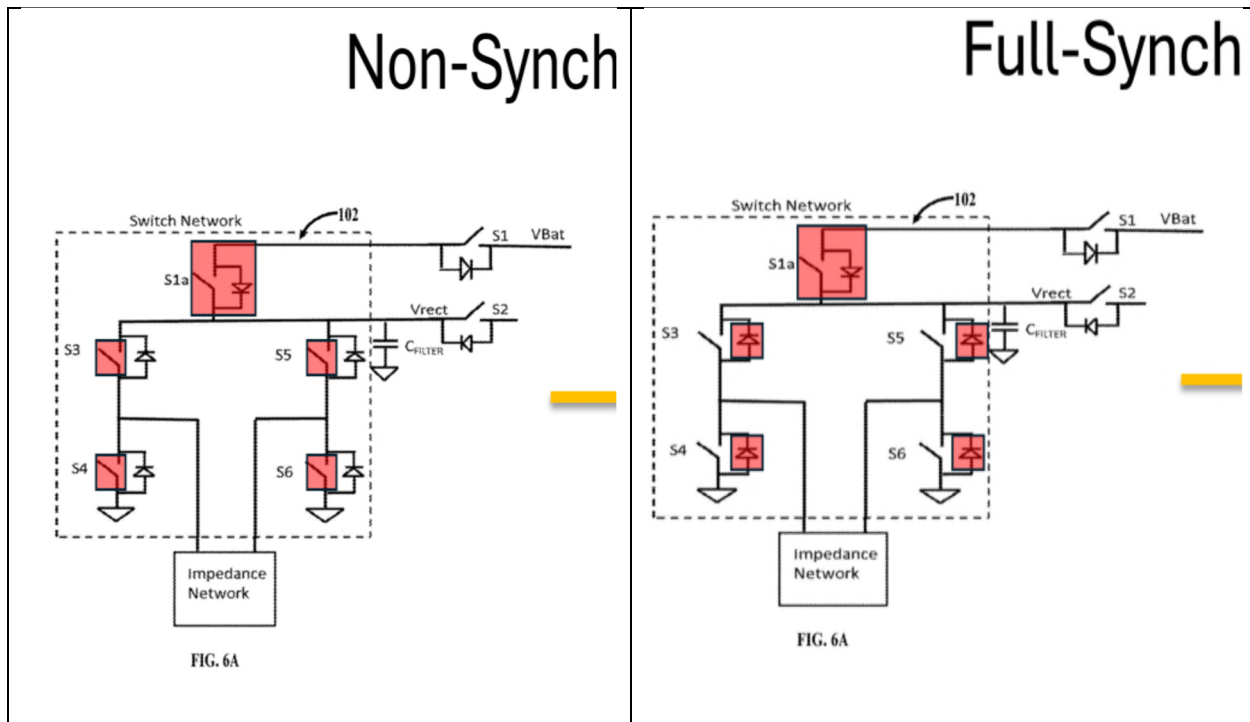
Claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’”). Any special definitions for claim terms must be set forth in the Specification with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475,

1480 (Fed. Cir. 1994).

Both parties agree that changing from an inverter to a rectifier, or the opposite, satisfies the claim phrase “*change ... topology of said switch network,*” but Patent Owner argues that changing the connected/disconnected states of switches by a rectifier, such as a fully-synchronous rectifier, does not satisfy the claim. Direen-Decl-2(EX2008), ¶55. Yet this position is directly contradictory to Patent Owner’s infringement contentions that argue that “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.**” EX1016, 34-35, 37. Thus, Patent Owner’s own infringement contentions argue that turning on and off the MOSFET switches changes the topology of the switch network. *Id.* The Board reviewed this issue in its Preliminary Guidance and 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).” Guidance, 17.

As shown in a comparison of Dr. Direen’s annotations to Fig. 6A of the ’339 patent below, the configuration of the switches in the switch network 102 determines

the topology of the switch network 102.



Direen-Decl-2(EX2008), ¶¶31, 33. Dr. Direen confirmed this on cross examination:

“Q. Dr. Direen, does the configuration of the switches of a switch network determine the topology for a switch network? A. **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.**” Direen-Depo(EX1020), 70:7-13. Thus, as 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.*, 72:21-73:3 (“in the full synchronous version none of the -- the -- those four switches stay stationery during the operation, they all synchronously turn on and off with the incoming signals.”). Accordingly, there is no

reason to disturb the Board’s previous determination 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).” Guidance, 17.

II. **SUBSTITUTE CLAIMS 21 and 22 ARE INVALID UNDER 35 U.S.C. §112 FOR LACK OF ENABLEMENT AND/OR INDEFINITENESS**

Patent Owner’s Revised Motion to Amend should not be granted because Patent Owner’s proposed claims are indefinite and lack enablement.

A. **Lack of Enablement**

Patent Owner’s proposed amendments to Claim 21 fail under §112 for a lack of enablement. Specifically, Patent Owner suggests that the amended claim [21.e] “requires at least additional control logic that is able to monitor that 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’ and argues that the asserted prior art is deficient for failing to teach such ‘control logic.’” Revised Motion, 24-25; Direen-Decl-2(EX2008), ¶¶73-77. However, the ’339 Patent does not teach “control logic” to manage the change in topology of the switch network to obtain a modified form of received power. Indeed, Patent Owner’s expert Dr. Direen conceded during cross-examination that the primary example from the specification that Patent Owner relies on as written description for its proposed amendment—“changing from non-synchronous to fully synchronous”—is not disclosed in the

provisional application to which the '339 patent claims priority. Direen-Depo-2(EX1020), 53:22-54:16. The generic disclosures in the '339 patent of the control logic as “a state machine, a microcontroller” (EX1001, 19:1-2) are not sufficient to enable “control logic” that can “manage the change in topology of the switch network to obtain a modified form of received power.” Phinney-Supp-2(EX1021), ¶20; *see also* Direen-Depo-2(EX1020), 97:10-20. Furthermore, Dr. Direen argues that the control logic is not within the knowledge of a POSA. Direen-Decl-2(EX2008), ¶72. Therefore, substitute Claim 21 lacks enablement.

B. Indefiniteness

The proposed amendments to Claim 21 also fail under § 112 as they are indefinite under Patent Owner’s proposed construction of “*topology*.” As discussed above, Patent Owner argues that “*topology*” means “a group of circuit components that perform a *type* of rectification of a *type* of power inversion”; and “*change ... topology of said switch network*” means “configured to change 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.” Revised Motion, 19-20. Patent Owner proposes this construction in an attempt to rebut that Board’s conclusion in the Preliminary Guidance that “*change ... topology of said switch network*” should be construed broadly to encompass “changing the connected/disconnected states of the switches.” Guidance, 17; *see also* Direen-Decl-

2(EX2008), ¶¶35, 54. But Patent Owner’s proposed construction renders the claim indefinite because it would be unclear to a POSA what constitutes a “type” of rectifier or inverter. Phinney-Supp-2, ¶25. For example, the ’339 patent describes various categories of inverters such as “a class D half bridge inverter, class E half bridge inverter, class D full bridge inverter,” but not even Dr. Direen could explain on cross-examination whether these are different “types” of inverters under Patent Owner’s construction of the term “*topology*.” As such, it is unclear, even to Dr. Direen, what it means to change the type of the switch network, such as whether it encompasses changing from a “class D half bridge inverter” to a “class E half bridge inverter.” Therefore, the claim fails to inform a POSA the reasonable scope of the claim and is indefinite.

III. SUBSTITUTE CLAIMS 21 and 22 ARE INVALID UNDER 35 U.S.C. §103

Substitute Claims 21 and 22 are obvious as follows.

Ground No.	Obviousness Grounds
1	Claims 21 and 22 are obvious based on Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA.
2	Under Patent Owner’s proposed construction of “ <i>topology</i> ,” substitute Claims 21 and 22 are obvious based on Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA.

A. GROUND 1: Chatterjee in view of Corbridge, Cook, and the Knowledge of a POSA

Assuming the Board correctly denies Patent Owner’s proposed construction of “*topology*” and maintains the construction applied in the Preliminary Guidance,

substitute Claims 21 and 22 should be found obvious for the same reasons as proposed in Ground 1 of Petitioner's first Opposition to the Motion to Amend. Petitioner's Opposition (Paper 14 ("First Opposition")), 9-18. The only difference between the first substitute Claim 21 and the revised substitute Claim 21 is Patent Owner's modification of the amendment to the claimed "*impedance network*" comprises components "one of which must be a passive component and one of which must be either an active component or switch." As determined in the Board's Preliminary Guidance and set forth below, such an "*impedance network*" is obvious in view of the cited prior art. Guidance, 18-22.

Chatterjee and Corbridge are both prior art as explained in the Petition. Pet., 12, 14. Cook was filed on March 4, 2009 and published on October 1, 2009 and thus qualifies as prior art under at least pre-AIA 35 U.S.C. §§102(a), and 102(b) and post-AIA 35 U.S.C. §§102(a)(1) or 102(a)(2).

1. Motivation to Combine

Chatterjee teaches an inductive signal interface that selectively operates in a power transmit mode and a power receive mode. Petition, 12-14 (citing Chatterjee(EX1003), ¶46). Corbridge similarly teaches an inductive signal transfer system, and in particular, teaches establishing a communication protocol for wireless power transmission. Petition, 14-15 (citing Corbridge(EX1004), ¶27). A POSA would have found it obvious to improve Chatterjee's inductive signal interface such

that, in the power transmit mode, it implements the sequence of signaling disclosed in Corbridge. Petition, §V.C.8.c (53-55). However, neither Chatterjee nor Corbridge expressly disclose changing impedance of the impedance network comprising at least one passive component and at least one active component or switch while the inductive signal interface is configured to receive power.

Cook teaches “[a] wireless power system includ[ing] a power source, power receiver, and components thereof.” Cook(EX1017), Abstract. In particular, Cook teaches 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 of the matching,” thus “improv[ing] the coupling.” Cook(EX1017), Abstract. Cook further teaches that the variable capacitor can comprise a “capacitor bank” which comprises at least one capacitor connected in series with at least one switch. Cook(EX1017), ¶¶104-107, 239, Fig. 16.

A POSA would have been motivated to improve Chatterjee’s inductive signal interface such that, in power receive mode, its impedance network—i.e. the capacitors connected to the coil—can be tuned while receiving power to improve performance, as taught by Cook. Phinney-Decl-2(EX1021), ¶34. Specifically, a POSA would have understood in view of Cook 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.” Cook(EX1017), ¶¶96-100; Phinney-Supp-2(EX1021), ¶34. Such a modification would have required applying Cook’s known capacitive tuning technique in Chatterjee’s inductive signal interface in the same way as it functions in Cook. Phinney-Supp-2(EX1021), ¶35. Such a 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.” Cook(EX1017), ¶¶104-107; Phinney-Supp-2(EX1021), ¶35. Chatterjee’s inductive signal interface is also similar to Cook’s receiver because the wireless power receivers taught in Chatterjee and Cook both comprise an antenna comprising a coil and a capacitor, a rectifier, a load, and control system, to similarly function to wirelessly receive, convert, and store power. Chatterjee(EX1003), ¶¶41-46, Fig. 4; Cook(EX1017), ¶¶128-133, Fig. 3; Phinney-Supp-2(EX1021), ¶35.

A POSA would also have been motivated to make such a combination because Chatterjee and Cook are both directed to the same field of endeavor, i.e., wireless power charging. Phinney-Supp-2(EX1021), ¶36. Chatterjee states that its invention “is not limited to those precise embodiments” described in the specification, and “many modifications and variations will be apparent to practitioners skilled in this art.” Chatterjee(EX1003), ¶97. Cook teaches that in wireless power transmission,

the “transmit and receiving antennas are preferably resonant antennas, which are substantially resonant, e.g., within 10% of resonance” Cook(EX1017), ¶16. During operation, various factors may cause “detuning effects,” i.e., mismatch of antenna frequencies, such as “extraneous objects,” “detuned power receivers in close proximity,” “variation of load impedance.” Cook(EX1017), ¶¶96-99; Phinney-Supp-2(EX1021), ¶36. Tuning may compensate for such detuning effects, as well as component tolerances, aging, etc. Cook(EX1017), ¶¶96-100; Phinney-Supp-2(EX1021), ¶36. Cook thus teaches a wireless receiver with a control system that performs “antenna tuning control” to improve antenna resonance matching and “maximize receiver efficiency.” Cook(EX1017), ¶¶119-124, 133.

A POSA would have had a reasonable expectation of success in applying Cook’s capacitive tuning technique in Chatterjee’s inductive signal interface. Phinney-Supp-2(EX1021), ¶37. A POSA would have understood that such a combination could be implemented as adding Cook’s capacitor bank to be connected in series with Chatterjee’s capacitor C6. Cook(EX1017), ¶240 (“a tuning capacitor bank 1600 . . . in series to the principal capacitor 1610”), Fig. 16; Phinney-Supp-2(EX1021), ¶37. Chatterjee’s inductive signal interface already includes a processor 413 that can control the operation of switches of its power bridge circuit. Chatterjee(EX1003), ¶¶55, 73. A POSA would have been familiar with how to use that processor 413 to also control the switches for capacitive tuning pursuant to

Cook's teaching, e.g., using "fractional tuning . . . in the order of +/- 10%."

Cook(EX1017), ¶¶101-103, 107, Fig. 16; Phinney-Supp-2(EX1021), ¶37.

2. Claim 21

Claim 21 is a proposed substitute claim of claim 1. The majority of the limitations set forth in proposed substitute Claim 21 are the same as in original claim 1, and, for those limitations, Petitioner relies upon Ground 1 in the Petition as establishing the obviousness of the limitation. *See* Pet., 12-67.

a. [21.p]

As the limitations for claim [21.p] are unchanged from the original, Petitioner relies upon the challenge in Ground 1 of the Petition. *See* Pet., §V.C.1.

b. [21.a] one of **coil** and capacitor electrodes

As the limitations for claim [21.a] are unchanged from the original, Petitioner relies upon the challenge in Ground 1 of the Petition. *See* Pet., §V.C.2.

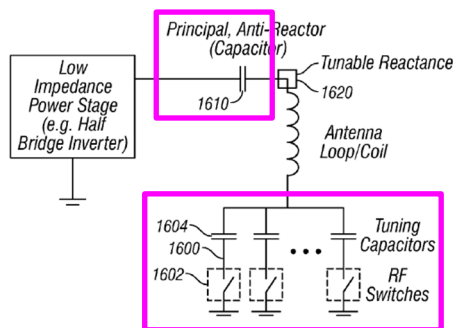
c. [21.b] a first circuitry comprising:

i. [21.b-i] **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**

Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA render obvious this claim limitation. Chatterjee discloses, as shown in Figure 6D, the coil assembly 635 comprises **capacitors C5 and C6** that are connected between the coil inductor L6 and L7 and the switch network (Power Bridge Circuit 610). Chatterjee(EX1003), Fig. 6D, 7E, 7F; Phinney-Supp-2(EX1021), ¶43. "In the power

Cook teaches a wireless receiver that comprises “a resonant antenna 210, tuning 220, matching 240, rectifier 250, load 260, **control system** 270.” Cook(EX1017), ¶91, Fig. 2. Cook’s resonant antenna comprises a “multi-turn loop of wire,” i.e., a coil, Cook(EX1017), ¶¶92, 130; and a **capacitor**. Cook(EX1017),

¶103 (“The resonant antenna can be changed by varying by anti-reactance (*capacitance*), or reactance of the inductive part of the antenna system.”), ¶130, Figs. 13, 15; *see also* Phinney-Supp-2(EX1021), ¶46. Cook further discloses that the **capacitor** comprises “[c]apacitor bank (library) and electronic or mechanical **switches** (RF relays),” an example of which is shown in Fig. 16 below. Cook(EX1017), ¶¶104-107, 239, Fig. 16. The **capacitor bank and switches** teach the “impedance network” of claim [21.b-i] because it comprises “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.”



Cook(EX1017), Fig. 16.

Cook further teaches “tuning the antenna’s resonance frequency” to compensate for “variation of load impedance,” Cook(EX1017), ¶¶96, 99, such as by capacitive tuning. Cook explains that “[c]apacitive tuning can use a set of capacitors, e.g., *a capacitor bank, in a series or parallel arrangement with RF switches* that may be opened or closed to adjust the effective capacitance.” Cook further teaches that the wireless receiver further comprises a **control system** 160 that “handles . . .

antenna tuning control” and “power and efficiency control.” Cook(EX1017), ¶¶76-78. A POSA would have understood that the controlling of capacitive turning takes place “*while configured to receive power*” because Cook teaches that tuning is “automatically executed by the receiver’s control system” including using, for example, a “fractional tuning range in the order of +/- 10%.” Cook(EX1017), ¶¶101, 102; Phinney-Supp-2(EX1021), ¶62. A POSA would have understood that fractional tuning takes places while the receiver is in operation, i.e., receiving power. Phinney-Supp-2(EX1021), ¶62. A POSA would have found it obvious to modify Chatterjee to add Cook’s “**capacitor bank ... with switches**” to be connected in series with capacitor C6 as to be able to change impedance of the wireless power receiver in the charging mode, as explained above in Section III.A.1.

ii. Claim [21.b-ii], [21.b-iii], [21.c], and [21.d]

As the limitations for claim [21.b-ii], [21.b-iii] [21.c], and [21.d] are unchanged from the original claim, Petitioner relies upon the challenge as set forth in Ground 1 of the Petition as follows: [21.b-ii] (*see* §V.C.3.b); [21.b-iii] (*see* §V.C.3.c); [21.c] (*see* §V.C.4); [21.d] (*see* §V.C.5).

d. [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** 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**

Petitioner will assume, for purposes of its obviousness argument that

“*changing . . . topology of said switch network*” includes changing the connect/disconnect state of switches of the switch network. Guidance, 17. Figure 6D of Chatterjee teaches a first circuitry comprising at least the “*impedance network*” (C5 and C6) and the “*switch network*” (power bridge circuit 610). Chatterjee(EX1003), Fig. 6D, ¶72. The processor 413 provides control signals G1-G6 to control the operation of the power bridge circuit. Chatterjee(EX1003), Fig. 6D, ¶63. In particular, in the power receive mode, processor 413 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—i.e., each switch alternates between the connected and disconnected states to change the topology of the power bridge circuit. Chatterjee(EX1003), ¶¶65, 4, Fig. 2; Phinney-Supp-2(EX1021), ¶55. Chatterjee therefore discloses “*said first circuitry, based on an input from said control logic circuit, configured to change . . . topology of said switch network.*” A POSA would also have understood that changing topology takes place “*while [the first circuitry is] configured to receive said power*” because switches 623-626 continually to switch on and off while in the power receive mode. Chatterjee(EX1003), ¶4, Fig. 2; Phinney-Supp-2(EX1021), ¶55. A POSA would further have understood that Chatterjee’s first circuitry is configured to change 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*” because switches

623-626 operating as a rectifier turns the received AC power into DC power, thus obtaining a “*modified form*” of the received power, and provides that modified form of said power to a load device such as a rechargeable battery. Chatterjee(EX1003), ¶37; Phinney-Decl.(EX1021), ¶56.

Furthermore, Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA teaches the claimed “*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**.*” See *supra* §III.A.2.c.i.

e. [21.f] –[21.i]: Petitioner relies upon the challenge as set forth in the Petition noted below.

As the limitations for claim [21.f] –[21.i] are unchanged, Petitioner relies upon the challenge as set forth in Ground 1 of the Petition as follows: [21.f] (*see* Pet., §V.C.7); [21.g] (*see* §V.C.8); [21.h] (*see* §V.C.9); [21.i] (*see* §V.C.10).

3. Claims 22

As the limitations for claim 22 are unchanged from the original claim 2, Petitioner relies upon the challenge in Ground 1 of the Petition. See Pet., §V.D.

B. GROUND 2: Chatterjee in view of Corbridge, Cook, and the Knowledge of a POSA

Even if the Board chooses to adopt the Patent Owner’s proposed construction of “*change ... topology of said switch network.*,” the amended claims are obvious over Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA because Corbridge teaches the aspect of changing rectification type while receiving power,

and, it would have been obvious to modify Chatterjee's switches in view of Corbridge to change rectification type while receiving power.

1. Motivation to Combine

If the Board construes "*change ... topology of said switch network*" to require changing the "type" of rectification between non-synchronous and synchronous while configured to receive power, proposed claim 21 is obvious as Corbridge teaches this limitation and it would have been obvious to combine this teaching with Chatterjee. Phinney-Supp-2(EX1021), ¶¶71-77. Specifically, Corbridge teaches that the switches of a full bridge rectifier comprise transistor-diode pairs, and further teaches a 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. Corbridge(EX1004), ¶¶85, 80. A POSA would have found it obvious to implement the transistor diode pairs disclosed in Corbridge to improve the Chatterjee's power bridge circuit to provide both non-synchronous and synchronous rectification. Such a 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." Corbridge(EX1004), ¶¶85, 80; Phinney-Supp-2(EX1021), ¶¶72, 75; *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 417 (2007). A POSA would have understood

Chatterjee's Fig. 6D to be a high level circuit diagram, and a POSA reviewing the diagram in Figure 6D would have appreciated that the switches 623-626 could have been implemented in several known ways, including as the transistor diode pairs disclosed in Corbridge. Phinney-Supp-2(EX1021), ¶73. Corbridge is in the same field of wireless power transmission as Chatterjee and is in fact "incorporated by reference in its entirety for all purposes" in Chatterjee such that a POSA would have consulted the reference. Chatterjee, ¶48; Phinney-Supp-2(EX1021), ¶73 .

A POSA would have had a reasonable expectation of success in applying Corbridge's control circuit to drive Chatterjee's switches 624 and 626. Additionally, rectifiers providing both non-synchronous diode based rectification and synchronous transistor based rectification were well known and widely used at the time of the invention. Chatterjee(EX1003), ¶4; Phinney-Supp-2(EX1021), ¶¶74-77. Dr. Phinney testifies as to one example of such a device being the Texas Instruments' bq51013 chip available in 2011, which provided a wireless power receiver chip in which, during the initial startup of the chip, the synchronous rectifier operated as a diode rectifier, i.e., a nonsynchronous rectifier, and once the input voltage reached a certain level, synchronous rectification was provided. EX1022, 17; Phinney-Supp-2(EX1021), ¶76. Therefore, the POSA would have had a reasonable expectation of success to improve Chatterjee's power bridge circuit to provide both non-synchronous diode based rectification and synchronous transistor based rectification

by implementing Corbridge's transistor diode pairs. Phinney-Supp-2(EX1021), ¶¶74-77.

Neither Chatterjee nor Corbridge expressly disclose changing impedance of the impedance network while the inductive signal interface is configured to receive power. As explained above in Sections III.A.2.c.i and III.A.1, this is disclosed in Cook, and a POSA would have found it obvious to combine Cook with Chatterjee and Corbridge. Phinney-Supp-2(EX1021), §§VI.A.2, VI.A.3.c.i, VI.A.3.f.

2. Claim 21

a. [21.p]

As the limitations for claim [21.p] are unchanged from the original, Petitioner relies upon the challenge in Ground 1 of the Petition. *See* Pet., §V.C.1.

b. [21.a] one of **coil** and capacitor electrodes

As the limitations for claim [21.a] are unchanged from the original, Petitioner relies upon the challenge in Ground 1 of the Petition. *See* Pet., §V.C.2.

c. [21.b] a first circuitry comprising:

i. [21.b-i] **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:

Claim limitation [21.b-i] is obvious over Chatterjee in view of Corbridge, Cook, and the knowledge of a POSA for the same reasons as established above in Ground 1, as the construction of “*topology*” does not impact this limitation. *See supra*, §III.A.2.c.i.

ii. [21.b-ii] a switch network

As the limitations for claim [21.b-ii] are unchanged from the original, Petitioner relies upon the challenge in Ground 1 of the Petition. *See* Pet., §V.C.3.b.

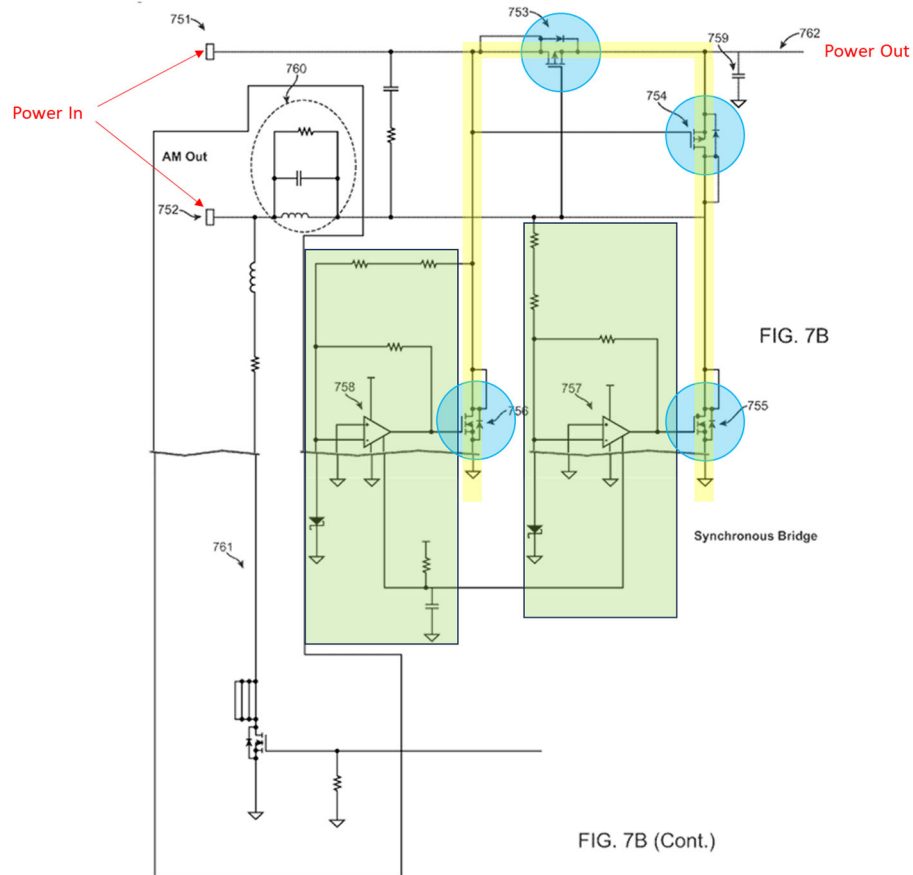
iii. [21.b-iii] a filter capacitor

As the limitations for claim [21.b-iii] are unchanged from the original, Petitioner relies upon the challenge in Ground 1 of the Petition. *See* Pet., §V.C.3.c.

d. [21.c] a second circuitry comprising: a control logic circuit; and a modulator/demodulator circuit;

Chatterjee in view of Corbridge, Cook, the knowledge of POSA renders obvious this limitation even under Patent Owner's construction of "*topology*." Chatterjee's **processor 413** teaches a "*control logic circuit*"; and its communication circuit 415 comprises **a modulator 416 and demodulator 417** that teach the "*modulator/demodulator circuit*." Petition, §V.C.4.

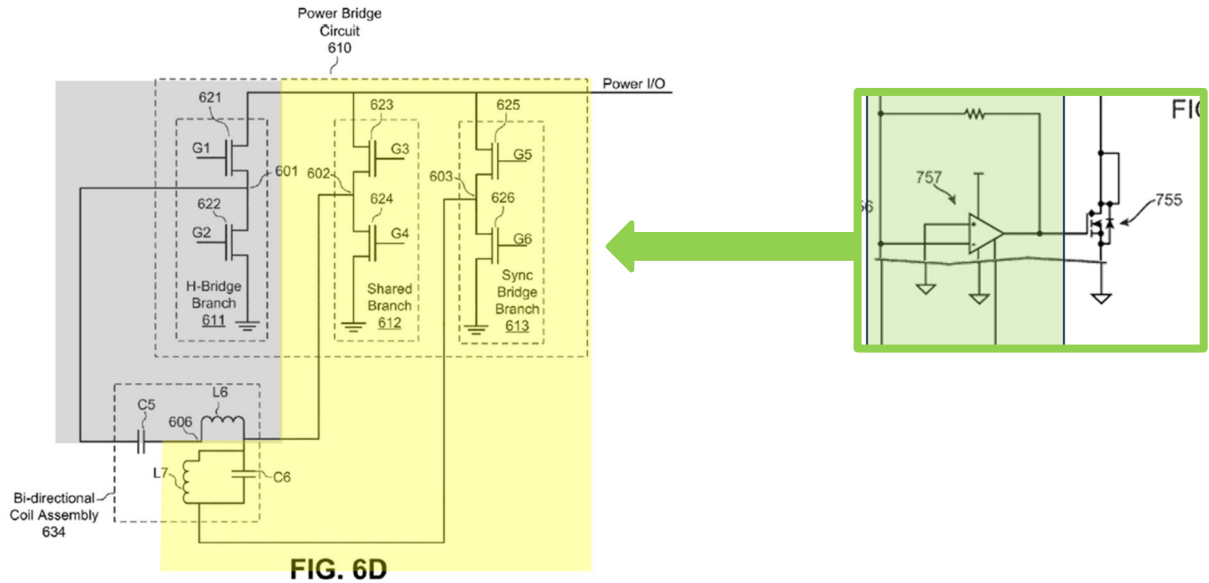
Corbridge similarly discloses a **control logic circuit** that controls the switch network, including whether certain switches of the switch network operate as transistors or diodes while in rectification mode. Figure 7B of Corbridge, reproduced below, provides "a circuit-level diagram" of a part of a wireless power receiver including a rectifier comprising **four switches, namely "transistor diode pairs 753, 754, 755 and 756"**:



As shown in Fig. 7B above, each of the “**transistor diode pairs**” has both a transistor and a diode and Corbridge discloses that the “**transistor diode pairs 753, 754, 755 and 756**” can selectively operate as “a rectifier formed by diodes” (i.e. nonsynchronous), “a synchronous bridge” (i.e. full synchronous), or a “half-synchronous bridge.” Corbridge, ¶¶85, 80; Phinney-Supp-2(EX1021), ¶84. Specifically, Corbridge discloses that “**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 “**Op Amp 758 is similarly configured to perform the same function on transistor diode**

pair 756.” Corbridge, ¶86. In view of this disclosure, a POSA would have understood that the 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. Corbridge, ¶86; Phinney-Supp-2(EX1021), ¶85. A POSA would also have understood that a transistor requires a certain amount of voltage to drive it to turn on and off, such as a gate-to-source voltage in a MOSFET. Phinney-Supp-2(EX1021), ¶85. In other words, 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 non-synchronous rectification. Phinney-Supp-2(EX1021), ¶85.

It would have been obvious to a POSA to improve the circuit illustrated in in Chatterjee’s Fig. 6D with the teachings of Corbridge regarding controlling a transistor diode pair to switch between a non-synchronous diode based rectifier and a synchronous transistor based rectifier, as illustrated in the annotated figures below.



(Power Receive Mode)

Chatterjee(EX1003), Fig. 6D; Corbridge(EX1004), Fig. 7B (excerpt); Phinney-Supp-2(EX1021), ¶86.

e. [21.d] said first circuitry configured to receive said power from a wireless power transmitter: *see* Petition, §V.C.5

f. [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** 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

If the Board construes “*changing . . . topology of the switch network*” to require changing the “type” of rectification between non-synchronous and synchronous, Chatterjee does not expressly disclose it. However, as established above, Corbridge teaches transistor diode pairs that can be “used as a synchronous bridge or rectifier formed by diodes.” *Supra* §III.B.2.d; Corbridge(EX1004), ¶85. Accordingly, it would have been obvious to configure Chatterjee’s power bridge

circuit 610, shown in Fig. 6D, such that switches 623-626 provide transistor diode pairs, as taught in Corbridge Fig. 7B, to provide the ability to alternate between a non-synchronous diode-based rectifier and synchronous transistor-based rectifier while configured to receive power. Phinney-Supp-2(EX1021), ¶88, §VI.B.1. Because the proposed combination can change the type of rectifier when configured to receive power, the proposed combination teaches the claimed “*changing . . . topology of the switch network*” under Patent Owner’s claim construction. Phinney-Supp-2(EX1021), ¶88.

Furthermore, Chatterjee in view of Corbridge, Cook and the knowledge of a POSA teaches the claimed “*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**.*” See *Supra* §III.A.2.c.is.

g. [21.f] –[21.i]

As the limitations for claim [21.f] –[21.i] are unchanged, Petitioner relies upon the challenge as set forth in Ground 1 of the Petition as follows: [21.f] (*see* Pet., §V.C.7); [21.g] (*see* §V.C.8); [21.h] (*see* §V.C.9); [21.i] (*see* §V.C.10).

3. Claim 22

As the limitations for claim 22 are unchanged from original claim 2, Petitioner relies upon the challenge as set forth in Ground 1 of the Petition. See Pet., §V.D.

Case No. IPR2024-00023

Patent No. 10,038,339

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Respectfully Submitted,

/s/ Trenton A. Ward

Trenton A. Ward (Reg. No. 59,157)

Lead Counsel

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing **Petitioner's Opposition to Patent Owner's Revised Motion to Amend** was served electronically on November 20, 2024, on counsel of record for the Patent Owner as follows:

Brian A. Carpenter, bcarpenter@coleschotz.com

Gary Sorden, gsorden@coleschotz.com

Date: November 20, 2024

/s/ Trenton A. Ward