

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.

U.S. Patent No. 10,038,339

Inter Partes Review No. IPR2024-00023

**DECLARATION OF DR. RANDAL H. DIREEN IN SUPPORT OF
PATENT OWNER'S REVISED MOTION TO AMEND**

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I, Randal H. Direen, hereby declare as follows:

I. INTRODUCTION

1. I have previously provided my *Declaration of Dr. Randal H Direen in Support of Patent Owner's Preliminary Response* executed on January 17, 2024 and filed as Exhibit 2001 (the "Direen Preliminary Declaration"). I have also provided my *Declaration of Dr. Randal H. Direen in Support of Patent Owner's Response* executed June 5, 2024 and filed as Exhibit 2003 (the "Direen Declaration"). In addition, I provided testimony in my deposition taken on August 6, 2024, the transcript of which I have reviewed, which transcript I understand has been filed by Petitioner/Samsung as Exhibit 1019 ("Direen Deposition").

2. I have been asked to review (1) *Petitioner's Reply Brief* filed on August 28, 2024 (the "Reply"), (2) *Petitioner's Opposition to Patent Owner's Motion to Amend* filed on August 28, 2024 (the "Opposition"), (3) *Supplemental Expert Declaration of Joshua A. Phinney in Support of Petitioner's Opposition to Motion to Amend U.S. Patent No. 10,038,339* filed as Exhibit 1015 (the "Phinney Supplemental Declaration"), (4) U.S. Patent No. 2009/0243397 titled *Packaging and Details of a Wireless Power Device* filed as Exhibit 1017 ("Cook"), and (5) U.S. Patent Publication 2013/0062959 filed as Exhibit 1018 ("Lee") (collectively, the "Materials"). I have also reviewed the Board's *Preliminary Guidance Patent*

Owner's Motion to Amend (Paper 15). These Materials are in addition to those identified in my Preliminary Declaration and Declaration.

3. I have been asked by counsel for WiPQTUS Inc. (“WiPQTUS”) in the above-captioned matter as an independent consultant to offer opinions in rebuttal to positions taken by Petitioner Samsung Electronics Co. Ltd. (“Samsung”) and/or Mr. Phinney in the above-referenced Materials, and particularly the Phinney Supplemental Declaration.

II. QUALIFICATIONS AND COMPENSATION

4. My qualifications and compensation were previously stated in my Preliminary Declaration, which I incorporate herein.

III. MATERIALS CONSIDERED

5. In preparing this declaration, I have reviewed and considered the Petitioner’s Reply Brief (Paper No. 13) and Petitioner’s Opposition to Patent Owner’s Motion to Amend (Paper No. 14), and the associated Exhibits and prior Exhibits, as well as other materials referenced in the body of this declaration:

Exhibit	Description
EX1001	U.S. Patent No. 10,038,339
EX1002	Phinney Declaration
EX1003	Chatterjee US2011/0018356 (“Chatterjee”)
EX1004	Corbridge US2010/083012 (“Corbridge”)

Exhibit	Description
EX1005	Phinney CV
EX1006	Application No. 15/095,070 (the “’070 Application”), which issued as the ‘339 Patent
EX1007	Application No. 13/964,310, which issued as the ‘929 Patent (the “’910 Application”)
EX1008	WPT SysDescrWPT-Vol 1, Part 1, 1.0.3
EX1009	IPR2020-01141, Paper 12, Institution Decision
EX1010	Docket Control Order, 23cv00054
EX1011	IPR2020-01141, Paper 12
EX1012	IPR2019-01393, Paper 24, Institution Decision
EX1013	IPR2020-00505, Paper 11
EX1015	SUPPLEMENTAL EXPERT DECLARATION OF JOSHUA PHINNEY, IN SUPPORT OF PETITIONER’S OPPOSITION TO MOTION TO AMEND U.S. PATENT NO. 10,038,339 (“Phinney Supplemental Decl.”)
EX1017	U.S. Patent No. 2009/0243397 titled Packaging and Details of a Wireless Power Device filed as Exhibit 1017 (“Cook”)
EX1018	U.S. Patent Publication 2013/0062959 filed as Exhibit 1018 (“Lee”)
EX1019	Transcript of Dr. Randal Direen, August 6, 2024
EX2002	U.S. Patent No. 9,343,929 (the “’929 Patent)
EX2004	‘312 Provisional Application
EX2005	Redline comparison of '312 Provisional to '929 Patent
EX2006	Redline comparison of '310 Application to '339 Patent

6. My opinions are based in part on a review and analysis of the above-mentioned documents and materials. I have also drawn on my education, experience, and knowledge of basic engineering and circuit design principles in forming my opinions.

7. I understand that WiPQTUS filed Patent Owner WiPQTUS' Motion to Amend Under 37 C.F.R. § 42.121 wherein WiPQTUS proposed the following substitute claims, among others:

21. (proposed substitute for claim [1]) 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:

one of coil and capacitor electrodes;

a first circuitry comprising:

an impedance network comprised of two or more electrical components from the list (i) one or more passive components, (ii) one or more active components, or (iii) one or more switches;

a switch network;

a filter capacitor;

a second circuitry comprising:

a control logic circuit; and

a modulator/demodulator circuit;

said first circuitry configured to receive said power from a wireless power transmitter;

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;

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;

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;

said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;

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

22. (proposed substitute for claim [2]) 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.

8. I understand that Samsung has opposed WiPQTUS' Motion Amend in part on the basis that the amendments on a number of bases, including that these proposed amended claims would not be patentable under the grounds of (1) Chatterjee, Corbridge, Cook, and "knowledge of a POSA," and (2) Chatterjee,

Corbridge, Lee, and “knowledge of a POSA.” I disagree for the reasons stated herein.

9. I also understand that WiPQTUS will file, contemporaneous with this Supplemental Declaration, a Revised Motion to Amend wherein the following revised substituted claims will be proposed:

21. (proposed substitute for claim [1]) 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:

one of coil and capacitor electrodes;

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;

a second circuitry comprising:

a control logic circuit; and

a modulator/demodulator circuit;

said first circuitry configured to receive said power from a wireless power transmitter;

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;

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;

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;

said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;

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

22. (proposed substitute for claim [2]) 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.

IV. UNDERSTANDING OF THE LAW

A. Legal Standards

10. I am not an attorney. However, I understand and have been informed of several legal principles, which I have employed in forming my opinions in this declaration. I set forth my understanding of the legal principles in my Preliminary

Declaration and my Declaration, which I incorporate herein by reference. *See* Exhibit 2001, Section V; Exhibit 2003, Section V. In addition, I am familiar with these legal principles as a result of my experience as an expert in other matters involving infringement/non-infringement and/or validity/invalidity.

V. OVERVIEW OF NEW GROUNDS AND REFERENCES

11. I understand that Samsung and Mr. Phinney rely upon two new grounds to argue that the Amended Claims shown in the Motion to Amend would be invalid. These grounds are: (1) "Chatterjee in view of Corbridge, Cook, and "Knowledge of a POSA" and (2) Chatterjee in view of Corbridge, Lee, and the Knowledge of a POSA." *See* Phinney Supplemental Declaration, p. 15.

12. In my Preliminary Declaration and Declaration, I discussed the Chatterjee and Corbridge references, which testimony I incorporate herein. I note that Dr. Phinney now agrees with my prior testimony that Chatterjee "does not explicitly disclose 'said first circuitry, based on input from said control logic circuitry, configured to change, while configured to receive power, the impedance of the impedance network.'" Phinney Supplemental Decl., ¶ 78. I would also add that Chatterjee does not implicitly disclose this limitation either.

13. I will now discuss each of the new references.

A. Cook

14. The Cook reference (“Cook”) is U.S. Published Application No. 2009/0243397 titled "Packaging and Details of a Wireless Power Device." Exhibit 1017. The publication date is listed as October 1, 2009.

15. Cook describes a wireless power system that includes a power source, power receiver, and associated components. Cook, Abstract. The system uses resonant antennas to wirelessly transfer power, with the ability to tune and match capacitors and inductors to improve efficiency and coupling in various modes. Cook, [0082]. The application emphasizes applications such as wirelessly charging personal electronic devices like mobile phones, laptops, and other battery-powered gadgets. Cook, [0138].

16. Of note, while Cook discusses both synchronous and asynchronous rectifiers as rectifier options, it makes no suggestion of including both in a particular design and switching between the two. *See, e.g.*, Cook [0272].

17. Further, Cook does not disclose a device that can switch between transmit and receive mode nor does it disclose any circuit that is “configured to change . . . topology of said switch network to obtain a modified form of received power,” as discussed below.

B. Lee

18. The Lee reference (“Lee”) is U.S. Published Application No. 2013/0062959 titled “Systems and Methods for Detecting and Identifying a Wireless Power Device.” Exhibit 1018. The publication date is March 14, 2013.

19. Lee describes systems and methods for detecting and identifying a wireless power device in a wireless power transfer field. Lee, Abstract. The focus is on detecting unauthorized or non-compliant devices within a charging region of a wireless power transmitter and managing power transmission accordingly. Lee, [0041].

20. The invention provides methods to identify objects like metal items or non-compliant wireless power receivers within the charging field that may interfere with power transfer. Detection helps prevent unintended power absorption and system inefficiency. Lee, [0002]. Upon detecting non-compliant or unauthorized devices, the system can limit or reduce the power transferred by the transmitter, minimizing risks like overheating or energy waste. Lee, [0041].

21. Further, Lee does not disclose a device that can switch between transmit and receive mode nor does it disclose any circuit that is “configured to change . . . topology of said switch network to obtain a modified form of received power,” as discussed below.

VI. FURTHER CLAIM CONSTRUCTION

A. “Topology”

22. A person of ordinary skill in the art would understand “topology” in the context of the `929 and `339 patents to refer to a collection of circuit components used to perform a particular function. Further, a POSA would understand that the particular function must be a well-defined operation within the context of the overall circuit. Within the `929 and `339 patents, the context is rectification and power inversion; a fully-synchronous rectifier, for example, is a particular function. Therefore, a POSA would understand “topology” in the context of the `929 and `339 patents to mean “a collection of circuit components that perform a type of rectification or a type of power inversion.”

23. The `929 and `339 patent specifications also supports this understanding of the term “topology.” For example, the specification 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.” `929 Patent, 3:67-4:3; *see also* `339 Patent, 4:4-7. Further the specification describes at least five “topologies”: (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. *See, e.g.,* `929 Patent, 3:67-4:3, 4:9-18, 14:41-58, Figs. 6A-B, Figs. 7A-B; *see also*

`339 Patent, 4:4-7, 4:14-23, 16:49-61, Figs. 6A-6B, Figs 7A-7B. All these topologies are referred to by the function they perform.

24. Configurations (1)-(3)—the non-synchronous full-bridge rectifier, the half-synchronous full-bridge rectifier, and the fully-synchronous full-bridge rectifier—are used in charging (or power receive) mode to receive AC power and convert it to DC power. `929 Patent, 14:41-58; *see also* `339 Patent, 16:49-61. Each of these configurations provides a modified form of power. Each of these configurations represent “topologies” that are referred to by the type of rectification they perform.

25. Configurations (4) and (5)—the half-bridge inverter and the full-bridge inverter—are used in communications (or power transmit) mode to convert DC power to AC power for communication. `929 Patent, 4:11-18; *see also* `339 Patent, 4:16-23. The half-bridge inverter and the full-bridge inverter each provide a modified form of power. Each of these configurations represent “topologies” that are referred to by the type of inversion they perform.

26. The specification discusses changing the topology during receive mode. For example, the specification explains that “[d]epending on the level of wireless power being received, the control logic circuit 105 adjusts the topology of the switch network 102 of the first circuitry.” `929 Patent, 8:58-60; *see also* `339 Patent, 10:65-11:1. More specifically, the specification explains that:

Disclosed herein are also methods for a dual mode wireless power receiver to communicate and receive power from a wireless power transmitter in a charging mode as well as for a dual mode wireless power receiver to deliver power and exchange information with a secondary wireless power receiver in a communication mode. The dual mode wireless power receiver is in the charging mode by default. ***This means that in idle state, the switch network of the dual mode wireless power receiver is configured as a rectifier to receive power from a wireless power transmitter. 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.*** `929 Patent, 3:53-4:3; see also `339 Patent, 3:57-4:7.

27. Of importance, the transition from the default non-synchronous rectifier to the fully-synchronous rectifier must occur during receiving power mode because the rectifier configuration is only used during receive mode.

28. The specification also discusses changing the topology during communication mode. For example, the specification explains:

In communication mode, the first circuitry of the dual mode wireless power receiver is configured to change the impedance of the impedance network and change the topology of the Switch network to an inverter, for example, a Class D half bridge inverter, Class E half bridge inverter, Class D full bridge inverter, etc., to transmit a part of the stored power to power-up the secondary wireless power receiver. `929 Patent, 4:11-18; see also `339 Patent, 4:16-23.

29. The specification discusses changing the topology during receive 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.” `929 Patent, 3:67-4:3; *see also* `339 Patent, 4:3-7. Further, the specification explains that “[d]epending on the level of wireless power being received, the control logic circuit 105 adjusts the topology of the switch network 102 of the first circuitry.” `929 Patent, 8:58-60; *see also* `339 Patent, 10:64-11:1.

30. The example from the specification indicates that changing the topology of the switch network is the act of, for example, changing the function of the switch network from a topology that functions as a non-synchronous rectifier to a fully-synchronous rectifier.

31. Here are illustrated examples of the topological change between non-synchronous, half-synchronous, and fullysynchronous versions of the rectifier. The non-synchronous version (shown below) disables switches S3, S4, S5, S6 during the receive mode (S2 is enabled to source power to the load for charging). The switches are fixed (not cycling) during this non-synchronous mode of operation.

Non-Synchronous

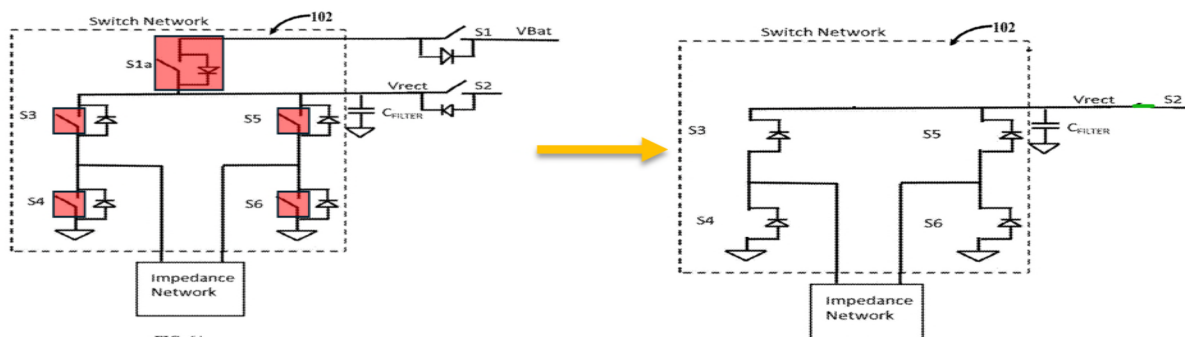
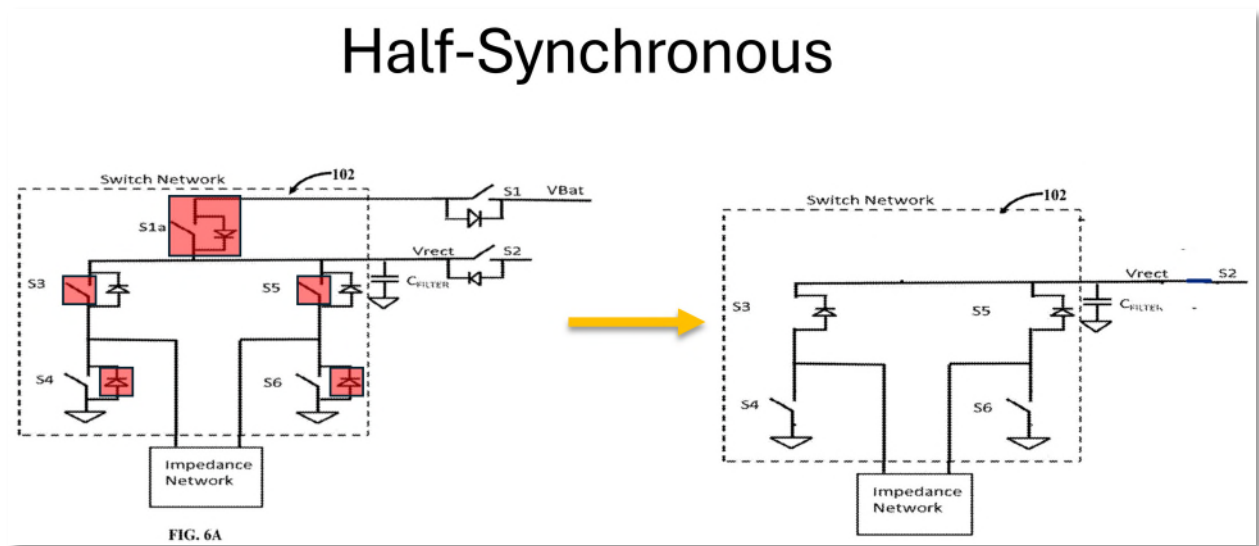


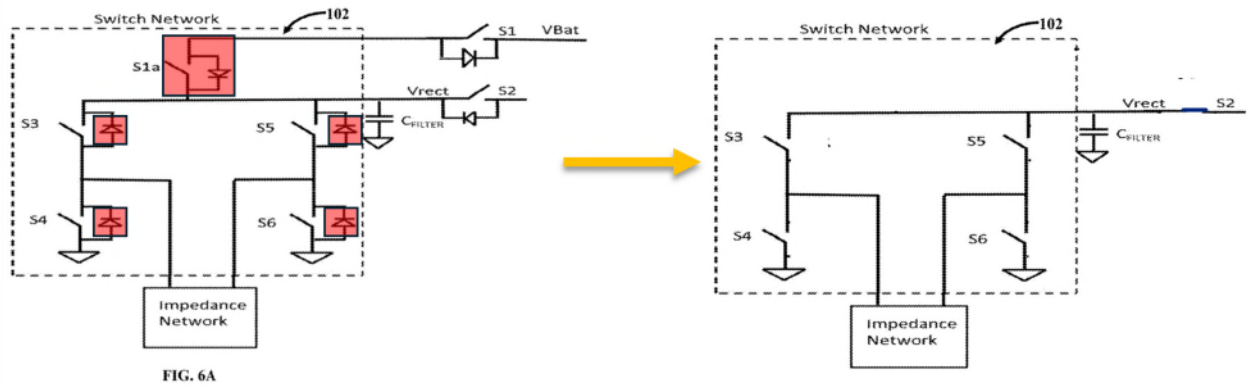
FIG. 6A

32. In this configuration, only diodes (commonly the body diode of a transistor) are used in what a POSA would identify as a circuit functioning as a classic full-bridge rectifier. A configuration for a half-synchronous rectifier topology is shown below. In this half-synchronous topology S3 and S5 are open and S4 and S6 are cycled.



33. Note that body diodes associated with switch S4 and S6 are removed; a POSA would understand that no current flows through these diodes and thus is not a part of the present circuit that functions as a half-synchronous rectifier topology. The function of this circuit is similar to the non-synchronous version (transforms current from AC to DC), but is more efficient since the diodes associated with S4 and S6 have been taken out. The fully-synchronous version of the circuit is shown below:

Full-Synchronous



34. In this version switches S3, S4, S5, and S6 are cycled synchronously within the incoming signal from the Impedance Network. This circuit also has a similar function to the two previous circuits, but is the most efficient of the group because all four diodes have been removed.

35. Dr. Phinney argues that continually switching the switches present within a power bridge circuit, during power receive mode, amounts to a topology change (See, for example, Paragraph 121 and 122 of EX1015), which indicates that he believes the static configuration of the switches S3-S6 in the figures above amount to individual “topologies.” I disagree. First, there is no place in the ‘929 or ‘339 Patents that supports this. Second, during the power receiver mode, a POSA would understand that the switches within the power bridge are the components used to implement rectification. The individual switches themselves are not being

used to select a topology with a well-defined function such as a half-synchronous rectifier, a fully-synchronous rectifier, etc.

36. The specification also discusses changing topology as a transition between a rectifier and an inverter. `929 Patent, 4:9-18; *see also* `339 Patent, 4:14-24.

37. In each rectifier and inverter configuration a subset of the switch network's switches are initially set to select the particular functionality of the circuit topology, configuring the type of functionality (e.g., configuring the switch network as a fully-synchronous full-bridge rectifier or a full bridge inverter, etc.), and a subset of the switch network's switches rapidly turn on and off to implement the selected functionality.

38. For example, looking at Fig. 6B, illustrates a fully-synchronous full-bridge rectifier, the diagram identifies that certain switches are always OFF (S1, S1a) and always ON (S2). S1, S1a, and S2 are statically set, which configures the switch network as a rectifier. Fig. 6B also shows wave forms showing a cycled on/off pattern for switches S3, S6, S4, and S5. These switches are rapidly cycled on and off to perform the power conversion. As 6B illustrates, S3, S6, S4, and S5 all continuously change while S1, S1a and S2 remain fixed to implement a circuit that performs the function of a fully-synchronous full-bridge rectifier. *See* `929 Patent, 14:27-53; *see also* `339 Patent, 16:36-62. If only switches S4 and S6

are rapidly cycling on and off, and switches S3 and S5 are kept off statically, the rectifier is configured as a half-synchronous full-bridge rectifier. *See id.* When S3, S6, S4, and S5 are all kept off, the rectifier is configured as a non-synchronous full-bridge rectifier. *See id.*

39. Similarly, Figs. 7A and 7B show how the switch network can be configured as a half-bridge inverter and a full-bridge inverter.

40. Lee, discussed by the Board and Dr. Phinney, supports the construction of “topology” as “a collection of circuit components that perform a type of rectification or a type of power inversion.” For example, Lee states that “[o]ther embodiments may include different ***filter topologies***, including but not limited to, notch filters that attenuate specific frequencies while passing others and may include an adaptive impedance match, that may be varied based on measurable transmit metrics, such as output power to the transmit coil **514** or DC current drawn by the driver **524**.” Lee, [0043] (emphasis added). Lee indicates that certain topologies are associated with a function such as filtering, and a particular kind of filter topology is a notch filter. The context Lee is working within is filtering, and a particular function he identified is a notch filter. So rather than “a collection of circuit components that perform a type of rectification or a type of power inversion,” Lee would identify a “topology” as a collection of circuit components the perform a type of filtering.

41. In conclusion, in view of my understanding as at least a POSA and in view of the specification, including those portions cited above, one of ordinary skill in the art would understand “topology” as used in the original Claims 1 and 2 as well as in the Revised Amended Claims 1 and 2 as “a collection of circuit components that perform a type of rectification or a type of power inversion.”

B. “configured to change . . . topology of said switch network, while configured to receive said power, to obtain a modified form of received power”

42. When looking at the phrase “configured to change . . . topology of said switch network to obtain a modified form of received power” in view of the specification, one of ordinary skill in the art would understand “configured to change . . . topology” 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.”

43. I first note that I previously construed "switch network" in my Declaration as: “an interconnected combination of two or more switches configurable to modify the form of power.” Furthermore, this interconnected combination must be separate from the “impedance network” and the “coil.” Declaration, Ex. 2003, ¶ 129. This remains my opinion as to the correct construction.

44. In addition, as previously noted in my Declaration as well as Preliminary Declaration, limitation 1[e] in original Claim 1 of the ‘339 Patent, requires that limitation [1.e] requires that the "impedance network" be "controllably varied during at least the receiving power mode." Declaration, ¶ 121. The bases were explained in ¶¶ 111 – 120, which I incorporate herein.

45. As is clear from the plain meaning of the original claim language, the term in limitation 1[e], the phrase “configured to change” applies to the entire phrase “impedance of said impedance network and topology of said switch network.” As discussed extensively in my Declaration at ¶¶ 111 – 120, the ‘312 Provisional supports this understanding as it applies to the impedance network. The same passages I cited therein also included changing topology of said switch network.” *Id.*

46. In addition, the following passage does not appear in the ‘312 Provisional Application, but does appear in the ‘310 Application (Exhibit 1007) (and the ‘929 Patent, Exhibit 2002) as well as the ‘070 Application (Exhibit 1006) (the ‘339 Patent, Ex. 1001):

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.***

Ex. 1007, ‘310 Application, [0010]; *see also* Exhibit 2002, 3:62 - 4:8 (emphasis added); *see also* Exhibit 1006, ‘070 Application, [0009]; *see also* Ex. 1001, ‘339 Patent, 3:66-4:7.

47. This passage further supports my construction that the changes to the impedance network and topology of the switch network must be made while the first circuitry has been configured to receive power. A POSA would understand that a rectifier is used to convert the AC current to DC current. Hence, the “change from the default non-synchronous rectifier to fully synchronous rectifier” would only be needed in the receiving power mode.

48. My opinion as to the meaning of limitation 1[e] has not changed. Furthermore, I understand that proposed substitute Claim 21 and the amendment “while in receiving power mode” to be commensurate in scope as limitation 1[e], and simply makes more explicit that the claimed first circuitry must have the capability to be configured so as to make the requisite changes while in the receiving power mode.

49. As discussed above, in view of the specification, one of ordinary skill in the art would understand “topology” to mean “a collection of circuit components that perform a type of rectification or a type of power inversion.”

50. This modification affects the overall electrical behavior of the circuit, such as how current flows, how voltages are distributed, and how the circuit responds to various inputs.

51. Topology changes can turn a circuit from one type (e.g., a low-pass filter) into another (e.g., a band-pass filter), or change a signal amplifier into an oscillator.

52. When looking at the phrase “configured to change ... topology of said switch network to obtain a modified form of received power” in view of the specification, one of ordinary skill in the art would understand “configured to change ... topology” 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.”

53. For example, as discussed above, looking at Figs. 6A, 6B, 7A, and 7B, note that there are switches identified as being “always ON,” “always OFF,” and switches with attendant wave forms cycling on and off. The switches that change the topology between rectification and inversion are marked as “always ON” or “always OFF.” Statically disabling the switches S3-S6 in various combinations (discussed earlier) will select various kinds of rectification topologies and inverter topologies. Each 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.

54. Note that each of these diagrams also contains a set of switches that continuously flip on and off as shown in the attendant waveforms. The switching of these devices, however, does *not* change the topology of the switch network to obtain a modified form of received power; rather, this switching action merely implements the selected rectifier functionality of the switch network.

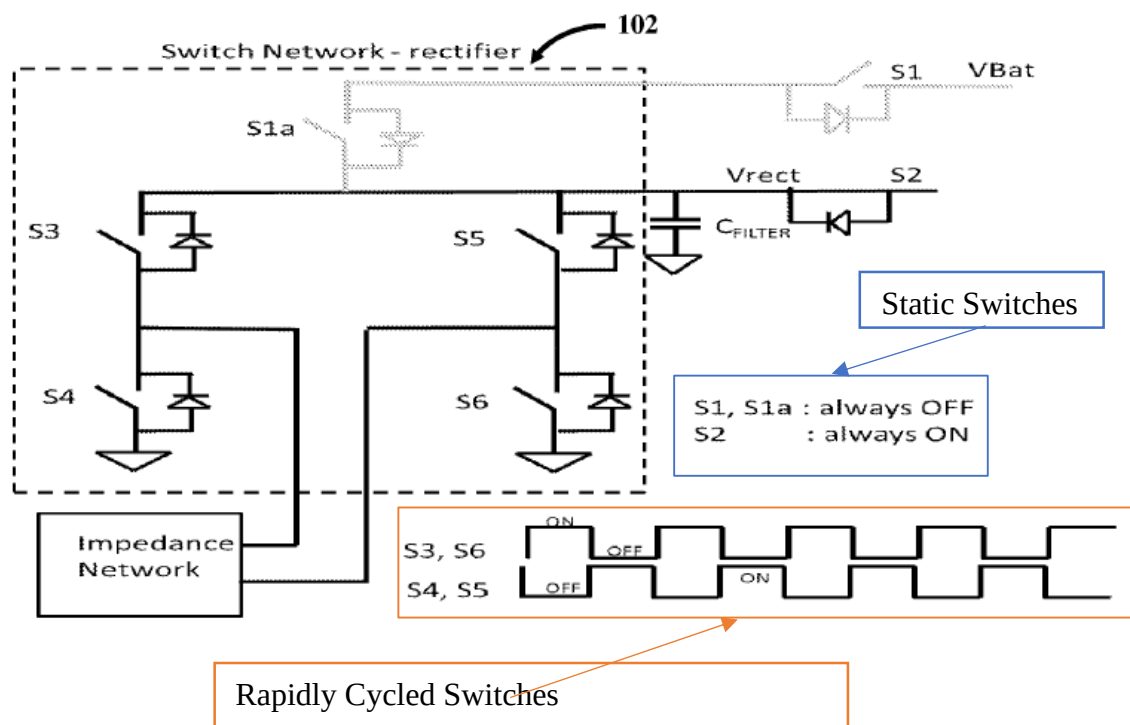


FIG. 6B

55. In his Declaration, Dr. Phinney asserts that "it is unclear whether 'change topology . . . of said switch network' means (1) changing from an inverter to a rectifier (or the opposite), or (2) more broadly, changing the

connected/disconnected states of the switches.” Ex. 1015, ¶ 38. From this, it is apparent that Dr. Phinney generally agrees that one of ordinary skill in the art could understand “configured to change . . . topology” 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.” I do not, however, agree that the meaning of this phrase is ambiguous when viewed in light of the specification. As discussed above, there are multiple examples within the `929 and `339 patents (described above) that indicate that changing topology is associated with things like changing from a type of inverter to a type of rectifier, or from one type of rectifier to another type of rectifier. There are no references associated with “changing the connected/disconnected states of the switches.” Ex. 1015, ¶ 38.

C. “Impedance Network” and Proposed Amended Claim 21

56. In my prior Declaration, I construed “impedance network” as follows:

110. Therefore, the term “impedance network” should be construed; further, based upon the above analysis, I conclude that a POSITA taking the phrase “impedance network” in the context of the Claims read in light of the specification would understand it to mean: **“a collection of two or more electrical components from the list (1) one or more passive components; (2) active components; and (3) switches.”** I further interpret “impedance network” as being separate from the induction coil used to transmit and receive power (as is evident from Figures 1, 3, and 5), and also separate from the “switch network.” As will be discussed below in connection with limitation [1.e], ***the impedance network must be capable of having its***

impedance controllably varied during at least the receiving power mode.

Declaration, Para. 110. During my deposition (Exhibit 1019), counsel for Samsung questioned me regarding Paragraph 110, and I agreed to a slight modification. A POSA would understand that “two or more” passive elements alone would not have the capability to be configured to change impedance, but that one or more active elements or switch(es) would be necessary to provide the functionality as required by limitation 1[e]. Nevertheless, to make this point absolutely clear, I agreed that a more clear construction would be: ***“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.”***

57. This construction is supported by paragraphs 95 – 109 of my Declaration, as well as by my testimony in the Deposition (Ex. 2019), including the following excerpts:

Q. Can impedance network 101 be made up of just active components and electronic switches?

A. It would -- not ideal electrical. They would have to have an impedance in there. So you would need to have something that demonstrates impedance like a resistor, capacitor, inductor like the figure shows --Figure 1 shows.

Exhibit 1019, p. 72 of 187¹, ll. 9 - 25.

¹ Referring to the numbering in the bottom right corner, not the actual deposition page number on top right.

Q. So the impedance network could not just be passive components, in your opinion?

A. The -- the impedance network -- if we're defining passive components as inductors, capacitors, and inductors and the -- whatever they're adding here, so basically causal linear devices, **you need to have at least one of those. And then you need to have something that makes it possible to vary this from control logic, which could include a transistor an implementation of a switch could be a transistor, so --**

Exhibit 1019, p. 74, ll. 1 - 11.

Q. The description column 9, line 4 of the impedance network 101 talks about active electronic components and electronic switches. Do you consider an electric switch to be a type of active electronic component?

A. Switches -- electric switches are generally -- I think you can implement one of them with a single transistor, but usually they're a collection of transistors used to implement the functionality of a switch.

Q. So is it your understanding that impedance network 101 could be implemented with as little as a resistor and an electronic switch?

A. Yes.

Q. And how would that satisfy the claimed impedance network?

A. How would that be an impedance network? I think it's that one that the -- impedance network is comprised of one or more of an electronic switch -- Did we say resistor or capacitor?

Q. Resistor.

A. Okay. -- a resistor, one of those, and to make it variable so that impedance can be modified as it's described in the claim language, you'd need something to make it modifiable. So you could potentially change its impedance by maybe shorting it out or something like that.

Q. So it's the switch would give you the capability to make the modification of the impedance by the resistor; correct?

A. That's correct. And that's also supported, I think, by Figure 1 where in Figure 1 you have a control logic just below the impedance network. **Control logic cannot be connected directly to a capacitor or an inductor and do anything. You would need it -- you would need the control logic to maybe control like a variable switch or a -- or a full switch, right.** So you need a passive element and an -- at the very least something that can modify that overall impedance.

Exhibit 1019, pp. 75, l. 14 - 76, l. 25 (emphasis added). *See also* Ex. 1019, p. 78, l. 5 - p. 80, l. 23. For the reasons that I provided in the testimony above, my prior construction is correct because a POSA would understand that the claimed first circuitry needed to be connected to control logic, which requires an active element or switch in order to have the claimed capability to change impedance in the receiving power mode “based on input from said control logic circuit.” *See* ‘339 Patent, Claim 1, 27:20 – 21. Nevertheless, the construction **“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”** more precisely states my understanding of the term “impedance network” in light of the surrounding claim language and specification, including the drawings, which I have discussed at length in my Declaration. *E.g.*, Para. 95 – 109.

VII. ANALYSIS OF PETITIONER’S GROUND 1 WITH COOK AND LEE AS APPLIED TO SUBSTITUTE CLAIMS 21 AND 22

58. Substitute Claim 21 requires “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.” Substitute Claim 22 depends from Substitute Claim 21.

59. As discussed below, in my opinion, neither the Chatterjee, Corbridge, and Cook combination, nor the Chatterjee, Corbridge, and Lee combination teach or suggest first circuitry that is “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.”

60. Further, Dr. Phinney has not explained how the knowledge of one of ordinary skill in the art would fill in this missing limitation; nor has Dr. Phinney explained how one would go about modifying the circuitry disclosed in Chatterjee, Corbridge, Cook, and Lee to operate with one another or to add this functionality.

A. Neither Chatterjee nor Corbridge teach or suggest the limitation “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.”

61. Chatterjee does not suggest “configured to change . . . topology of said switch network, while configured to receive said power, to obtain a modified form of received power.” Rather, Chatterjee merely discusses using a synchronous bridge rectifier, but never teaches or suggests the possibility of using other types of rectifiers or switching between rectifier types during operation. See Chatterjee, [0007], [0038], [0061], Claim 4.

62. Nor does Corbridge suggest “configured to change . . . topology of said switch network, while configured to receive said power, to obtain a modified form of received power.” Corbridge does explain that “[t]he power component of the received AC signal is converted to a DC power signal using a synchronous bridge *or* rectifier formed by diodes.” Corbridge, [0085] (emphasis added). Corbridge also explains that “A half-synchronous bridge may *alternatively* be used. Corbridge, [0085] (emphasis added). However, Corbridge never teaches or suggests the possibility of switching between the use of these rectifier topologies while in operation.

63. In addition, neither Chatterjee nor Corbridge disclose an “impedance network” as further recited in Claim 21. Response, p. 52-54; Ex. 2003, ¶ 150. As one example, as explained in the Patent Owner’s Response, Chatterjee’s bi-

directional coil assembly with a single capacitor and wire (as alleged by Dr. Phinney, Ex. 1002, ¶ 115 (in the configuration shown in Ex. 1003, Fig. 6B (see Ex. 1002, ¶ 113)) does not disclose the limitation of an “impedance network” which requires two or more electrical components as further recited in Claim 21. *Id.*

64. Further, I note that in its response to Patent Owner’s Motion to Amend, Petitioner’s and Dr. Phinney admit that “neither Chatterjee nor Corbridge expressly disclose changing impedance of the impedance network while the inductive signal interface is configured to receive power.” Response to MTA, p. 10; Supp. Expert Decl. of [Phinney], in Support of Petitioner's Opposition to [MTA], Exhibit 1015, ¶ 52 (identical statement) (the "Phinney Supp. Decl.>").

65. For at least these reasons, it is my opinion that Substitute Claims 21 and 22 are patentable (*i.e.*, novel and non-obvious) over Chatterjee and Corbridge.

B. The Chatterjee, Corbridge, and Cook combination does not teach or suggest the limitation “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.”

66. As discussed above, neither Chatterjee nor Corbridge teach or suggest the limitation “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power” required by Substitute Claims 21 and 22.

67. Further, Cook does not teach or suggest “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain

a modified form of said received power.” Rather, in Cook, rectifier 250 is either a non-synchronous rectifier or a synchronous rectifier. See Cook, [0112]. Cook does discuss the possible advantage of using a synchronous rectifier despite its added complexity, but Cook does not teach the possibility of changing network topology between the two based on received power. See Cook [0114], [0272].

68. For at least these reasons, it is my opinion that Substitute Claims 21 and 22 are patentable (*i.e.*, novel and non-obvious) over the Chatterjee, Corbridge, and Cook combination.

C. The Chatterjee, Corbridge, and Lee combination does not teach or suggest the limitation “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.”

69. As discussed above, neither Chatterjee nor Corbridge teach or suggest the limitation “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power” required by Substitute Claims 21 and 22.

70. Further, Lee does not teach or suggest “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.” Like Cook, while Lee explains that “various RF-to-DC converters may be used”, specifically identifying “partial and full rectifiers, regulators, bridges, doublers, as well as linear and switching

converters,” Lee does not teach does not teach the possibility of changing network topology between the two based on received power. Lee, [0055].

71. For at least these reasons, it is my opinion that Substitute Claims 21 and 22 are patentable (*i.e.*, novel and non-obvious) over the Chatterjee, Corbridge, and Lee combination.

D. It would not have been obvious to one of ordinary skill in the art to modify Chatterjee, Corbridge, Cook, or Lee to make it “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.”

72. As I have explained above, the claim limitation “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power” is not disclosed by either the Chatterjee, Corbridge, and Cook combination or the Chatterjee, Corbridge, and Lee combination. Furthermore, the ill-defined "knowledge of a POSA" does not make up for this limitation missing from each of these references. That is, even assuming a rationale to combine, the combination is still missing limitations. For example, it is my opinion that a POSA in 2012 would not have found it obvious to modify the device of Chatterjee, Corbridge, Cook, or Lee to add circuitry to meet the limitation “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.”

73. A circuit being “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power” would require at least additional control logic that is able to monitor the power delivered to the battery and the system and manage the topological changes.

74. Lee does not contain any control logic to monitor the power delivered to a system battery for the purpose of managing responsive topological changes to the rectifier. The “rectifier switching” block in Fig. 2 does not identify any particular components and is not connected to any type of control logic. Further, Fig. 6 only shows a rectifier made from a single diode and capacitor – again with no additional components for configuring an alternative topology or connected control logic for managing such changes. While Lee does discuss monitoring power draw, this is for the purpose of detecting and limiting power to non-compliant devices; however, no topological changes are implemented as a result, which would require additional logic or software. *See, e.g.*, Lee, [0006]. Nor does Dr. Phinney explain in any detail how Lee could be modified to add circuitry “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.” *See, e.g.*, Ex. 1015, ¶¶ 101-102, 120.

75. Cook does not contain any control logic to monitor the power delivered to a system battery for the purpose of managing responsive topological changes to the rectifier. Figure 2, showing a block diagram of the energy receiver, contains only a non-descript block for the rectifier. It does not show the rectifier connected to any control logic that could monitor battery power and manage such topological changes. Further, while Figures 13 and 15 shows a Frequency Generation & Control unit connected to the rectifier, Cook explains:

The rectifier & filter subunit 1320 may include functions that are controlled by the frequency generation and control subunit over control interface A. Typically, the DC/DC converter 1330 is a step-down converter providing an output DC voltage that is lower than its input voltage. In general, the output voltage generated by the DC/DC converter 1330 is variable and controlled by the frequency generation and control subunit via control interface B for power control and to achieve maximum energy transfer efficiency.

Cook, [0169]. Based on this it is evident that this “control unit” has no capacity to manage changing topologies. Nor does Dr. Phinney explain in any detail how Cook could be modified to add circuitry “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.” See, e.g., Ex. 1015, ¶¶ 54-55, 73.

76. Chatterjee does not contain any control logic to monitor the power delivered to a system battery for the purpose of managing responsive topological changes to the rectifier. While Chatterjee does state that “power circuit **314** includes 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,” it offers no indication whatsoever that any of these sensors should, or even could, be used to in conjunction with control circuitry to trigger topological changes while receiving power in the Power Bridge Circuit (311). *See* Lee, [0037]. Nor does Dr. Phinney explain in any detail how Chatterjee could be modified to add circuitry “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.” *See, e.g.*, Ex. 1015, ¶¶ 54-55, 73, 101-102, 120.

77. Corbridge does not contain any control logic to monitor the power delivered to a system battery for the purpose of managing responsive topological changes to the rectifier. While Corbridge does state that “[t]he signal processor 740 also monitors current (current value 744) to detect current levels of the power signal received over the coil 722,” it offers no indication whatsoever that any of these sensors should, or even could, be used to in conjunction with control circuitry to trigger topological changes while receiving power. *See* Corbridge, [0080]. Nor does Dr. Phinney explain in any detail how Corbridge could be modified to add circuitry “configured to change, while configured to receive said power, the . . . topology of said switch network to obtain a modified form of said received power.” *See, e.g.*, Ex. 1015, ¶¶ 54-55, 73, 101-102, 120.

E. Summary

78. For the reasons explained above, in my opinion, Substitute Claims 21 and 22 are not anticipated nor rendered obvious by Petitioner's Ground 1, even with the addition of Cook or Lee. I reserve further and more detailed analysis in the event that Dr. Phinney provides additional constructions and/or explanations and/or rationales for combining the items of Ground 1 with Cook or Lee. I also reserve the right to address the dependent claims in the event Dr. Phinney shows Substitute Claim 1 to be obvious, which he has not done so far.

79. In conclusion, a POSITA, viewing Substitute Claim 21 as a whole, would **not** find Substitute Claim 21 obvious in view of the differences between the claimed invention and the references and/or knowledge of a POSITA set forth in Ground 1, even with the addition of Cook or Lee.

VIII. ANALYSIS OF SUPPORT IN '312 PROVISIONAL APPLICATION AND THE '310 APPLICATION (RESULTING IN THE '929 PATENT)

A. WRITTEN DESCRIPTION SUPPORT FOR SUBSTITUTE CLAIMS 21 AND 22

80. I have previously stated my understanding of the "written description" requirement in my Declaration. Exhibit 2003, Para. 24. Therein, I explained that "I understand that a claim must have written description support in the application(s) to which it claims priority to be entitled to an earlier effective filing date." *Id.*

81. I have reviewed the Phinney Suppl. Declaration, and understand that Dr. Phinney opined that the limitation “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” as found in the original proposed substitute Claim 21 in the Motion to Amend lacks support to meet the “written description” requirement. I disagree.

82. I have previously explained that my construction of limitation 1[e], “said first circuitry, based on input from said control logic circuit, configured to change impedance of said impedance network ...to obtain a modified form of said received power” required that the impedance network have the capability to have its impedance changed while the first circuitry was in the receiving power mode in response to input from control logic. See Exhibit 2003, Paragraphs 111 – 121.

83. I have consistently made it clear that the "impedance network" must have the capability of controllably varying its impedance during the receiving power mode. For example, in my Preliminary Declaration, I stated:

From this section of the specification [referring to '339, 9:4-14], a POSITA would understand that the “impedance network” is an entity consisting of two or more components, one or more of which must be passive components, and additional components used for the purpose of varying impedance.

Exhibit 2001, ¶ 87. Similarly:

89. I also note the limitation of “said first circuitry, based on an input from said control logic circuit, configured to change impedance of said impedance network and topology ... to obtain a modified form of said received power [...] .” Thus, from the structure of Claim 1, it is clear that ***the impedance network must be capable of being varied during at least the receiving power mode of operation.***

Id., ¶ 89 (emphasis added). In addition:

97. Therefore, the term “impedance network” should be construed; further, based upon the above analysis, I conclude that a POSITA taking the phrase “impedance network” in the context of the Claims read in light of the specification would understand it to mean: “a collection of two or more electrical components (from the list (1) one or more passive components; (2) active components; and (3) switches), excluding the induction coil used to transmit and receive power (as is evident from Figures 1, 3, and 5), and wherein ***the impedance of the network can be controllably varied during at least the receiving power mode.***”

Id., ¶ 97 (emphasis added). “Can be” refers to a capability.

“Impedance network” means “a collection of two or more electrical components (from the list (1) one or more passive components; (2) active components; and (3) switches), excluding the induction coil used to transmit and receive power (as is evident from Figures 1, 3, and 5), and wherein the impedance of the network ***can be controllably varied*** during at least the receiving power mode”; ...

Id., ¶ 108. Again, “can be” refers to a capability.

84. In my Declaration, I testified as follows:

118. Read in the light of surrounding claim language, it would be clear to the POSITA that limitation [1.e] requires that the

"impedance of the impedance network" be **capable of changing** while in the receiving power mode.

...

120. In addition, the specification states in connection with the description of "impedance network" that its **impedance must be capable of being varied or adjusted**.

Ex. 2003, ¶¶ 118, 120. In paragraph 121, I stated my conclusion:

121. In view of the surrounding claim language and the specification, a POSITA would understand that limitation [1.e] requires that the "impedance network" **be** "controllably varied during at least the receiving power mode."

Exhibit 2003, ¶ 21. In the context Paragraph 120 and my prior testimony, it should be clear that the "be" in the above statement refers to a capability. It is and has always been my opinion that limitation 1(e) refers to a capability of the "impedance network."

85. In addition, I was deposed on August 6, 2024 by Samsung's attorney, and further explained my positions including the following:

his deposition:

Q. My question is in reading paragraph 121 of your declaration, you say that limitation 1.e requires that the impedance network be controllably varied during at least the receiving power mode. Does that require that the impedance of the impedance network change while the device is receiving power?

A. I think it merely needs to be configured to be changed.

Q. And what's the difference between?

A. Well, I think it needs to be configurable for if you're in the receive mode as the claim states. It says it's configured to change impedance of said impedance network and topology of said switch network. So it needs to at least be configurable to change.

Q. So in your opinion, Claim 1.e does not require realtime modification to the impedance of the impedance network during receiving power mode?

A. And my paragraph 120 says: (As read) In addition, the specification states in connection with the description of "impedance network," **that its impedance must be capable of being varied or adjusted.**

So there could be a case where under that situation when you're in receive mode, you -- **it's configurable but you don't necessarily vary it is how I interpret "configured to change."**

Q. How do you marry that with your statement in paragraph 121 that it be controllably varied during at least the receiving power mode? It doesn't say "configured to be controllably varied." It says "controllably varied during receiving power mode -- the impedance of the impedance network; correct?

A. **I think this is more accurate to say that it's -- like I said up here, that the impedance must be capable of being adjusted.**

Q. So do you believe that your statement in paragraph 121 needs to be corrected to say "capable of being controllably varied"?

A. **I think it needs to be configurable to be controllably varied at least in receiving power mode.**

Exhibit 119, p. 115 of 187, l. 8 - p. 117, l. 8 (emphasis added).

86. It is and has always been my opinion that limitation 1(e) refers to a capability that the claimed "impedance network" must possess. The impedance of the network must be capable of being controllably varied during at least the receiving power mode.

87. In addition, as set forth above, the same holds true for the "switch network" of the "first circuitry." The "switch network" of the "first circuitry" must be capable of having its topology changed during in receiving power mode.

88. The written description support for limitation 1(e) is as follows:

89. The '312 Provisional states in the "Summary of the Invention" section:

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 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.

Ex. 2004, p. 2, [0004] (emphasis added). The '929 Patent (Exhibit 2002) contains the same language (see Exhibit 2002, 3:38 – 46) as does the '339 Patent. Exhibit 1001, 2:39 - 41. See also Exhibits 1007 [0007] and 1006 [0006].

90. In addition, the '929 Patent further supports Patent Owner's construction of limitation 1(e):

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.***

Exhibit 2002, 3:62 - 4:3 (emphasis added); see also Exhibit 1001, 3:66-4:7;

Exhibit 1006, [0009]; Exhibit 1007 [0010]. The first sentence sets the context in stating that the dual mode wireless power receiver (“DMWPR”) is in the receiving power mode as shown by the phrase “[o]n receiving sufficient level of power.”

After receiving the sufficient level of power, the DMWPR adjusts both “the impedance” and “topology of the switch network.” That the topology is adjusted from a non-synchronous rectifier to a fully synchronous rectifier makes clear that the changes to impedance and topology are performed by the DMWPR in the receiving power mode, which is the mode in which a rectifier is used (an inverter is used to transmit power).

91. From Figure 2B in the '312 Provisional, the '310 Application, and the '070 Application, it is clear that the impedance network of the DMWPR must be capable of being changed during the receiving power mode as required in limitation 1(e). Figure 2B of the '312 Provisional Application is as follows is as follows:

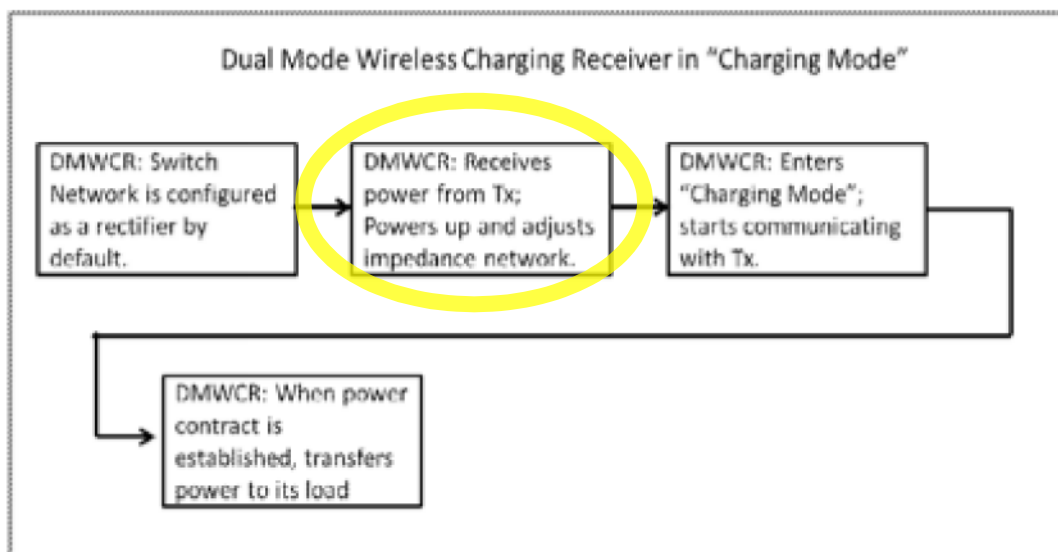


FIG. 2B

WIPQTUS Exhibit 2004

Exhibit 2004, '312 Provisional.

A similar but more detailed Figure 2B appears in the '929 Patent:

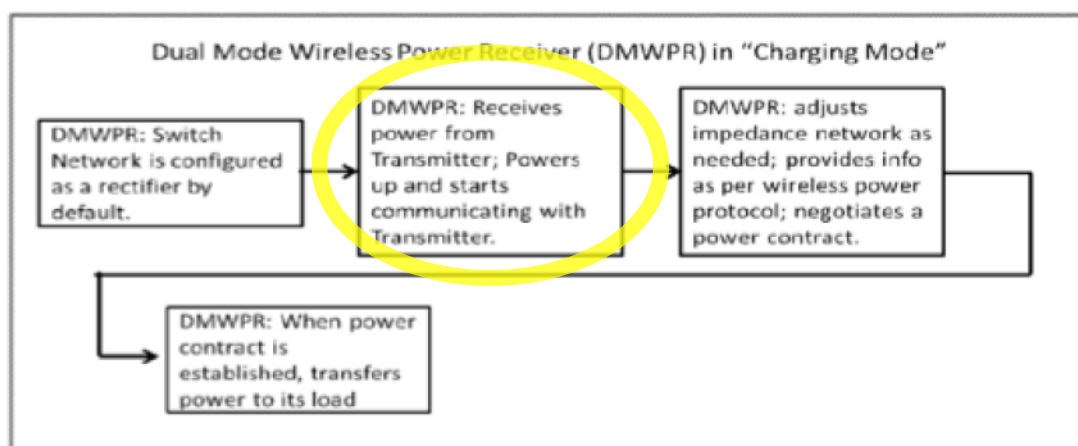


FIG. 2B

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Exhibit 2002, '929 Patent; Exhibit 1007, Fig. 2B. Fig. 2B in the '070 Application is the same as shown above in the '310 Application. See Exhibit 1006; Exhibit 1001. As shown, the switch network of the DMWPR is configured as a rectifier. Then, the receiver receives power from a transmitter. Subsequently, while still in the receiving power mode, the impedance of the impedance network is adjusted.

92. The '312 Provisional describes Figure 2B:

In the charging mode, switch S2 is closed and switch S1 is open to direct the rectified power to the load device. Based on an input from the control logic circuit 105, the dual mode wireless charging receiver 100 changes the impedance of the impedance network 101... on receiving power from the wireless transmitter 200. The dual mode wireless charging receiver 100 powers up and adjust the impedance network 101 of the first of first circuitry.

Exhibit 2004, [0029], pp. 11 – 12. Similarly, the '929 Patent describes

Figure 2B under the "Detailed Description":

Fig. 2B exemplary illustrates a flow diagram showing the operation of the dual mode wireless power receiver 100 exemplary illustrated in Fig. 2A, ***in the charging mode.*** ... On receiving sufficient level of power from the wireless power transmitter 200, the dual mode wireless power receiver 100 powers up and starts communicating with the wireless power transmitter 200. Depending on the type of wireless power transmitter 200, ***the control logic circuit 105 adjusts the impedance*** of the impedance network 101 of the first circuitry.

'929 Patent, 8:40 – 58 (emphasis added); Exhibit 1007 [0034]; Exhibit 1006 [0050].

93. Hence, based on the surrounding claim language, Fig. 2B, and the specification, under the correct construction of limitation 1(e), the "impedance network" must be capable of having its impedance changed while in the receiving power mode, and the "switch network" must be capable of having its topology changed during the receiving power mode. Furthermore, each must be capable of being changed "based on an input from said control logic circuit."

94. In addition, each and every limitation of Claim 21 and Claim 22 has adequate support in the '312 Provisional or, alternatively, the '310 Application as well as the '070 Application, as shown by the following summary table:

	Limitation	Support
21.1	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	A dual mode wireless power receiver ("DMWPR") is described throughout the '312 Provisional and '310 and '070 Applications. Exs. 2004, 1006, 1007. An illustrative schematic for a DMWPR is depicted in Fig. 1 of the '070 Application, the '310 Application, and the '312 Provisional. Ex. 1006, '070 Application, p. 56; Ex. 1007, '310 Application, p. 34; Ex. 2004, '312 Provisional, p. 27. An illustrative schematic for a DMWPR in communication mode with secondary wireless power receiver is depicted in Fig. 3 of the '070 Application, '310 Application and the '312 Provisional. Ex. 1006, '070 Application, p. 59; Ex. 1007, '310 Application, p. 37; Ex. 2004, '312 Provisional, p. 29. The '070 Application discloses: "[a] [DMWPR] configured to selectively apply a received power to

	Limitation	Support
	secondary wireless power receiver's load device, said dual mode wireless power receiver comprising:	a load device and 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. 1006, '070 Application, p. 5, [0006]. The '310 Application discloses: "[a] [DMWPR] configured to selectively apply a received power to a load device and 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 a transaction or charge a load device of the secondary wireless power receiver" Ex. 1007, '310 Application, p. 4, [0007]. The '312 Provisional discloses: "[a] dual mode wireless charging receiver configured to selectively apply a received power to a load device and utilize at least a part of the power to power-up, communicate and charge a secondary wireless power receiver". Ex. 2004, '312 Provisional, p. 2, [0004].
21.2	one of coil and capacitor electrodes;	Fig. 2A of the '070 Application, the '310 Application, and the '312 Provisional discloses receiver coil 106 and capacitor electrodes 203. Ex. 1006, '070 Application, p. 57; Ex. 1007, '310 Application, p. 35; Ex. 2004, '312 Provisional, p. 28. In reference to Fig. 2A, receiver coil and capacitor electrodes are described. Ex. 1006, '070 Application, pp. 18-19, [0048]-[0049] ("receiver coil 106" and "capacitor electrodes 203"); Ex. 1007, '310 Application, pp. 13-14, [0033]-[0034] ("receiver coil 106" and "capacitor electrodes 203"); Ex. 2004, '312 Provisional, pp. 11-12, [0027]-[0028] ("receiver coil 106" and "capacitor" 203). Furthermore, the '070 Application and the '310 Application discloses "one of a coil and capacitor electrodes" and "coil or capacitor electrodes". Ex. 1006, '070 Application, pp. 16, 20, [0043], [0051];

	Limitation	Support
		Ex. 1007, '310 Application, pp. 11, 15, [0027], [0035]. The '312 Provisional discloses “a coil or a capacitor”. Ex. 2004, '312 Provisional, 12, [0030].
21.3	a first circuitry comprising:	At least the Figs. 1, 3, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depicts schematic of the first circuitry. Ex. 1006, '070 Application, pp. 56, 59, 62, 63; Ex. 1007, '310 Application, pp. 34, 37, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 29, 32. Figs. 8A-C, 9A-D, 10A-H of the '070 Application also depicts schematic of the first circuitry and various embodiments of the first circuitry. Ex. 1006, '070 Application, pp. 66-76. Furthermore, first circuitry is described throughout the '070 Application, the '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, p. 5, [0006], Ex. 1007, '310 Application, p. 4, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004] (“The first circuitry comprises an impedance network, a switch network, a filter capacitor, and one or more switches”).
21.4	an impedance network <u>comprising two or more electrical components, one of which must be a passive component and one of which must be either an active component or a switch;</u>	At least the Figs. 1, 3, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depicts an impedance network 101. Ex. 1006, '070 Application, pp. 56, 59, 62, 63; Ex. 1007, '310 Application, pp. 34, 37, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 29, 32. Figs. 8A-C, 9A-D of the '070 Application also depicts an impedance network while Figs. 10A-H depicts various embodiments of the first circuitry with variations of the impedance network. Ex. 1006, '070 Application, pp. 66-76. Impedance network is described in the '070 Application, the '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, pp. 16, 36-43, [0044]. [0078]-[0093]; Ex. 1007, '310

	Limitation	Support
		Application, p. 12, [0028]; Ex. 2004, '312 Provisional, p. 9, [0024]. The additional limitation “comprising two or more electrical components, one of which must be a passive component and one of which must be either an active component or a switch” is supported by the '070 Application, the '310 Application, and the '312 Provisional which discloses the following: “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.” Ex. 1006, '070 Application, p. 16, [0044]; Ex. 1007, '310 Application, p. 12, [0028]; Ex. 2004, '312 Provisional, p. 9, [0024].
21.5	a switch network;	At least Figs. 1, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depicts a switch network 102 as part of the first circuitry. Ex. 1006, '070 Application, pp. 56, 62, 63; Ex. 1007, '310 Application, pp. 34, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 32. Figs. 8A-C, 9A-D, 10A-H of the '070 Application also depicts a switch network 102 as part of the first circuitry. Ex. 1006, '070 Application, pp. 66-76. Furthermore, Figs. 6A, 6B, 7A, 7B of the '070 Application, the '310 Application, and the '312 Provisional depicts several embodiments of a switch network. Ex.

	Limitation	Support
		1006, '070 Application, pp. 64-65; Ex. 1007, pp. 42-45; Ex. 2004, '312 Provisional pp. 33-34. Switch network is described in the '070 Application, the '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, pp. 27-32, [0065]-[0073]; Ex. 1007, '310 Application, pp. 23-25, [0049]-[0055]; Ex. 2004, '312 Provisional, pp. 18-20, [0042]-[0048]. The first circuit is also described as comprising of a switch network 102 in the '070 Application, the '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004]. An example of a switch network is described as comprising switches S1a, S3, S4, S5, and S6, and configured as either an inverter or a rectifier depending on mode of operation. Ex. 1007, ¶ [0051]; Ex. 1006, ¶ [0068].
21.6	a filter capacitor;	At least Figs. 1, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depicts a filter capacitor 107 as part of the first circuitry. Ex. 1006, '070 Application, pp. 56, 62, 63; Ex. 1007, '310 Application, pp. 34, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 32. Figs. 8A-C, 9A-D, 10A-H of the '070 Application also depicts a filter capacitor as part of the first circuitry. Ex. 1006, '070 Application, pp. 66-76. Furthermore, the first circuit is described as including a filter capacitor 107 in both '070 Application and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004].
21.7	a second circuitry comprising:	At least the Figs. 1, 3, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depicts schematic of a second circuitry. Ex. 1006, '070 Application, pp. 56, 59, 62, 63; Ex. 1007, '310 Application, pp. 34, 37, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 29, 32. Figs. 8A-C,

	Limitation	Support
		9A-D of the '070 Application also depicts schematic of a second circuitry and various embodiments of the first circuitry. Ex. 1006, '070 Application, pp. 66-72. Second circuitry is described throughout the '070 Application, the '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004]. (“The second circuitry comprises a security engine configured to authenticate, decrypt and encrypt a data transfer between the [DMWPR] and the secondary wireless power receiver, a control logic circuit, and a modulator/demodulator circuit.”).
21.8	a control logic circuit; and	At least the Figs. 1, 3, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depicts a control logic circuit 105 as part of the second circuitry. Ex. 1006, '070 Application, pp. 56, 59, 62, 63; Ex. 1007, '310 Application, pp. 34, 37, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 29, 32. Figs. 8A-C, 9A-D of the '070 Application also depicts a control logic circuit 105 as part of the second circuitry. Ex. 1006, '070 Application, pp. 66-72. Furthermore, the secondary circuit is described as comprising of a control logic circuit 105 in the '070 Application, '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004].
21.9	a modulator/demodulator circuit;	At least the Figs. 1, 3, 5A, 5B, of the '070 Application, the '310 Application, and the '312 Provisional depict a modulator/demodulator circuit 103 as part of the second circuitry. Ex. 1006, '070 Application, pp. 56, 59, 62, 63; Ex. 1007, '310 Application, pp. 34, 37, 40, 41; Ex. 2004, '312 Provisional, pp. 27, 29, 32. Figs. 8A-C, 9A-D of the '070 Application also depicts a

	Limitation	Support
		modulator/demodulator circuit 103 as part of the second circuitry. Ex. 1006, '070 Application, pp. 66-72. A modulator/demodulator 103 is also described in the '070 Application, '310 Application, and the '312 Provisional. <i>E.g.</i> , Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004].
21.10	said first circuitry configured to receive said power from a wireless power transmitter;	As established above, the specification discloses and describes the first circuitry. Furthermore, the '070 Application, the '310 Application, and the '312 Provisional discloses a “[DMWPR] configures the first circuitry to receive the power from an external wireless power transmitter”. <i>E.g.</i> , Ex. 1006, '070 Application, p. 5, [0006]; Ex. '310 Application, p. 3, [0007]; Ex. 2004, '312 Provisional, p. 2, [0004].
21.11	said first circuitry, based on an input from said control logic circuit, configured to change, <u>while said first circuitry is configured to receive said power from a wireless power transmitter</u> , 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	The '070 Application and the '310 Application discloses at least: “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 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.” Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007. '310 Application, p. 4, [0007]. The '312 Provisional discloses at least: “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

	Limitation	Support
	said power to said load device;	the received power, and apply the modified form of the power to the load device, for example, a battery.” Ex. 2004, '312 Provisional, p. 2, [0004]. This limitation is further disclosed and described in the '070 Application, the '310 Application, and the '312 Provisional. <i>E.g.</i>, Ex. 1006, '070 Application, p. 6, 21, 36-43, [0010], [0054], [0078]-[0093]; Ex. 1007, '310 Application, p. 5, 16, [0008], [0037]; Ex. 2004, '312 Provisional, p. 4, 12-13, [0007], [0032]. The additional limitation “while said first circuitry is configured to receive said power from a wireless power transmitter, the” is supported by the '070 Application, the '310 Application, and the '312 Provisional which discloses the following: “In the charging mode, dual mode wireless charging receiver configures the first circuitry to receive the power from an external 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” Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]; <i>see also</i> Ex. 2004, '312 Provisional, p. 2, [0004]. Furthermore, the '070 Application and the '310 Application further supports the amendment: 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

	Limitation	Support
		[DMWPR] also adjusts the topology of the switch network, for example from the default non-synchronous rectifier to fully synchronous rectifier. Ex. 1006, '070 Application, p. 7, [0009]; Ex. 1007, '310 Application, p. 6, [0010].
21.12	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;	The '070 Application and the '310 Application discloses at least: “In the communication mode, the [DMWPR] 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 to power-up the secondary wireless power receiver.” Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4, [0007]. The '312 Provisional discloses at least: “In a communication mode, the dual mode wireless charging 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 at least part of the modified power to the secondary wireless power receiver to power-up the secondary wireless power receiver.” Ex. 2004, '312 Provisional, p. 2, [0004].
21.13	said second circuitry, on power-up of said secondary wireless power receiver, configured to identify a type of said secondary wireless power receiver and	The '070 Application, the '310 Application, and the '312 Provisional discloses at least: “The second circuitry is configured to identify a type of the secondary wireless power receiver and identify a wireless power protocol of the secondary wireless power receiver.” Ex. 1006, '070 Application, p. 5, [0006]; Ex. 1007, '310 Application, p. 4-5, [0007]; Ex. 2004, '312 Provisional, p. 2-3, [0004].

	Limitation	Support
	identify a wireless power protocol of said secondary wireless power receiver;	
21.14	said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;	The '070 Application, the '310 Application, and the '312 Provisional discloses “the second circuitry of the [DMWPR] receives and interprets the data from the non-authenticating secondary wireless power receiver”, “receives, decrypts and interprets the data from the one-way authenticating secondary wireless power receiver”, and “receives, decrypts and interprets data from the two-way authenticating secondary wireless power receiver”. Ex. 1006, '070 Application, p. 6-7, [0007]-[0008]; Ex. 1007, '310 Application, p. 5-6, [0008]-[0009]; Ex. 2004, '312 Provisional, p. 3-4, [0005]-[0006] The '070 Application, the '310 Application, and the '312 Provisional further discloses and describes interpreting data from a secondary wireless power receiver. <i>E.g.</i>, Ex. 1006, '070 Application, p. 17-18, [0047]; Ex. 1007, '310 Application, p. 13, [0031]; Ex. 2004, '312 Provisional, p. 10, [0026].
21.15	said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.	The '070 Application, the '310 Application, and the '312 Provisional discloses “The second circuitry interprets the received request and performs a function associated with the transmitted power in conjunction with the first circuitry. For example, the [DMWPR] interprets the request from the power sinking secondary wireless power receiver to perform a function such as increase the transmitted power, decrease the transmitted power, maintain the transmitted power, turn off the transmitted power, etc. and takes action as per the wireless power protocol for such a type of secondary wireless power receiver.” Ex. 1006, '070 Application, p. 6-7, [0007]-[0008]; Ex. 1007, '310

	Limitation	Support
		Application, p. 5-6, [0008]-[0009]; Ex. 2004, '312 Provisional, p. 3-4, [0005]-[0006]. The '070 Application, the '310 Application, and the '312 Provisional further discloses and describes performing a function based on said interpretation. <i>E.g.</i>, Ex. 1006, '070 Application, p. 17-18, [0047]; Ex. 1007, '310 Application, p. 13, [0031]; Ex. 2004, '312 Provisional, p. 10, [0026].
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 rectifier.	The written description support for [DMWPR] is shown above in 21.1. The written description support for switch network of said first circuitry is shown above in 21.5. At least the Figs. 6A, 6B, 7A, and 7B of the '070 Application, the '310 Application, and the '312 Provisional depicts switch network 102 configured as one of inverter and rectifier. Ex. 1006, '070 Application, pp. 64-65; Ex. 1007, pp. 42-45; Ex. 2004, '312 Provisional pp. 33-34. The switch network of said first circuitry configured as one of an inverter and rectifier is at least described in the context of Figs. 6A, 6B, 7A, and 7B. Ex. 1006, '070 Application, pp. 28-29, [0067]-[0070]; Ex. 1007, '310 Application, pp. 23-25, [0051]-[0054]; Ex. 2004, '312 Provisional, pp.19-20, [0044]-[0047].

95. Based on the above, it is my opinion that a POSA would understand upon reviewing the '312 Provisional and/or the '310 Application that the inventor possessed the invention as claimed in original Claim 1 as well as in substitute Claim 21 as of August 13, 2012, or alternatively, at least as of August 12, 2013. Furthermore, and in the alternative, it is my opinion that a POSA would understand

upon reviewing the '070 Application that the inventors possessed the invention as claimed in original Claim 1 as well as in substitute Claim 21 no later than April 10, 2016. Therefore, the written description requirement is met for the limitation “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,” which appears in Substitute Claim 21. Furthermore, the written description requirement is met for the limitation “impedance network comprising two or more electrical components, one of which must be a passive component and one of which must be either an active component or a switch.”

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 9th day of October, 2024.

/s/ Dr. Randal H. Direen

DR. RANDAL H. DIREEN