

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.

Petitioner,

v.

WIPQTUS, INC.

Patent Owner

**EXPERT DECLARATION OF JOSHUA PHINNEY,
IN SUPPORT OF PETITION FOR *INTER PARTES*
REVIEW OF U.S. PATENT NO. 10,038,339**

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I, Joshua Phinney, hereby declare as follows:

I. INTRODUCTION AND QUALIFICATIONS

1. I have been retained on behalf of Samsung Electronics Co. Ltd. (“Samsung” or “Petitioner”) to provide my technical review, analysis, insights, and opinions concerning the validity of claims 1-3, 5, 7, 9 of U.S. Patent No. 10,038,339 (“the ’339 patent”) (EX1001) entitled “Dual Mode Wireless Power Receiver.” I understand that the ’339 patent is assigned to WiPQTUS, Inc. (“WiPQTUS”).

2. My complete qualifications and professional experience are described in my Curriculum Vitae, a copy of which can be found in Exhibit 1005. The following is a brief summary of my relevant qualifications and professional experience.

3. I am a Principal Engineer in the Electrical Engineering and Computer Science practice at Exponent, an engineering and scientific consulting firm headquartered at 149 Commonwealth Drive, Menlo Park, California 94025. I received a Ph.D. in Electrical Engineering from the Massachusetts Institute of Technology (“MIT”) in 2005. I also earned S.M. and B.S. degrees in Electrical Engineering from MIT and the University of Illinois, Chicago (“UIC”), respectively.

4. My graduate work centered on miniaturization of power converters and magnetics. As part of my doctoral work, I constructed and modeled planar magnetic systems, including magnetically coupled, printed magnetic coils. In addition, at

MIT, I designed and constructed inverters and modulators for the 13.56 MHz band. I am a co-inventor on patents for magnetically coupled windings that are used to improve the performance of capacitors, EMI filters, and common-mode chokes.

5. For my publications related to both my Master's and Ph.D. thesis, I received the William M. Portnoy Prize Paper Award (2003) and the IEEE Power Electronics Society Transactions Prize Paper Award (2004).

6. After earning my Ph.D., I joined Exponent and have led technical investigations to portable electronic devices, microcomputers, as well as industrial and consumer devices with embedded controllers. My job functions include analyzing hardware and software of these devices to understand their modes of failure, and testifying regarding these devices in legal matters involving patents and trade secrets.

7. As part of my employment at Exponent, I have performed design, design reviews, and failure analysis for wireless charging and communication systems. The focus of this work has been (1) coupling between transmitter and receiver coils from the standpoint of efficiency and magnetic-field exposure to users, in particular for the Power Matters Alliance; (2) coupling of interrogators and transponder coils in printed magnetic cards; and (3) integrated-circuit and coil failures due to wear, dimensional changes, and triboelectric charging. In addition to testifying regarding resonant and inductive wireless-power transfer, I have consulted

for industry regarding coil design, RFID and near-field communication (NFC) integrated circuits, modulation methods, and on-metal RFID tags.

8. I have testified regarding wireless power transfer technology, including trade secrets related to the software, coils, and circuitry of commercial wireless chargers (*Spark Connected v. Semtech Corp.*, Case No. 4:18-CV-00748 in the United States District Court, Eastern District of Texas, Sherman Division). In addition, I have testified on behalf of apple in in Inter Partes Reviews regarding 10 patents related to wireless power transfer (e.g., IPR2022-00117, 00118, 00120, 00350, 00351, before the U.S. Patent Trial and Appeal Board). My experience with wireless RF circuitry includes failure analysis of amplifiers, power supplies, matching networks, and multiplexers in satellites, semiconductor-processing equipment, and medical devices. I also testify regarding electronics more generally, including the power electronics in communication systems, wind turbines, grid-scale photovoltaic plants, and consumer electronics. In addition, I have testified regarding control and compensation in industrial controllers, voltage regulators, and switched-mode power converters.

9. Regarding the mechanical elements of electronic equipment, I have testified regarding buttons and touch interfaces, connectors, linear and rotary actuators, position-measuring devices, and the design and construction of modular housings for computerized equipment and peripherals. In particular, I have testified

regarding detachable components as they are constructed in relation to the housing and underlying electronic assemblies, including printed circuit boards, flex printed circuits, and other connector assemblies within the housing of electronic equipment.

10. In addition to the forgoing, I perform electromagnetic assessment of utility and communication infrastructure. These issues include permitting, interference, and environmental impact of radar, AC and HVDC transmission lines, substations, photovoltaic installations, generators, broadcast antennas, and electrified mass transit systems.

11. I am being compensated for my work associated with this case plus reimbursement of reasonable expenses. My compensation is not contingent on my opinions or the outcome of the case, and I have no other interest in this case or the parties thereto.

II. UNDERSTANDING OF THE GOVERNING LAW

A. Invalidity by Obviousness

12. I understand that a claim may be invalid under 35 U.S.C. § 103 if the subject matter described by the claim as a whole would have been obvious to a POSA in view of a prior art reference, or in view of a combination of references at the time the claimed invention was made. I understand that obviousness is analyzed from the perspective of a POSA at the time of the alleged invention. I also understand that a

POSA is presumed to have been aware of all pertinent prior art at the time of the alleged invention.

13. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSA in view of the prior art, and in light of the general knowledge in the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSA would have reached the claimed invention through routine experimentation.

14. I understand that obviousness can be established by combining or modifying the disclosures of the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSA.

15. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a POSA

has good reason to pursue the known options within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

16. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness include failure of others, copying, unexpected results, information that “teaches away” from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that in order for objective indicia of non-obviousness to be applicable, the indicia must have some sort of nexus to the subject matter in the claim that was not known in the art. I understand that such nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged. I also understand that an independently made invention that is made within a comparatively short period of time is evidence that the claimed invention was the product of ordinary skill.

17. Finally, I understand that patent examiners at the U.S. Patent and Trademark Office (“USPTO”) rely upon certain exemplary rationales in reviewing

patent applications to understand whether the subject matter of the claims is obvious.

I understand that the following is the list of exemplary rationales relied upon by patent examiners at the USPTO:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices, methods, or products in the same way;
- Applying a known technique to a known device, method, or product ready for improvement to yield predictable results;
- “Obvious to try” – Choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

18. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and

19. Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

B. Interpreting Claims Before the Patent Office

20. I understand that *inter partes* review is a proceeding before the USPTO for evaluating the validity of issued patent claims. I understand that, in an *inter partes* review, a claim term is interpreted in a manner consistent with the standard used in patent litigation, as set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). That standard generally construes the claims according to their “ordinary and customary” meaning in view of the claim language, specification, and file history, and where applicable, relevant other evidence.

21. I understand that a patent’s “specification” includes all the figures, discussion, and claims within the patent. I understand that the USPTO will look to the specification and prosecution history to see if there is a definition for a given claim term, and if not, will apply the ordinary and customary meaning from the perspective of a POSA at the time in which the alleged invention was made.

C. Analogous Art

22. I understand that a consideration for an obviousness analysis is whether the prior art being relied upon is “analogous art.” I understand that to be analogous art, a prior art reference must either be (1) from the same field of endeavor as the patent, or (2) if not from the same field, then it must still be reasonably pertinent to the particular problem with which the inventors were concerned.

D. Materials Relied on in Forming My Opinions

23. In forming my opinions expressed in this declaration, I have relied on my own knowledge, experience, and expertise, as well as the knowledge of a POSA in the relevant timeframe. In addition, I have reviewed and relied upon all documents referenced in this declaration including the following materials. I understand the documents have been given the following exhibit numbers in this proceeding:

- U.S. Patent No. 10,038,339 (“the ’339 Patent”) (EX1001);
- U.S. Patent Publication No. US2011/0018356 (“Chatterjee”) (EX1003);
- U.S. Patent Publication No. US2010/0083012 (“Corbridge”) (EX1004)
- Prosecution History of the ’339 patent (EX1006)
- Prosecution History of U.S. Patent No. 9,343,929 (EX1007)
- System Description, Wireless Power Transfer, Volume I: Low Power, Part 1: Interface Definition, Version 1.0.3, September 2011 (“WPT”) (EX1008)

III. BACKGROUND OF THE ART

A. Wireless Power Transfer

24. Wireless power transfer uses electromagnetic fields to transmit electrical energy without wires as a physical link. In a wireless power transmission system, an electrically powered transmitter device generates a time-varying electromagnetic field that transmits power across space to a receiver device; the receiver device extracts power from the field and supplies it to an electrical load.

25. There are two types of wireless power transfer: inductive and capacitive. The inductive wireless power transfer uses coils of wire to transfer power wirelessly via a magnetic field. The capacitive wireless power transfer uses two metal electrodes to transfer power wirelessly via an electrical field.

26. Inductive wireless power transfer was well known at the time of the invention of the '339 patent, as reflected in the industry standards competing for adoption at that time. An industry standard for inductive wireless power transfer widely known at the time was the Wireless Power Transfer Standard, also known as "the Qi Standard." The Qi Standard was first released by the Wireless Power Consortium in 2009 whose members include Samsung. In September 2011, almost a year before the earliest possible effective filing date of the '339 patent on August 13, 2012, the Wireless Power Consortium published version 1.0.3 of the "System Description, Wireless Power Transfer, Volume I: Low Power, Part 1: Interface Definition" of the Qi Standard (Exhibit 1008 (the "WPT Standard" or "WPT")). WPT(EX1008).

27. The WPT standard defines "a method of contactless power transfer from a Base Station to a Mobile Device, which is based on near field magnetic induction between coils." WPT, 1. Specifically, Sections 2 to 5 of the WPT standard define aspects of the wireless power transfer interface that provide helpful background information for the '339 patent, as explained below.

28. Section 2 of the WPT Standard is entitled “System Overview” and provides an “informative” overview of the wireless power transfer system. WPT, 7. In a wireless power transfer system, “[t]wo kinds of devices are distinguished, namely devices that provide wireless power—referred to as Base Stations—and devices that consume wireless power—referred to as Mobile Devices. Power transfer always takes place from a Base Station to a Mobile Device.” *Id.* “For this purpose, a Base Station contains a subsystem—referred to as a Power Transmitter—that comprises a Primary Coil and a Mobile Device contains a subsystem—referred to as a Power Receiver—comprises a Secondary Coil.” *Id.* “Figure 2-1 illustrates the basic system configuration.” *Id.*

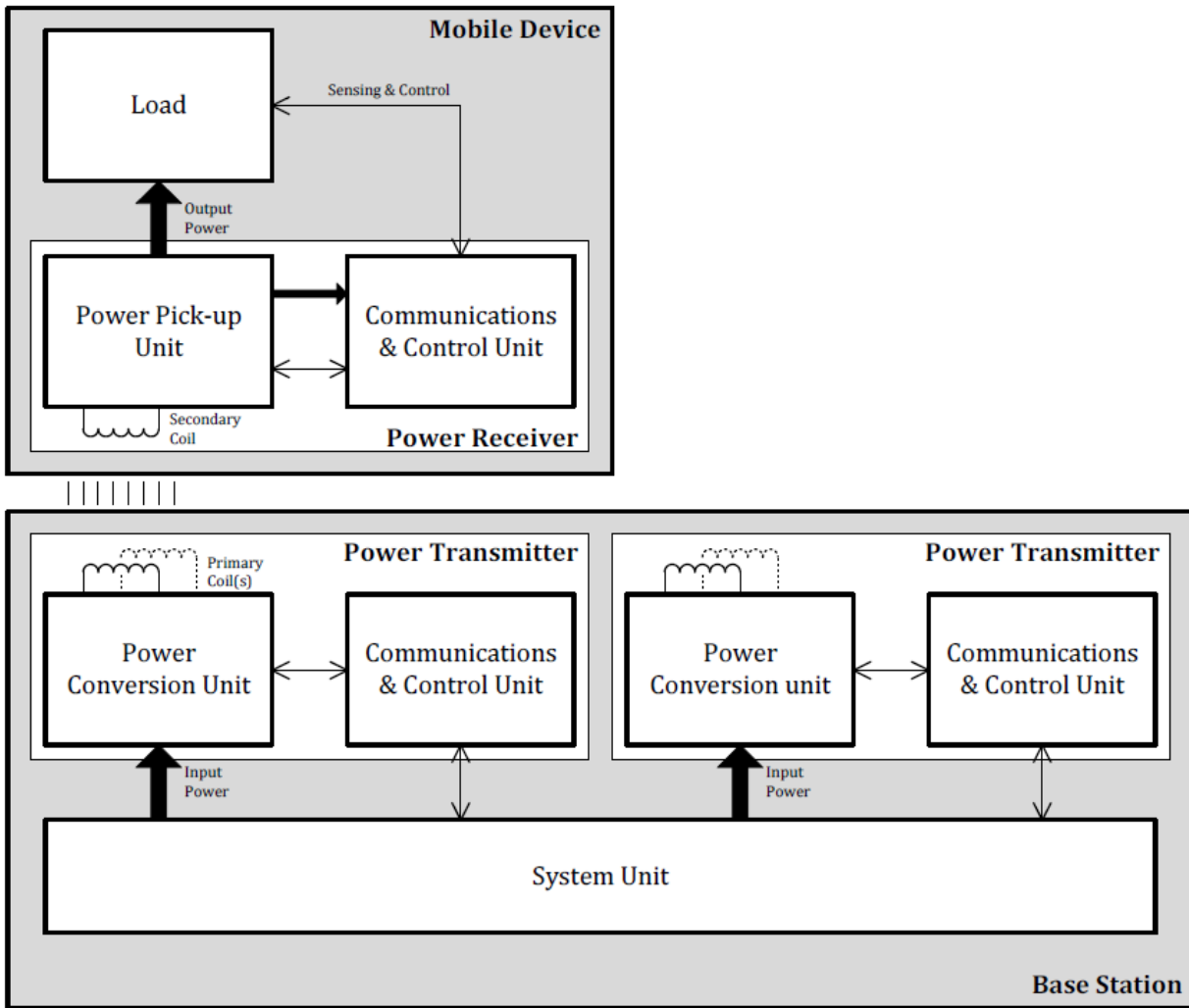


Figure 2-1: Basic system overview

29. “As shown [in Figure 2-1], a Power Transmitter comprises two main functional units, namely a Power Conversion Unit and a Communications and Control Unit.” WPT at 7. “The diagram explicitly shows the Primary Coil (array) as the magnetic field generating element of the Power Conversion Unit.” *Id.* “The Control and Communications Unit regulates the transferred power to the level that the Power Receiver requests.” *Id.*

30. Also as shown in Figure 2-1, “[a] Power Receiver comprises a Power Pick-up Unit and a Communications and Control Unit.” WPT at 7. “Similar to the Power Conversion Unit of the Transmitter, Figure 2-1 explicitly shows the Secondary Coil as the magnetic field capturing element of the Power Pick-up Unit.” *Id.* “The Communications and Control Unit regulates the transferred power to the level that is appropriate for the subsystems connected to the output of the Power Receiver.” *Id.*

31. Section 3 of the WPT Standard is entitled “Basic Power Transmitter Designs.” WPT, 11. According to Section 3 of the WPT standard, “[t]he Power Transmitter designs, which this version 1.0.3 of the System Description Wireless Power Transfer, Volume I, Part 1, defines, are grouped into two basic types”: “Type A Power Transmitter designs have a single Primary Coil” and enables “either Guided Positioning or Free Positioning”; “Type B Power Transmitters have an array of Primary Coils” and “[a]ll Type B Power Transmitters enable Free Position.” WPT, 11.

32. “Figure 3-1 illustrate the functional block diagram” of Power Transmitter design A1 that enables Guided Positioning, which “consists of two major functional units, namely a Power Conversion Unit and a Communications and Control Unit.” WPT, 11.

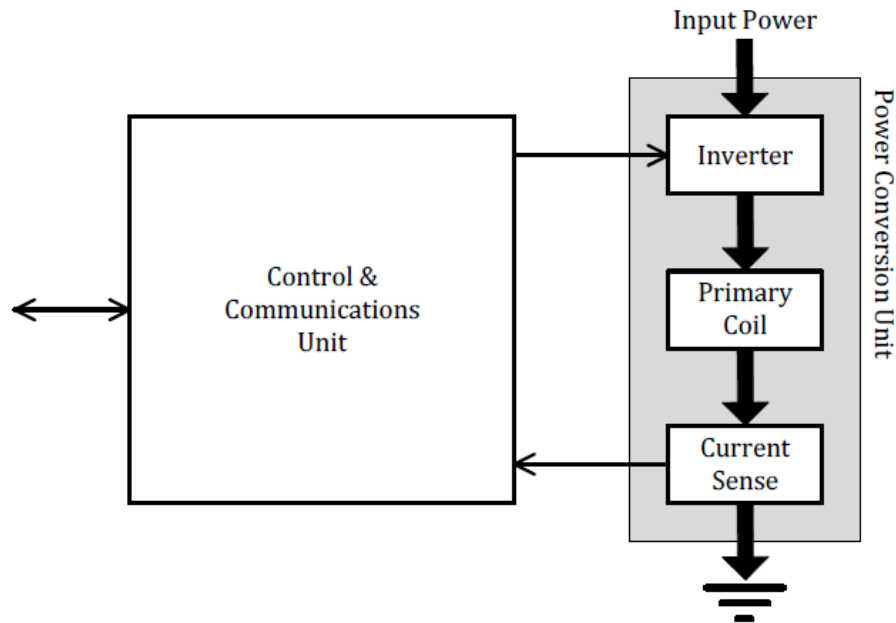


Figure 3-1: Functional block diagram of Power Transmitter design A1

33. “The Power Conversion Unit on the right-hand side of Figure 3-1 comprises the analog parts of the design. The inverter converts the DC input into an AC waveform that drives a resonant circuit, which consists of the Primary Coil plus a series capacitor.” WPT, 12.

34. “The Control & Communication Unit on the left-hand side of Figure 3-1 comprises the digital logic part of the design. This unit receives and decodes messages from the Power Receiver, executes the relevant power control algorithms and protocols, and drives the frequency of the AC wave form to control the power transfer.” WPT, 12.

35. Section 4 of the WPT Standard is entitled “Power Receiver Design Requirements.” WPT, 29. “Figure 4-1 illustrates an example functional block diagram of a Power Receiver.” *Id.*

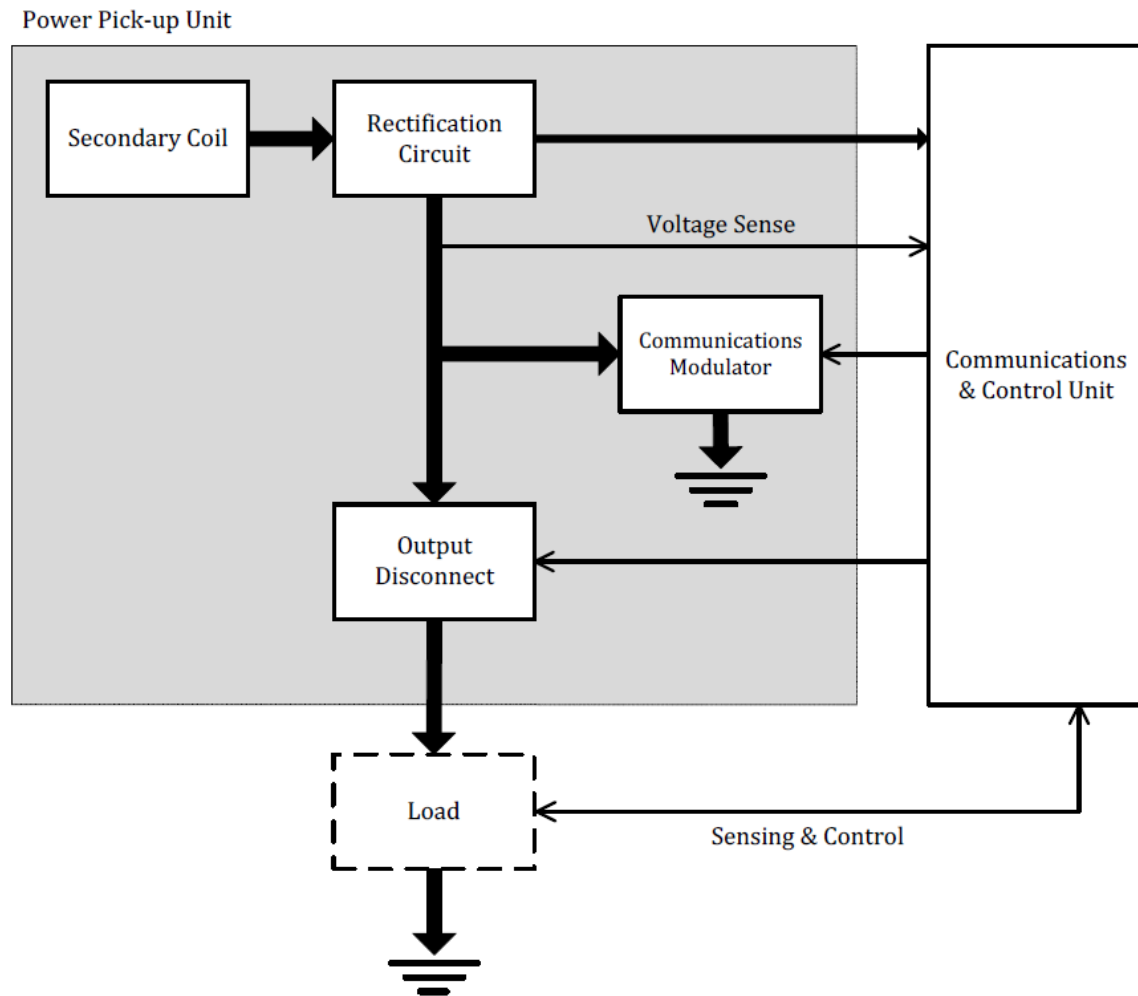


Figure 4-1: Example functional block diagram of a Power Receiver

36. “In this example, the Power Receiver consists of a Power Pick-Up Unit and a Communications and Control Unit.” WPT, 29. “The Power Pick-up Unit on the left-hand side of Figure 4-1 comprises the analog components of the Power Receiver:

- A dual resonant circuit consisting of a Secondary Coil plus series and parallel capacitances to enhance the power transfer efficiency and enable a resonant detection method . . .
- A rectification circuit that provides full-wave rectification of the AC wave form, using e.g. four diodes in a full-bridge configuration . . .
- A communications modulator. . . .”

WPT, 29-30.

37. “The Communications & Control Circuit on the right-hand side of Figure 4-1 comprises the digital logic part of the Power Receiver.” WPT, 30. “This unit executes the relevant power control algorithms and protocols; drives the communications modulator; controls the output disconnect switch; and monitors several sensing circuits.” *Id.*

38. Section 5 of the WPT Standard is entitled “System Control.” WPT, 35. According to Section 5 of the WPT Standard, “[f]rom a system control perspective, power transfer from a Power Transmitter to a Power Receiver comprises four phases, namely *selection, ping, identification & configuration, and power transfer.*” *Id.* “Figure 5-1 illustrates the relation between the phases.” *Id.*

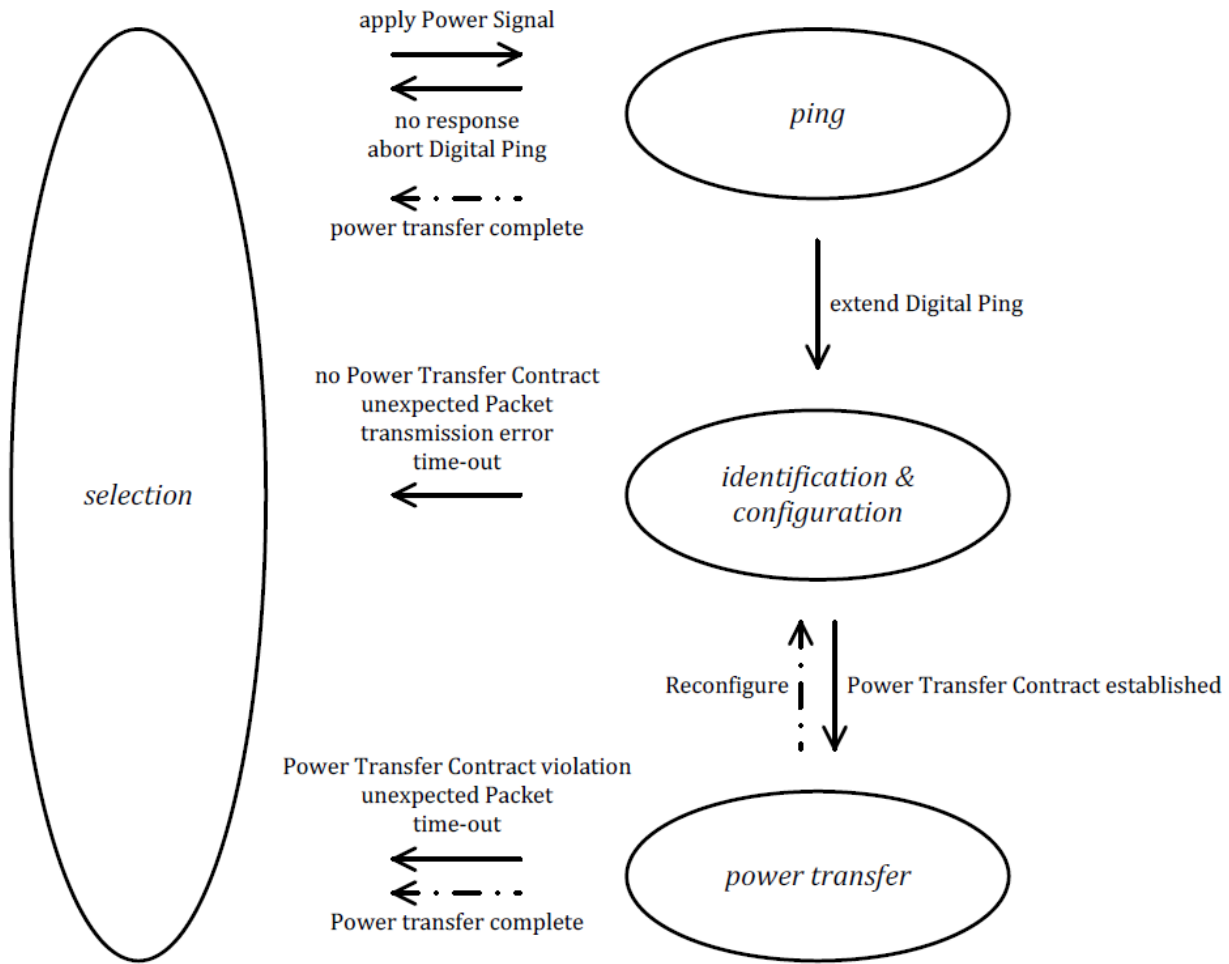


Figure 5-1: Power transfer phases

39. In the *selection* phase, the Power Transmitter “attempts to discover and locate objects that are placed on the Interface Surface” and “to discriminate between Power Receivers and foreign objects and to select a Power Receiver (or object) for power transfer.” WPT, 8, 35. For example, during this phase, the transmitter may operate in a low-power standby mode, periodically emitting “analog pings” to detect a potential power receiver. WPT, 67. An analog ping is test pulse applied to the primary coil. Power receivers and foreign objects (e.g., passive metal objects such

as keys) absorb energy of the test pulse, and dampen the voltage observed at the terminal of the primary coils; in contrast, the voltage on the primary terminals is larger with no object on the Interface Surface. *See* WPT, 67-68.

40. In the *ping* phase, the Power Transmitter “attempts to discover if an object contains a Power Receiver” by “execut[ing] a Digital Ping, and listen[ing] for a response.” WPT, 8, 36. “Digital pings” are pulses with enough energy to activate a compliant power receiver and communicate with it, if such a receiver is present at the Interface Surface. Upon being powered by the digital ping signal, the receiver controller responds with a signal strength indicator packet. WPT, 38. A valid response packet distinguishes a compliant power receiver from a foreign object or a non-compliant receiver. *Id.* Response packets can be sent from the power receiver to the power transmitter, using the mutual magnetic field for both power and communication such as via amplitude modulation. WPT, 51.

41. In the *identification & configuration* phase, the Power Transmitter “prepares for power transfer to the Power Receiver” by “identif[y]ing the selected Power Receiver and obtain[ing] configuration information such as the maximum amount of power that the Power Receiver intends to provide at its output.” WPT, 8, 36. For example, the receiver may send data packets that contain the Qi version of the receiver and maximum required output power using amplitude modulation. WPT, 40-42.

42. In the *power transfer* phase, “actual power transfer takes place,” including the Power Transmitter “adjusting its [coil] current in response to control data that it receives from the Power Receiver.” WPT, 9, 36. For example, the power transfer phase implements a feedback control system to maintain required power level and detect foreign objects, by which the receiver measures the power it receives and sends this information back to the transmitter, which adjusts the transmitted power level to match requirements in real time. WPT, 44-46.

IV. OVERVIEW OF THE '339 PATENT

A. Specification of the '339 Patent

43. The '339 patent describes dual mode wireless charging receivers and methods for the dual mode wireless charging receivers. '339 patent, 2:25-28.

44. One stated object of the '339 patent is to enable “mobile devices with big battery capacity such as a notebook, tablet, etc., that typically are carried along on the trips, were able to wirelessly charge other lower battery capacity mobile devices such as a mobile phone, camera, etc., that are also carried on the trips.” *Id.*, 1:23-24.

45. Another state object is to use the wireless charging circuitry to “emulate NFC like functionality” such that “in addition to being able to receive power to charg[e] the mobile device’s battery, the wireless power receiver circuitry should also be able to transmit power to perform an action or a transaction” such as

“unlocking a luggage, unlocking a safe, unlocking a computer, virtual wallet, travel-pass for commuter train, boarding pass for flights, etc.” *Id.*, 1:60-67.

46. The resulting dual mode wireless charging receiver is configured to “in one mode, receives wireless power to charge, for example, a mobile device”; “in another mode, transmits power to a secondary wireless power receiver to perform an action or transaction, where such an action or transaction is made inherently secure and reliable via the two-way communication and security capabilities of the dual mode wireless power receiver”; and in a further mode, “transforms into a wireless transmitter for charging a secondary wireless power receiver.” *Id.*, 2:10-20.

47. Figure 1 of the '339 patent “exemplarily illustrates a schematic diagram of a dual mode wireless power receiver 100.” *Id.*, 8:4-5. As shown in Figure 1, the dual mode wireless power receiver 100 comprises a coil 106 that is used to transmit power via a magnetic field, a first circuitry, and a second circuitry.” *Id.*, Fig. 1, 8:27-28, 10:18-20. “The first circuitry comprises an impedance network 101, a switch network 102, a filter capacitor 107, and switches S1 and S2.” *Id.*, 8:34-37. “The second circuitry comprises a control logic circuit 105, a security engine 104, and a modulator/demodulator circuit 103.” *Id.*, 8:40-43.

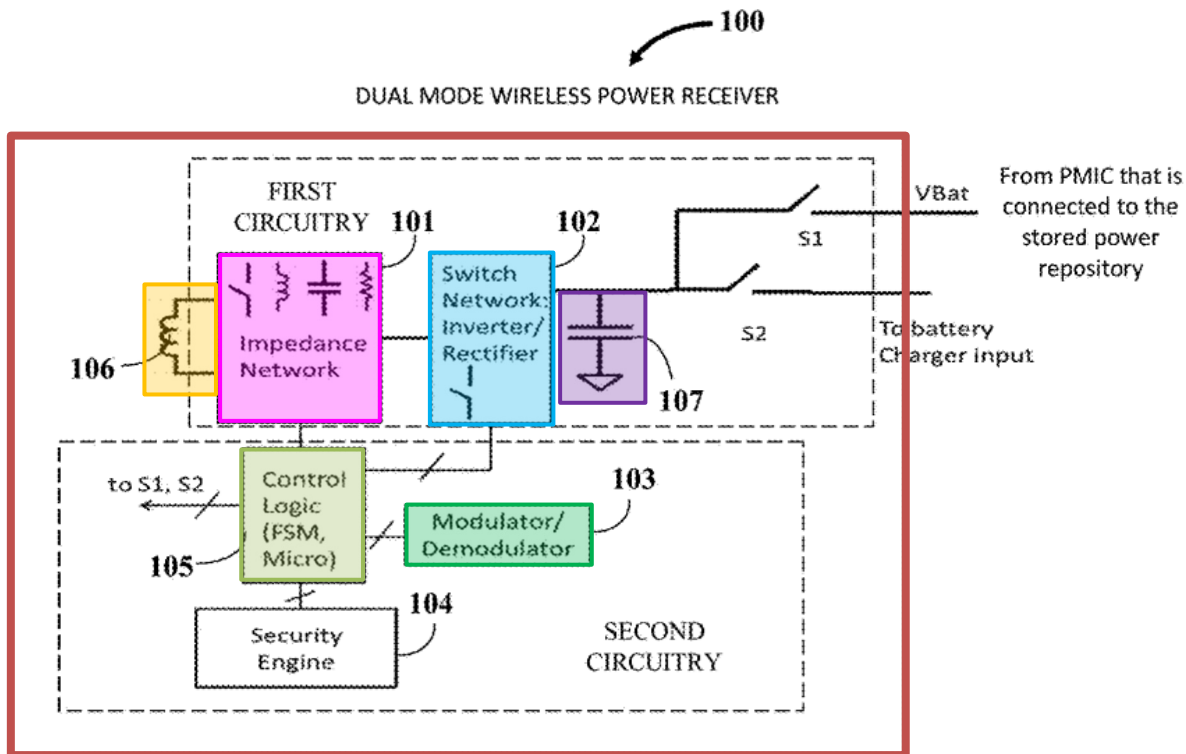


FIG. 1

Id., Fig. 1 (annotated).¹

48. “The dual mode wireless power receiver 100 operates in a charging mode and a communication mode.” *Id.*, 8:7-9.

49. “In the charging mode, the first circuitry receives power from a wireless power transmitter 200 and applies that power to the load device, for example, a sophisticated CMIC or PMIC (Power Management Integrated Circuit), a simple battery charger, a battery, a resistive load, etc.” *Id.*, 8:30-34. “As exemplarily

¹ All color lines appearing in the figures herein are annotations, unless otherwise noted.

illustrated in FIG. 5A, in the charging mode, the **switch network** 102 of the first circuitry is configured as a rectifier; switch S1 is open and switch S2 is closed to direct the rectified and filtered power to the load device.” *Id.*, 8:36-40. “In the charging mode, the second circuitry communicates with the wireless power transmitter 200 to regulate the amount of power that it receives as per the norms of the implemented wireless power protocol.” *Id.*, 8:43-46. “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.” *Id.*, 2:42-46.

50. “In the communication mode, the **switch network** 102 of the first circuitry is configured as an inverter, transforming the **dual mode wireless power receiver** 100 into a wireless power transmitter for transmitting power to a **secondary wireless power receiver** 300.” *Id.*, 8:47-51. “[S]witch S1 is closed and switch S2 is kept open to direct the power from the battery via the **inverter** to . . . a **coil**,” which “is used to wirelessly transmit **dual mode wireless power receiver**’s 100 battery power to the **secondary wireless power receiver** 300 via a magnetic field.” *Id.*, 8:52-58. “In communication mode, the first circuitry of the **dual mode wireless power receiver** 100 is configured to change the impedance of the impedance network 101 and change the topology of the **switch network** 102 to transmit a part of the stored

power to the secondary wireless power receiver 300 to power-up the secondary wireless power receiver 300.” *Id.*, 15:33-39.

B. The Relevant Claims of the '339 Patent

51. The '339 patent includes 20 claims, and claims 1 and 13 are independent claims. *See* EX1001, cols. 27-30. I have been asked to evaluate the patentability of claims 1-3, 5, 7, 9 of the '339 patent. Those claims are reproduced in full below.

52. Claim 1 recites:

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;

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 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.

EX1001, 27:2-43.

53. Claim 2 recites:

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

EX1001, 27:44-46.

54. Claim 3 recites:

3. The dual mode wireless power receiver of claim 1, wherein said impedance network of said first circuitry comprising of elements that are one of chosen a priori with fixed values and tuned during operation over a range of values.

EX1001, 27:47-51.

55. Claim 5 recites:

5. The dual mode wireless power receiver of claim 1, wherein said first circuitry is further comprising one of switch_configuration_A and switch_configuration_B:

said switch_configuration_A comprising first switch and second switch,

said first switch operationally connecting and disconnecting said dual mode wireless power receiver with said stored power directly or via intermediate circuitry, and

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

said switch_configuration_B comprising single switch,

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

EX1001, 28:14-30.

56. Claim 7 recites:

7. The dual mode wireless power receiver of claim 1, wherein said first circuitry is further comprising a switch that connects and disconnects said dual mode wireless power receiver with said stored power, said connection

and disconnection to said stored power being direct or indirect via other intermediate circuitry and a power regulation circuitry that connects and disconnects said dual mode wireless power receiver with said load.

EX1001, 28:48-55.

57. Claim 9 recites:

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

EX1001, 28:64-29:4.

C. The Prosecution History of the '237 Patent

58. The '339 patent has 20 claims, of which claims 1-12 are directed to a dual mode wireless power receiver and claims 13-20 are directed to a method for a dual mode wireless power receiver. '339 patent, 27:1-30:59.

59. I understand that during prosecution of the '339 patent, the examiner issued a first Office Action on November 7, 2017, indicating that the pending claims 1-20 are allowed, and that the pending claims 1, 2, 13, and 20 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-3, 10, and 11 over U.S. Patent No. 9,343,929. EX1006, 128-135. The Office Action included a statement of the reasons for allowance that generally asserts that the

limitations recited in the issued independent claims 1 or 13 are not taught by the prior art on the record. *Id.*, 132-133.

60. I understand that the applicant filed a reply to the November 7, 2017 Office Action including a terminal disclaimer to “overcome the double patenting rejection in view of patent 9343929” and correcting “[g]rammatical errors and typos in the Claims.” EX1006, 143-153.

61. I understand that the examiner issued a Notice of Allowance on April 10, 2018 that included a statement of the reasons for allowance that generally asserts that the limitations recited in the issued independent claims 1 or 13 are not taught by the prior art on the record. EX.1006, 170-178.

62. I understand that the ’339 patent is a continuation-in-part of U.S. Patent No. 9,343,929. EX1001, cover.

63. I understand that during the prosecution of U.S. Patent No. 9,343,929, the examiner issued a Notice of Allowability on April 23, 2015 as the first office action. EX1007, 114-118. The Notice of Allowability included a statement of the reasons for allowance that generally asserts that the limitations recited in the issued independent claims 1 or 3 are not taught by the prior art on the record. *Id.*, 110-118.

D. The Priority Date of the ’339 Patent

64. I understand that the earliest-filed patent application to which the ’339 Patent claims priority (U.S. Provisional Patent Application No. 61/682,312) was

filed on August 12, 2012. I have therefore been asked for purposes of this declaration to analyze obviousness as of August 12, 2012.

V. STATE OF THE ART PRIOR TO THE '237 PATENT

A. The Person of Ordinary Skill in the Art

65. The '339 patent relates to “a dual mode wireless power receiver” and methods for the “dual mode wireless power receiver.” EX1001, Abstract, 11:54-67. Based on my review of the '339 patent, it is my opinion that, as of August 12, 2012, a POSA would have had a bachelor’s degree in electrical engineering or a similar discipline, and at least two years of professional experience working with wireless power systems. Additional education, such as a master’s degree of electrical engineering could substitute for professional experience and significant work experience could substitute for formal education. The POSA would have knowledge about circuitry and controller design in the context of wireless power transfer.

66. As detailed above, I qualify as a POSA, and also qualified as a POSA as of August 12, 2012. I have a sufficient level of knowledge, experience, and expertise to provide an expert opinion in the field of the '339 Patent.

B. Chatterjee

67. Chatterjee is a United States Patent Application Publication with Publication No. US 2011/0018356. Chatterjee was filed on December 1, 2009, and published on January 27, 2011.

68. Chatterjee discloses “an **inductive signal interface** capable of bi-directional inductive signaling.” Chatterjee(EX1003), ¶2. The **inductive signal interface** “uses shared circuit elements to be operable as either a power transmitter or a power receiver.” *Id.* ¶29.

69. Chatterjee discloses an **inductive signal interface** 410 in Figure 4 that “resides on an electronic device 402 (e.g. mobile computing device or dock) and includes a **power bridge circuit** 411, a bi-directional coil assembly 412, a **processor** 413, a power circuit 414, and a communication circuit 415.” Chatterjee(EX1003), ¶41; Fig. 4 (annotated).

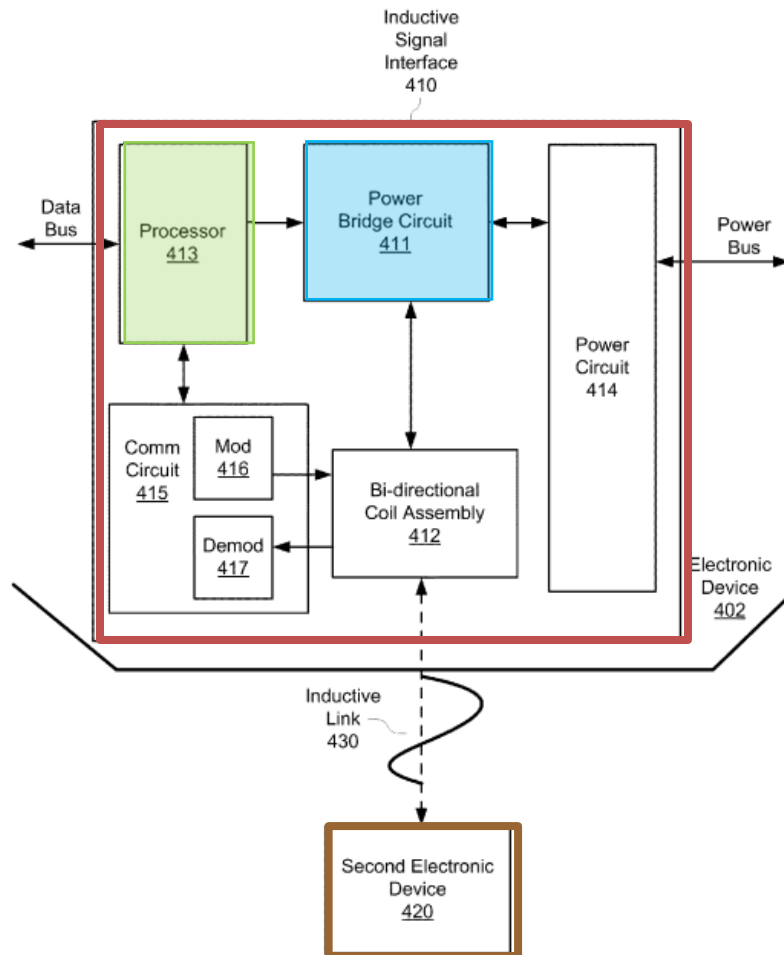


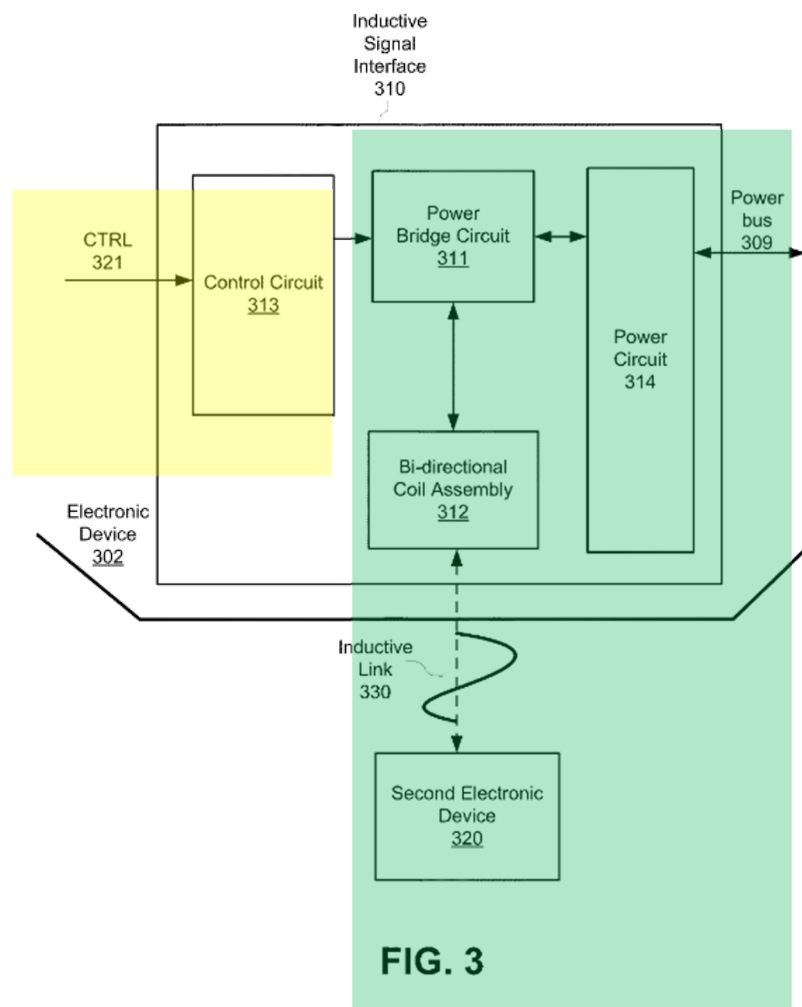
FIG. 4

70. “During the power receive mode of the inductive signal interface 410, the bi-directional coil assembly 412 receives power over the inductive link 430 from the second electronic device 420.” *Id.* ¶46. “The power signal is transmitted in modulated form over the power bridge circuit 411, which performs rectification to output a DC current to the power circuit 414.” *Id.* “The power circuit 414 is configured to clamp current levels, regulate voltage levels, and perform other functions to transmit an outgoing power signal,” which is “routed to . . . charge a rechargeable battery within the electronic device 402.” *Id.*

71. “During the power transmit mode of the **inductive signal interface 410**, the bi-directional coil assembly 412 is used to carry the modulated power signal to the **second electronic device 420**.” *Id.* ¶47. “The power may originate from another component on the electronic device 402, such as a battery (not shown).” *Id.* “The power circuit 414 is configured to treat the incoming power signal . . . to transmit a treated outgoing power signal to the **power bridge circuit 411**.” *Id.* “[T]he output power signal of the power circuit 414 to the **power bridge circuit 411** in the power transmit mode is substantially a DC signal, and the **power bridge circuit 411** performs DC to high-frequency conversion to output a high-frequency power signal to the bi-directional coil assembly 412,” which “transmits power via the inductive link 430 to the **second electronic device 420**.” *Id.*

72. Chatterjee also discloses another embodiment, inductive signal interface 310 (*id.* ¶¶ 34-44, Fig. 3) that is similar to **inductive signal interface 410** at least with respect to the structure, function, and operation of the bi-directional coil assembly 314/412, **power bridge circuit 311/411**, and power circuit 314/414. *E.g.*, *id.* ¶41 (“Similar to the inductive signal interface 310 of FIG. 3, the **inductive signal interface 410** may reside on any device that is capable of inductively receiving or transmitting power with another suitably configured device”); ¶44 (“The power circuit 414 operates in a similar fashion as the power circuit 314 of FIG. 3 The **power bridge circuit 411** operates in a similar fashion as the power bridge circuit

311 of FIG. 3.”); ¶45 (“The bi-directional coil assembly 412 operates in a similar fashion as the bi-directional coil assembly 312 of FIG. 3”). As shown in annotated Figures 3 and 4 below, the green highlighted portion are components of inductive signal interface 310 and inductive signal interface 410 that operate in similar ways and have similar functions.



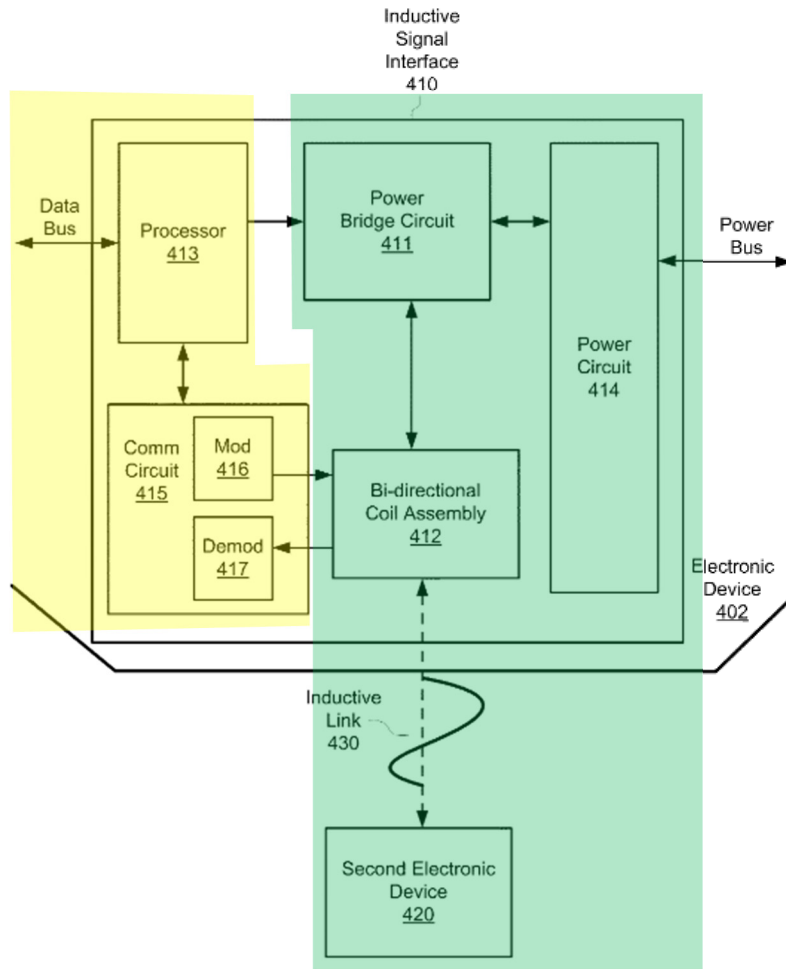


FIG. 4

73. Therefore, unless otherwise noted, I cite to descriptions of inductive signal interface 310 in this declaration to describe the structure, operation, and function of the **inductive signal interface 410** because these two embodiments have similar structures and perform similar operations and functions.

74. Aside from the block diagram of Figure 4, Chatterjee further discloses circuitry-level embodiments of the its **power bridge circuit 411**, **bi-directional coil assembly 412**, and **power circuit 414** in Figures 6A to 6D and Figure 10, and explains that these embodiments can work with each other. Chatterjee(EX1003), ¶89 (“The

power bridge circuit and bi-directional coil assembly combination [of Figure 10] may be any of the above described embodiments.”).

75. Chatterjee explains that FIG. 6A to 6D are “circuit level embodiment[s] of the power bridge circuit . . . 411 . . . and the bi-directional coil assembly . . . 412 . . . of FIG[.] 4.” *Id.* ¶¶61, Figs. 6A-6D.

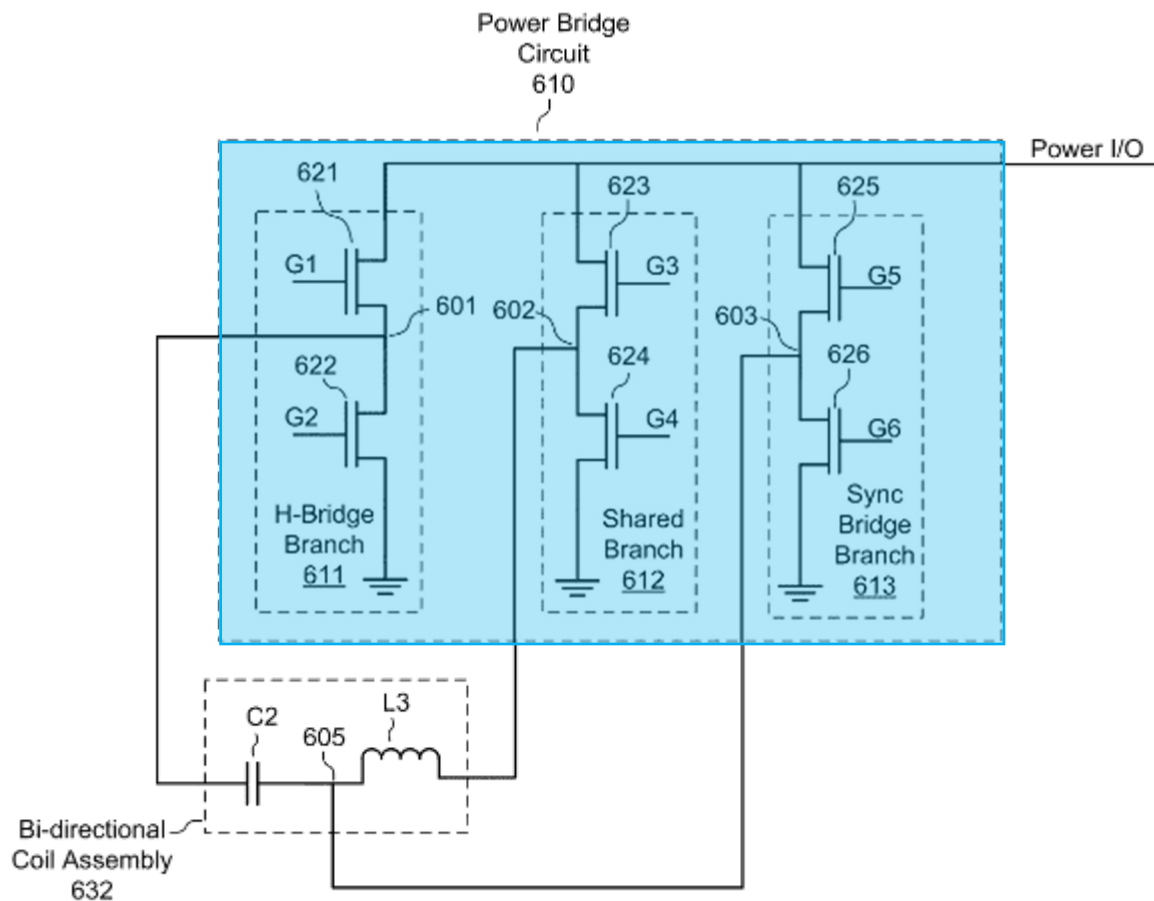


FIG. 6B

76. Chatterjee's Figure 10 discloses a circuitry-level embodiment of the power circuit 414, as annotated by a blue box below, because the annotated circuitry performs the same operation and function as the power circuitry 414 in Figure 4.

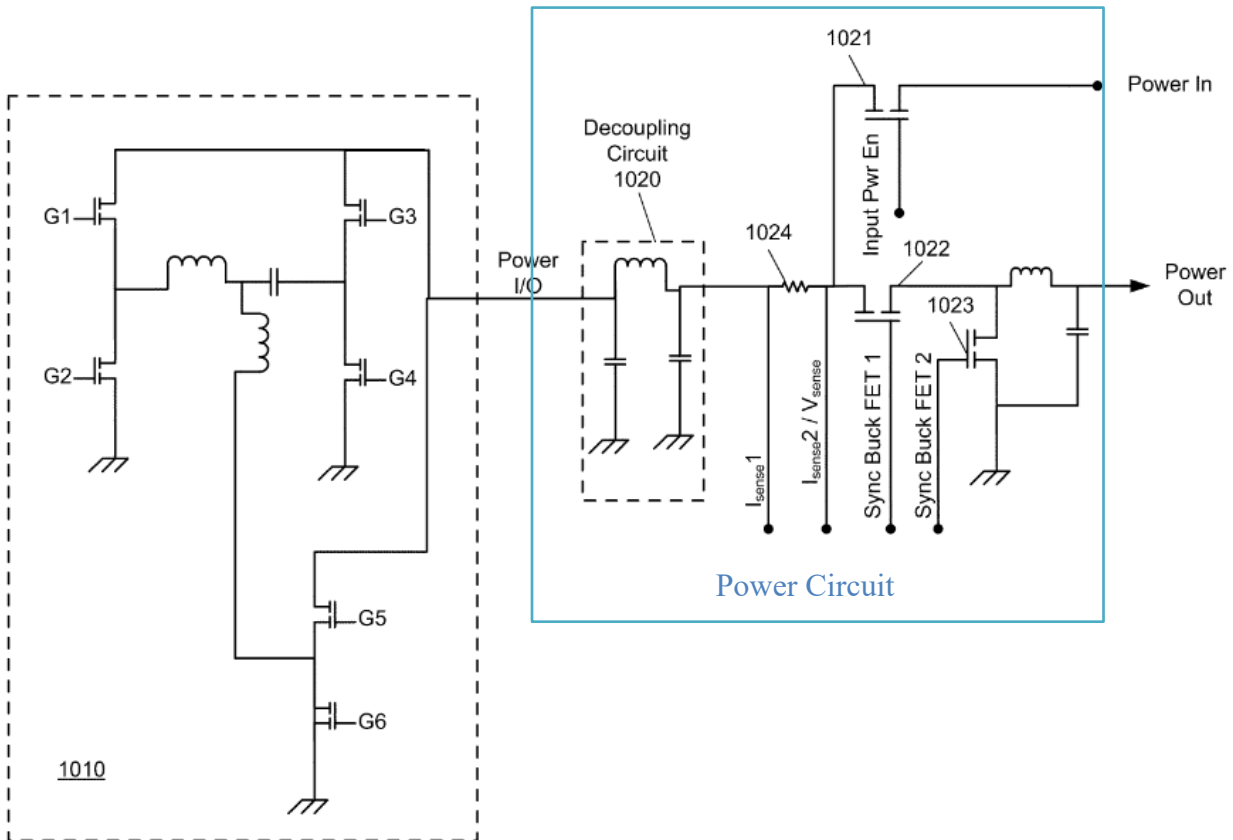


FIG. 10

77. The power circuit 414 of Figure 4 connects to the power bridge circuitry via an “Power I/O” line to “to handle current received in either the power transfer mode or the power receive mode.” *Id.* ¶44, Fig. 4, Fig. 6B (“Power I/O”). Specifically, the power circuitry 414 transmits power from, e.g., a battery, to the power bridge circuit in power transmit mode. *Id.*, ¶64 (“In the power transmit mode of the inductive signal interface, the power I/O transmits an input DC current to the

power bridge circuit 610.”), ¶37 (“In the power transmit mode, the power circuit 314 handles incoming power signal originating from a power source . . . , the incoming power signal being used to transmit the power to the second electronic device 320 over the inductive link 330.”). And it receives power from the power bridge circuit and outputs power to, e.g., a battery in power receive mode. *Id.* Fig. 3, Fig. 6B (“Power I/O”), ¶65 (“In the power receive mode of the inductive signal interface, the power I/O transmits an output DC current from the power bridge circuit 610.”), ¶37 (“In the power receive mode, the power circuit 314 outputs power received over the inductive link to . . . e.g. rechargeable battery.”). The power circuitry 414 “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,” including “to clamp current levels, regulate voltage levels or perform other treatment functions for incoming (power transmit mode) and outgoing power signal (power receive mode). *Id.* ¶37.

78. Like the power circuitry 414 of Figure 4, the annotated circuitry in Figure 10 above also connects to the power bridge circuitry via a “Power I/O” line. *Id.* Fig. 10. It delivers power from a power source (via the “Power In” line) to the power bridge circuitry in the power transmit mode. *Id.* ¶89 (“The switch 1021 operates to couple a power signal line Power In to the resistor 1024 in order to deliver power to the power bridge circuit and bi-directional coil assembly combination

1010.”) And it receives power from the power bridge circuit to the “Power Out” line in the power receive mode. *Id.* (“Two transistors 1022 and 1023 are coupled as illustrated to act as a voltage and current regulator for outgoing current from the power bridge circuit and bi-directional coil assembly combination 1010.”) Like the power circuitry 414, the annotated circuit in Figure 10 is a “current conditioning circuitry,” and includes current sensor and voltage sensor “to measure the current and voltage of the signal” and “a voltage and current regulator,” to regulate the voltage and current of the DC current over the Power I/O line. *Id.*

79. It is also my opinion that Chatterjee is analogous art to the '339 patent as Chatterjee is from the same field of endeavor—wireless power charging—and at least reasonably pertinent to a problem addressed by the '339 patent—providing a dual mode or bi-directional wireless power receiver. *See* '339 patent, 2:10-20 (“Hence, there is a need for a dual mode wireless charging receiver with security features built into the hardware of the mobile device that **in one mode, receives wireless power** to charge, for example, a mobile device, and **in another mode, transmits power to a secondary wireless power receiver** to perform an action or transaction, where such an action or transaction is made inherently secure and reliable via the two-way communication and security capabilities of the dual mode wireless power receiver and **in another mode, transforms into a wireless transmitter for charging a secondary wireless power receiver.**”);

Chatterjee(EX1003), Abstract (“The bridge circuit has components that operate to enable the inductive signal interface to **selectively operate in either a power transmit mode or a power receive mode.**”).

C. Corbridge

80. Corbridge is a United States Patent Application Publication with Publication No. US 2010/0083012. Corbridge was filed on June 4, 2009, and published on April 1, 2010.

81. Entitled “Inductive Signal Transfer System for Computing Devices,” Corbridge is directed to an inductive signal transfer system comprising at least two devices in which “[o]ne device is capable of inductively transmitting a power signal to a second device, and to receive feedback from the second device in order to regulate the power signal.” Corbridge(EX1004), ¶27.

82. Corbridge also discloses techniques by which “a communication protocol may be established to enable the real-time regulation of the power signal based on power conditions existing on the device receiving the power signal.” *Id.* ¶27.

83. FIG. 11 of Corbridge “illustrates steps performed on respective power supply and power receiving devices in enabling two such devices inductively link to one another under a controlled protocol or process, according to an embodiment.” *Id.* ¶109, Fig. 11.

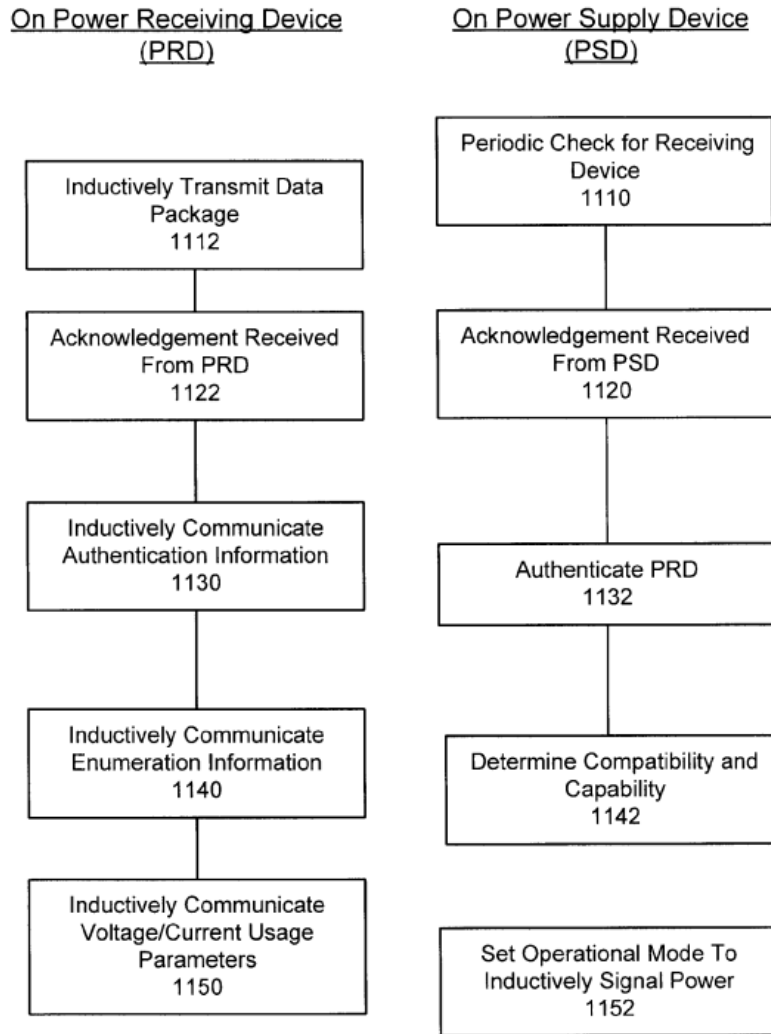


FIG. 11

84. The steps of Figure 11 enable authentication, identification, power regulation, and other functions for communication and power transfer between devices. *Id.* ¶¶110-113, Fig. 11. For example, Corbridge discloses that in step 1130, “the power receiving device inductively communicates authentication information to the power supply device.” *Id.* ¶ 111. Corbridge further discloses that step 1140, “the power receiving device communicates enumeration information using the

inductive link” that may be used to “identify hardware, firmware or software,” “identify whether compatibility issues exist between the two devices,” and “enable one or both devices to identify the other device by type of kind.” *Id.* ¶112. Corbridge further discloses that in step 1150, “the power receiving device communicates information about its voltage/current usage,” and accordingly, in step 1152, “the power supply device receives the information and regulates its power output based on identifying the needs or power levels of the power receiving device.” *Id.* ¶113.

85. It is my opinion that Corbridge is analogous art to the '339 patent. The reference is from the same field of endeavor—wireless power charging—and at least reasonably pertinent to a problem addressed by the '339 patent—inductively exchanging power and data between two devices. '339 patent, 1:60-2:20 (“there is a need for a dual mode wireless charging receiver with security features built into the hardware of the mobile device that in one mode, **receives wireless power to charge, for example, a mobile device**, and in another mode, transmits power to a secondary wireless power receiver to perform an action or transaction, where such an action or transaction is made inherently secure and reliable via **the two-way communication** and security capabilities of the dual mode wireless power receiver”); Corbridge(EX1004), Abstract, ¶27 (“Embodiments described herein provide for a computing system, or devices that comprise part of the computing system, in which least **two devices inductively exchange power and data.**”).

86. Corbridge is “incorporated by reference [] in its entirety” into Chatterjee, and Chatterjee expressly instructs a POSA to review Corbridge for “examples of the type of data that can be communicated over using the inductive signal interface.” Chatterjee(EX1003), ¶48.

VI. CLAIM CONSTRUCTION

87. I understand that in *inter partes* review, claims are “construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). I understand that claims must be given their ordinary and customary meaning as understood by a POSA at the time of the invention in light of the specification and the prosecution history. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2015) (en banc); 83 Fed. Reg. 51340, Vol. 83, No. 197 (Oct. 11, 2018). I understand that terms not specifically construed have their plain and ordinary meaning as understood by a POSA.

88. For purposes of this declaration, unless otherwise noted herein, I apply the ordinary and customary meaning of the claim language as it would have been understood by a POSA as of August 12, 2012 based on the ’339 Patent and the prosecution history.

89. I have been told that the terms in the Challenged Claims do not require construction to evaluate the prior art in this Petition.

VII. SUMMARY OF POSITIONS

90. It is my opinion that Claims 1-3, 5, 7, 9 of the '339 Patent are rendered obvious by Chatterjee in view of Corbridge further in view of the knowledge of a POSA. The claims merely recite an obvious variant of the systems and techniques taught by these references, and I believe that a POSA, having knowledge of both Chatterjee and Corbridge, would have been motivated to combine their disclosures to create the claimed elements. The reasons for my opinions are provided in the following section.

VIII. CLAIMS 1-3, 5, 7, and 9 ARE UNPATENTABLE

A. GROUND 1: CLAIMS 1-3, 5, 7, and 9 ARE UNPATENTABLE AS OBVIOUS OVER CHATTERJEE IN VIEW OF CORBRIDGE FURTHER IN VIEW OF THE KNOWLEDGE OF A POSA

91. It is my opinion that a POSA would have found Claims 1-3, 5, 7, and 9 of the '339 Patent to be obvious over Chatterjee in view of Corbridge further in view of the knowledge of a POSA.

1. Claim 1

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

92. I understand that claim [1.p] is referred to as the “preamble” of the claim. I also understand that certain rules apply for determining whether a preamble

is limiting or not. For claim 1, I have been asked to assume that these aspects of Claim 1 are requirements of the claim for the purposes of my obviousness analysis.

93. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious the preamble.

94. It is my opinion that a POSA would have understood that Chatterjee's inductive signal interface 410 discloses a “*wireless power receiver.*”² Chatterjee discloses in Figure 4 an inductive signal interface 410 that “resides on an electronic device 402 (e.g. mobile computer device . . .),” which “uses the inductive signal interface 402 to form an inductive link 430 with a second electronic device 420.” *Id.* ¶41.

² Italicized text appearing in quotes herein is used to identify claim language, unless otherwise noted.

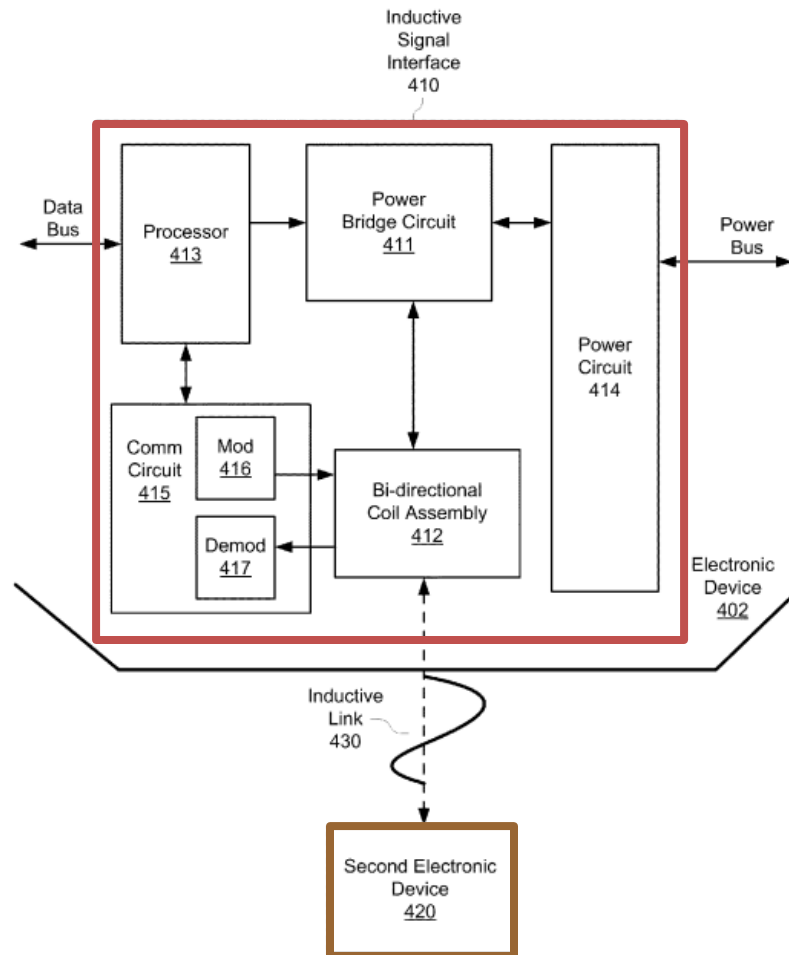


FIG. 4

Id. Fig. 4 (annotated). Chatterjee further discloses that the **inductive signal interface** is operative to receive power via the inductive link. *Id.* ¶46 (“During the power receive mode of the **inductive signal interface** 410, the bi-directional coil assembly 412 receives power over the inductive link 430 from the **second electronic device** 420.”); ¶29 (“an **inductive signal interface** ... operable as ... a **power receiver**”); ¶30 (“The bridge circuit has components that operate to enable the **inductive signal interface** to selectively operate in ... a power receive mode”); ¶40 (“when **inductive**

signal interface [] is in a power receive mode, the power signal is received from the second electronic device [] over the inductive link [].”); Fig. 4 (annotated). Because the inductive signal interface 410 receives power via an inductive link, a POSA would have understood the inductive signal interface 410 to disclose a “*wireless power receiver*” as when power is transmitted over an inductive link, it is transmitted wirelessly through a magnetic field. For example, in Figure 3 and 4 of Chatterjee, the inductive link 330/440 is depicted as a sinusoid along a dashed line. Consistent with Chatterjee’s title (“Power bridge circuit for bi-directional **wireless** power transmission”), a POSA would have understood this sinusoid to represent the time-varying field that transfers power contactlessly through magnetic induction. Chatterjee(EX1003), Figs. 3, 4. Furthermore, paragraphs 42 and 43 of Chatterjee describe instances of how inductive signal interface 410 can function in as a wireless power receiver by “inductively . . . receiving power.” Chatterjee(EX1003), ¶¶ 42, 43; *see also* EX1001, 8:55-58 (“The coil . . . is used to **wirelessly** transmit dual mode wireless power receiver’s 100 battery power to the secondary wireless power receiver 300 **via a magnetic field.**”); 10:10-13 (“a wireless power transmitter 200 transmits wireless power to the dual mode wireless power receiver 100 **through a magnetic field using inductive coupling**”).

95. Chatterjee’s discloses that its inductive signal interface is “*dual mode*” because it can “selectively operate in either a power transmit mode or a power

receive mode.” Chatterjee(EX1003), Abstract; *see also id.* ¶2 (“an inductive signal interface capable of bi-directional inductive signaling”), ¶29 (“an inductive signal interface that uses shared circuit elements to be operable as either a power transmitter or a power receiver); ¶42 (“certain implementations of the inductive signal interface 410 is able to operate in power transmit and receive modes”).)

96. Chatterjee discloses that in the power receive mode, the inductive signal interface 410 “operates to receive power over the inductive link,” Chatterjee(EX1003), ¶35, and “outputs power received over the inductive link to . . . [a] rechargeable battery (corresponding to the claimed load device).” *Id.* ¶37; *see also id.* ¶46 (“During the power receive mode, the bi-directional coil assembly 412 receives power over the inductive link 430 from the second electronic device 420. . . . [a] resulting power signal . . . is routed to . . . charge a rechargeable battery within the electronic device”). Therefore, it is my opinion that a POSA would have understood that Chatterjee’s inductive signal interface is “*configured to selectively apply a received power to a load device*,” because it can selectively operate in a power receive mode to receive power over an inductive link and output the received power to a rechargeable battery. *See* ’339 patent, 8:11-15 (“The load device may be, for example, . . . a battery”). A POSA would also have appreciated that power is transferred inductively in service of power-consuming applications of Chatterjee’s electronic device, which can be a battery-operated mobile phone. *See*

Chatterjee(EX1003), Fig. 11, ¶90. A POSA would have understood that Chatterjee’s electronic device, such as the mobile phone, comprises power-consuming applications, such as a display screen, that may receive power through the inductive signal interface, e.g., through the power bus (Figures 3 and 4) or the “Power Out” terminal (Figure 10). Chatterjee(EX1003), Figs. 3, 4, 10.

97. Chatterjee discloses that in the power transmit mode, the **inductive signal interface 410**’s “power circuit [] handles incoming power signal originating from a power source ..., the incoming power signal being used to transmit the power to the **second electronic device** [] over the inductive link” Chatterjee(EX1003), ¶37; *see also id.* ¶35. Chatterjee discloses that the “power source” can be a “**battery unit**,” Chatterjee(EX1003), ¶35 (“the power bridge circuit may be structured to handle a DC current that originates from a power source, such as . . . **battery unit**”), which, as described above, can store power received in the power receive mode. Chatterjee further discloses that the **second electronic device** may include “a similarly structured inductive signal interface” as the **inductive signal interface 410** of the electronic device 402 that, as explained above, may receive power to power-up, or charge, the battery of the **second electronic device**. Chatterjee(EX1003), ¶34 (“the inductive signal interface [] resides in a[n] inductive **charger** for the mobile device”).

98. Therefore, it is my opinion that a POSA would have understood that Chatterjee’s **inductive signal interface** is “*configured to selectively . . . utilize at least a part of the **stored power** to power-up a **secondary wireless power receiver***” as claimed, because it can selectively operate in a power transmit mode to transmit power from the electronic device 402’s **battery** to wirelessly charge the **second electronic device**. Indeed, a POSA would have recognized that a mobile device that is transmitting power but is not otherwise “plugged in,” must derive that power from a reservoir of stored energy, e.g., a battery. A POSA would further have appreciated that Chatterjee’s inductive signal interface is configured to “*selectively*” convert power because of how power bridge circuit 411 is controlled, i.e., either as an inverter or rectifier. Chatterjee’s **processor 413** generates a plurality of switch control signals in response to power requirements, e.g., “to determine a mode of operation of the inductive signal interface 410.” *Id.* ¶¶55, 63.

99. As to the claimed “*communicate with said **secondary wireless power receiver***,” Chatterjee discloses that the **inductive signal interface** is also capable of performing data transfer through the inductive link with the **second electronic device**. Chatterjee(EX1003), ¶41 (“FIG. 4 illustrates an embodiment of the **inductive signal interface** capable of performing data transfer through an inductive link. . . . As with an embodiment of FIG. 3, a first computing device uses the **inductive signal interface 410** to form an inductive link 430 with a **second electronic device 420**.”).

The **inductive signal interface 410**'s "bi-directional coil assembly 412 is [] coupled to the communication circuit 415 to receive and transmit modulated data signals." Chatterjee(EX1003), ¶45; *see also id.* ¶51. "[T]he incoming modulated data signal received over the inductive link 420 is transmitted to [a] demodulator 417" within the communication circuit 415, which "performs demodulation to generate a demodulated data signal." Chatterjee(EX1003), ¶53. The **processor 413** of the **inductive signal interface 410** "may be configured to process identification and status information transmitted over the inductive signal [link] 430 to determine a mode of operation of the **inductive signal interface 410**," Chatterjee(EX1003), ¶55. A POSA would have understood that the **inductive signal interface 410** can communicate with the **second electronic device** to determine to operate under, e.g., a power receive mode, in which the **inductive signal interface** charges the **second electronic device** as explained above. Therefore, it is my opinion that a POSA would thus have understood that Chatterjee's **inductive signal interface** is configured to ... "*communicate with said secondary wireless power receiver to . . . charge said secondary wireless power receiver's load device*" because it is configured to receive identification and status information from the **second electronic device** to determine to operate in a power charge mode, in which it transmits power to charge the **second electronic device**. A POSA would have been familiar with how response packets can be sent from the power receiver to the power transmitter, using their mutual magnetic

field for both power and communication via modulation. *See* Chatterjee(EX1003), ¶52 (“the modulator 416 and the demodulator 417, respectively, may implement modulation schemes such as amplitude modulation, frequency modulation, digital modulation (such as frequency-shift keying (FSK) modulation, or phase-shift keying (PSK) modulation)”).

100. Therefore, it is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious Claim [1.p].

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

101. I have been asked to assume that claim [1.a] can be met by disclosure of either one of “*coil*” and “*capacitor electrodes*.”

102. In my opinion, Chatterjee in view of the knowledge of a POSA renders obvious claim [1.a] because it discloses “*coil*.”

103. Coils can be used to transmit power wirelessly “through a magnetic field using inductive coupling.” ’339 patent, 6:50-51. As described in the ’339 patent, “a transmitter coil [] is used for inducing a magnetic field to a coupling region for providing energy transfer to” a wireless power receiver. ’339 patent, 10:17-19. “[A] receiver coil [] picks up the magnetic field based of a magnetic field coupling that exists between the transmitter coil [] and the receiver coil [].” ’339 patent, 10:26-29. The ’339 patent discloses a “coil” in the dual mode wireless power receiver that wirelessly transmits power in a charging mode, and wirelessly receives power in a

communication mode. '339 patent, 21:36-39 (“In charging mode, the **dual mode wireless power receiver** 100 receives AC (alternating current) wireless power when its receiver **coil** 106 is placed in an external varying magnetic field”), 22:26-40 (“In Communication Mode . . . [t]he AC power flows . . . into the receiver **coil** 106 where the alternating current creates a varying magnetic field enabling transfer of power to the secondary wireless power receivers 300”), Fig. 1 (annotated).

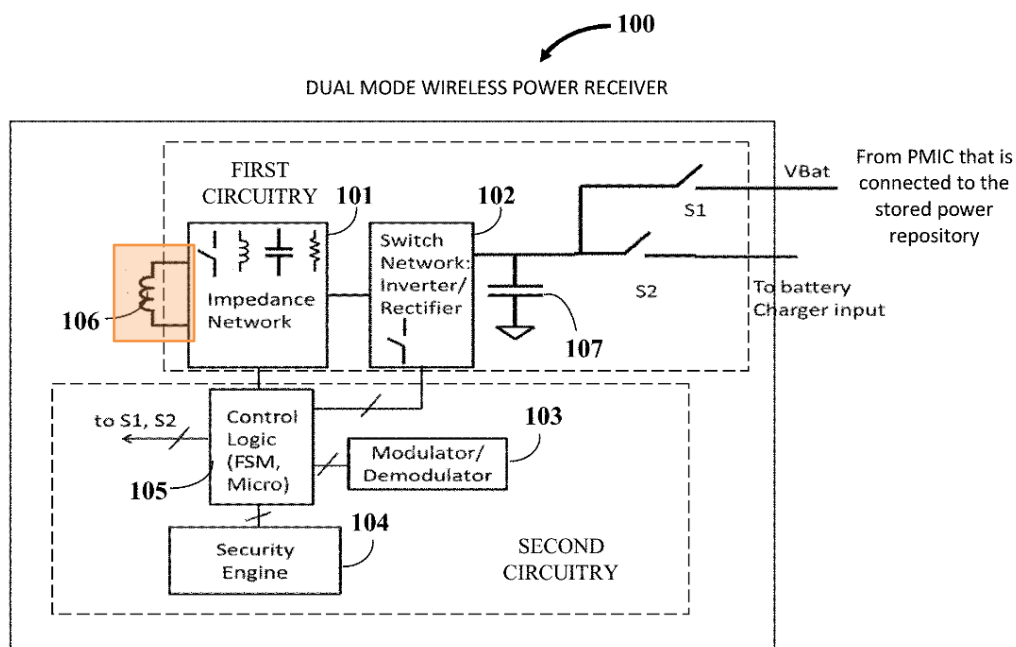


FIG. 1

104. Like the '339 patent, Chatterjee's bi-directional **coil** assembly 412 “has one or more inductive **coils**” Chatterjee(EX1003), ¶30, and “is configurable to form the inductive link 430 with the **second electronic device** 420 . . . to transmit and/or receive a power signal.” Chatterjee(EX1003), ¶45. As illustrated in Fig. 4 of

Chatterjee reproduced below, “[d]uring the power receive mode . . . the bi-directional **coil** assembly 412 receives power over the inductive link 430 from the second electronic device.” Chatterjee(EX1003), ¶46.

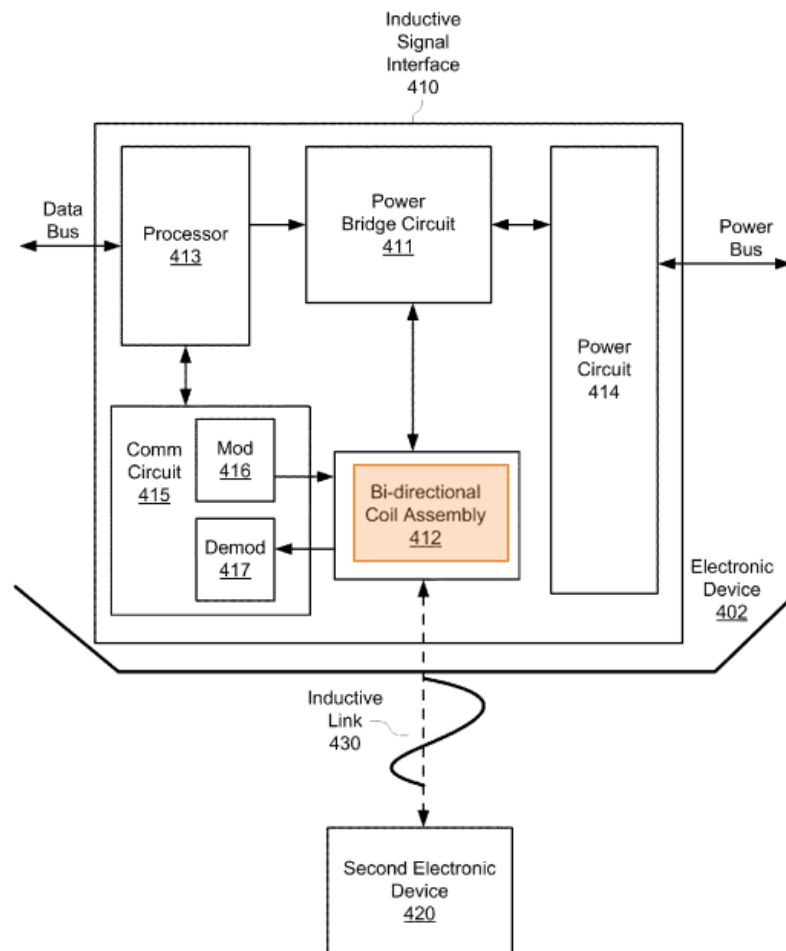


FIG. 4

105. “During the power transmit mode . . . the bi-directional **coil** assembly 412 is used to carry the modulated power signal to the **second electronic device 420**.” Chatterjee(EX1003), ¶47.

106. Accordingly, in my opinion, the **coil** in Chatterjee’s bi-directional **coil** assembly 412 teaches the claimed “**coil**.”

[1.b] a first circuitry comprising: an **impedance network**; a **switch network**; a **filter capacitor**;

107. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [1.b].

108. Specifically, and as explained in further detailed below, it is my opinion that Chatterjee’s bi-directional coil assembly 412 discloses the claimed “**impedance network**”; its **power bridge circuit 411** discloses the claimed “**switch network**”; and its power circuit 414 discloses the claimed “**filter capacitor**.” Chatterjee(EX1003), ¶¶66, 69, 89, Figs. 6B, 10.

109. As an example, the ’339 patent discloses a **dual mode wireless power receiver** with a first circuitry and a second circuitry. “The first circuitry receives power in charging mode and transmits power in communication mode.” ’339 patent, abstract. “The second circuitry configures the first circuitry to allow receipt and transmittal of power” ’339 patent, abstract. For example, an embodiment of the first circuitry is shown below in Figure 1 and comprises, *inter alia*, an **impedance network** 101 that connects to the **coil** 106, a **switch network** 102 that connects to the impedance network 101; and a **filter capacitor** 107 that connects to a node between the **switch network** and the battery. ’339 patent, Fig. 1(annotated); *see also* Figs. 10A-10H.

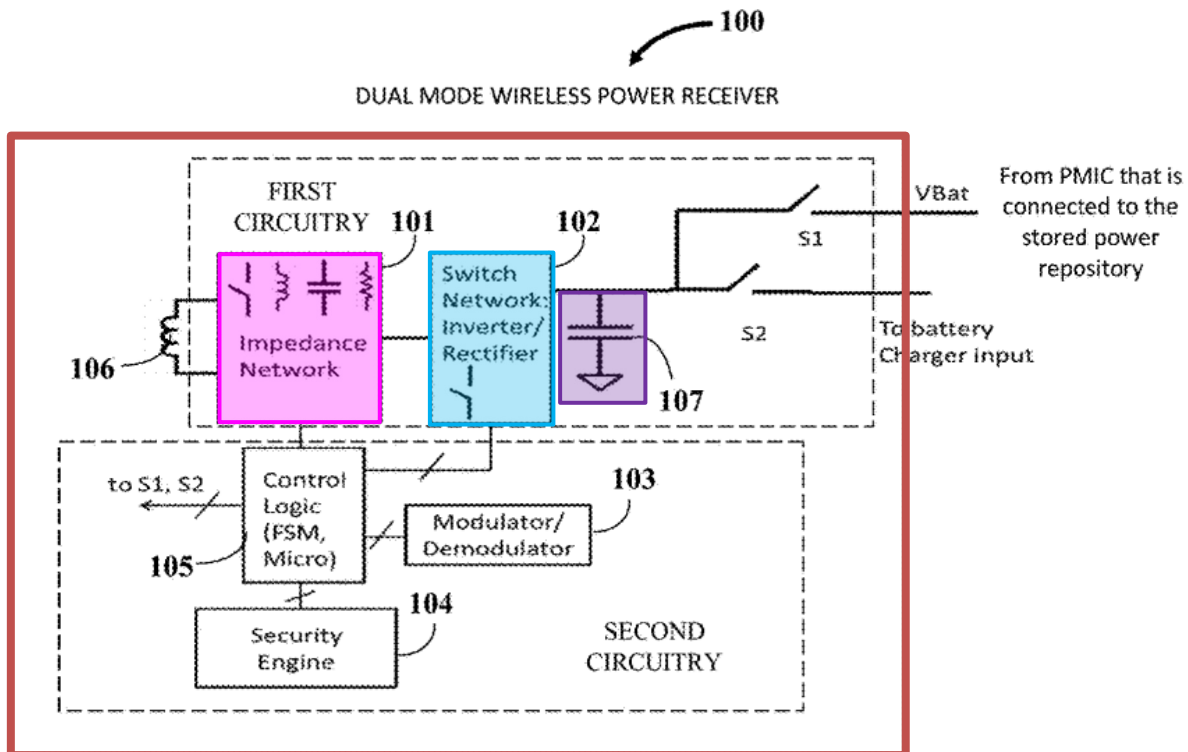


FIG. 1

110. It is my opinion that Chatterjee’s bi-directional coil assembly 412 discloses the claimed “**impedance network.**”

111. As an example of the claimed “**impedance network,**” the ’339 patent describes that the **impedance network** 101 as comprising “one or more of passive electronic components, for example, **a resistor, a capacitor.**” ’339 patent, 9:4-11. The ’339 patent also provides “exemplarily” embodiments of the impedance network, ’339 patent, 23:60, such as being “comprised of **capacitor Cs,**” ’339 patent, i.e., a capacitor that is connected in series with the inductor coil. ’339 patent, Fig. 10E (annotated), 24:6-7.

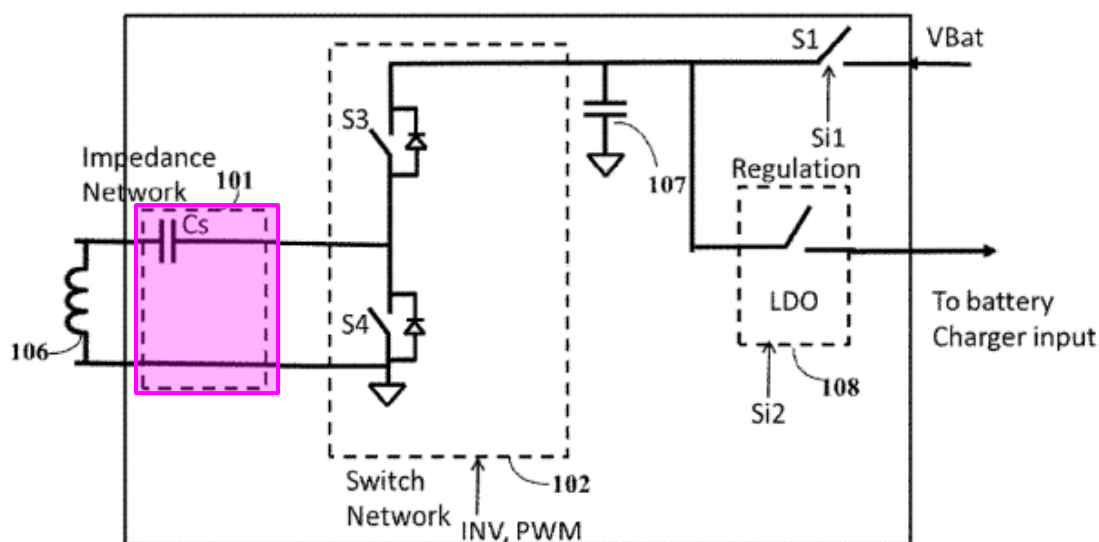


FIG. 10E

112. The '339 patent further describes that the impedance of the impedance network can be changed such as by tuning the capacitance of capacitor Cs. '339 patent, cl. 1 (“said first circuitry ... configured to change impedance of said impedance network”); 24:7-9 (“Capacitor Cs’s capacitance value is ... tuned during operation (variable) to change the impedance of the impedance network 101”).

113. Like the '339 patent, Chatterjee discloses an embodiment of the bi-directional coil assembly that includes a capacitor C2 between node 601 and 605 and a wire between node 603 and 605 that can each be connected with the inductive coil L3 in series under different modes to provide different impedance values, as shown in Figure 6B. Chatterjee(EX1003), Fig. 6B (annotated).

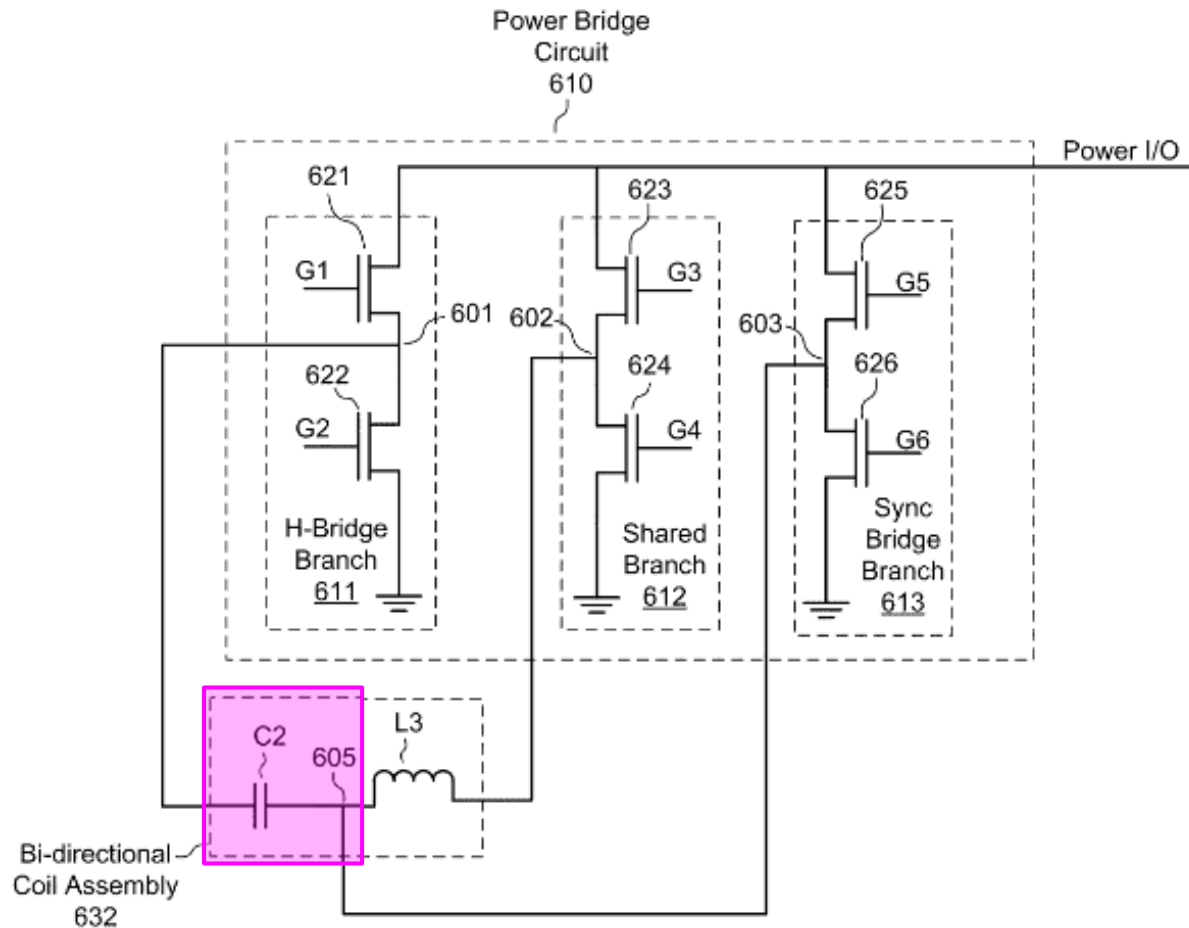


FIG. 6B

114. Specifically, Chatterjee discloses that the **inductive signal interface's** power bridge circuit “is configurable to selectively turn off current paths in the bi-directional coil assembly [] to change the impedance of the bi-directional coil assembly.” Chatterjee(EX1003), ¶66. “In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 632 is the series combination of the capacitor C2 and the inductive coil L3.” Chatterjee(EX1003), ¶69. “In the power receive mode, the H-bridge branch 611 is

turned off and the current path through the bi-directional coil assembly 632 is the inductive coil L3.” Chatterjee(EX1003), ¶69.

115. Therefore, it is my opinion that Chatterjee’s bi-directional coil assembly discloses the claimed “*impedance network*” such as by providing a capacitor C2 with capacitive impedance and a wire with no impedance that can each be selectively connected with the inductive coil under different modes to provide variable impedance under different modes. A POSA would have appreciated that the capacitor C2 changes the driving-point impedance viewed from the transistor-bridge terminals, e.g., across the node pair 601/602, compared to the impedance that would be observed if the capacitor were replaced with a short circuit, e.g. across the node pair 602/603. *Id.* ¶66.

116. It is my opinion that Chatterjee’s power bridge circuit 411 discloses the claimed “switch network.”

117. As an example of the claimed “switch network,” the ’339 patent discloses a switch network that “is configured as an inverter” in the communication mode and “is configured as a rectifier” in the charging mode. ’339 patent, 2:62-67. An “exemplar[y]” embodiment of the switch network 102 comprises four switches S3, S4, S5, and S6 connected as shown in Figure 10A below. ’339 patent, Figs. 10A (annotated).

FIRST CIRCUITRY OF DUAL MODE WIRELESS POWER RECEIVER

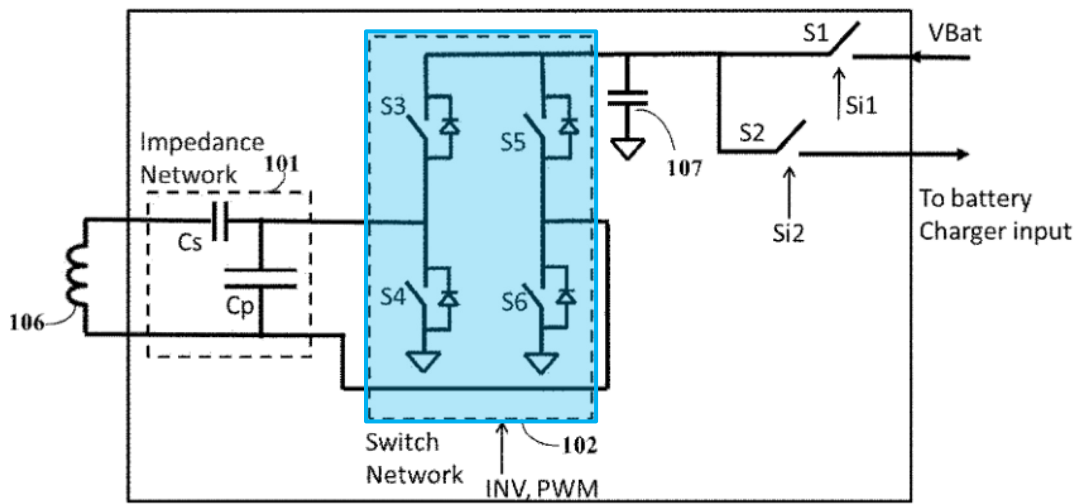


FIG. 10A

118. A POSA would have recognized that the circuitry illustrated in Fig. 10 of the '339 patent above to be an H-bridge. *See, e.g., '339 patent, 4:20-21, 16:66.*

119. A POSA would have learned in the context of electronics education, or more specifically in power electronics coursework, that an H-bridge is so called because the high- and low-side switches on either side of the load resemble a capital letter H. This topology is apparent when the load is drawn at the “crossbar” position, at the center of the bridge:

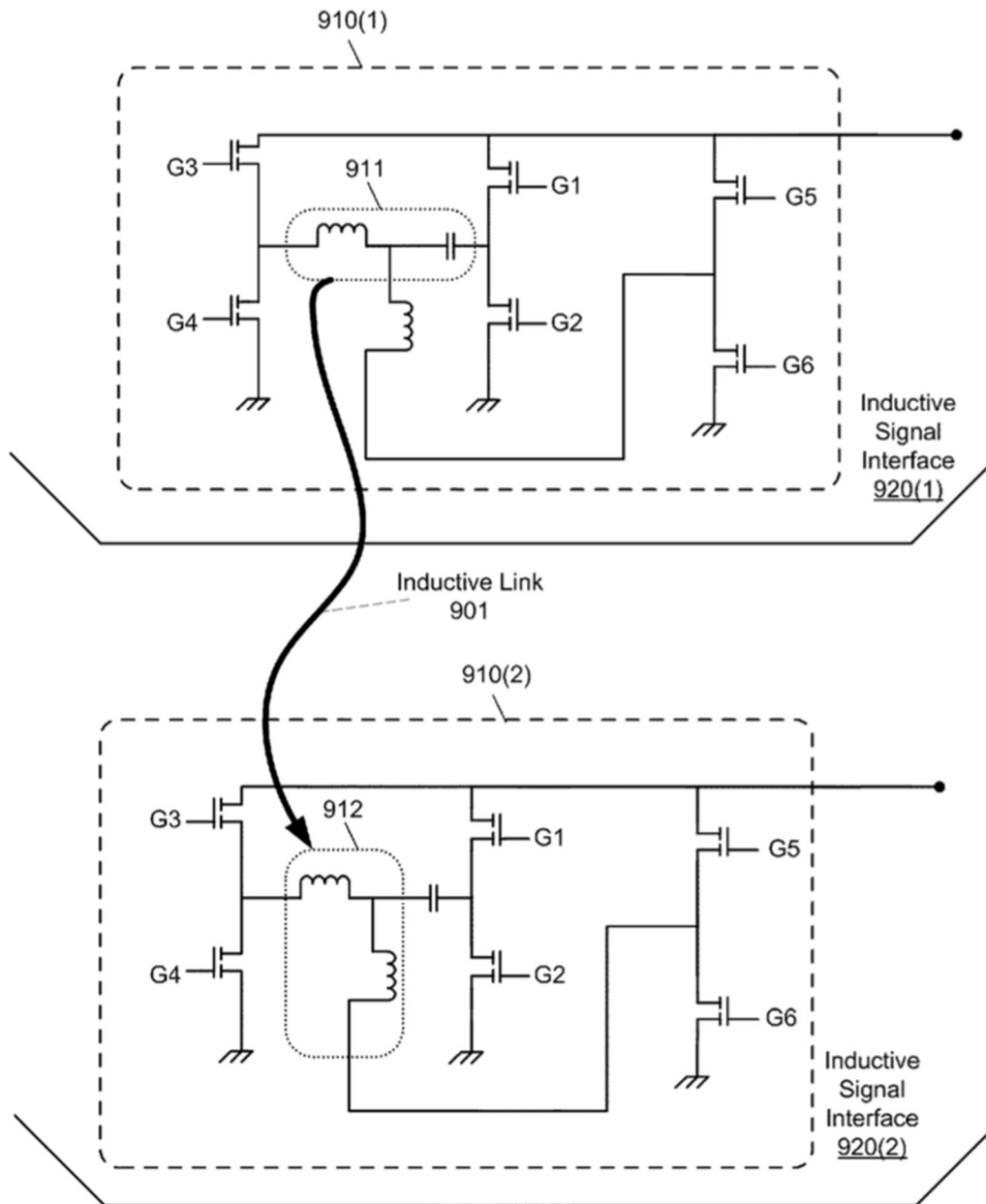


FIG. 9

Chatterjee(EX1003), Fig. 9. In Figure 9, the coil assembly 911 is shown in the “crossbar” position. When switches G1 to G4 operate as an inverter, different pairs of diagonally opposed switches are turn on synchronously to apply positive or negative voltage to the load.

120. The H-bridge topology, which is also called a “full bridge,” is capable of bi-directional transfer of power when the load is replaced by an AC source. A POSA would have recognized that when used as a synchronous rectifier, the switches can be controlled to reverse the connection polarity whenever the AC source has a negative value. *See* Chatterjee(EX1003), Figs. 1, 2, ¶¶3, 4. In this manner, the AC voltage source is continuously re-connected to deliver a positive (e.g., rectified) voltage at the DC terminals.

121. Similar to the '339 patent, Chatterjee discloses a [power bridge circuit](#) that operates to form a [rectifier](#) circuit in the power receive mode and operates to form an [inverter](#) circuit in the power transmit mode. *See* Chatterjee(EX1003), cl. 4 (“two of the three branches operate to form a synchronous bridge [rectifier](#) circuit while the [inductive signal interface](#) operates in the power receive mode”), cl. 3 (“two of the three branches operate to form an [H-bridge circuit](#) while the [inductive signal interface](#) operates in the power transmit mode”); ¶3 (“an [H bridge inverter circuit](#) [] for transferring power from a DC supply [] to an AC load 115”).

122. Specifically, Chatterjee discloses that when the embodiment of Figure 6B operates in the power transmit mode, “the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 632 is the series combination of the [capacitor C2](#) and the [inductive coil L3](#).” Chatterjee(EX1003),

¶69. The annotated Fig. 6B below shows the active part of the Fig. 6B circuitry in yellow highlighting, and the inactive part in grey.

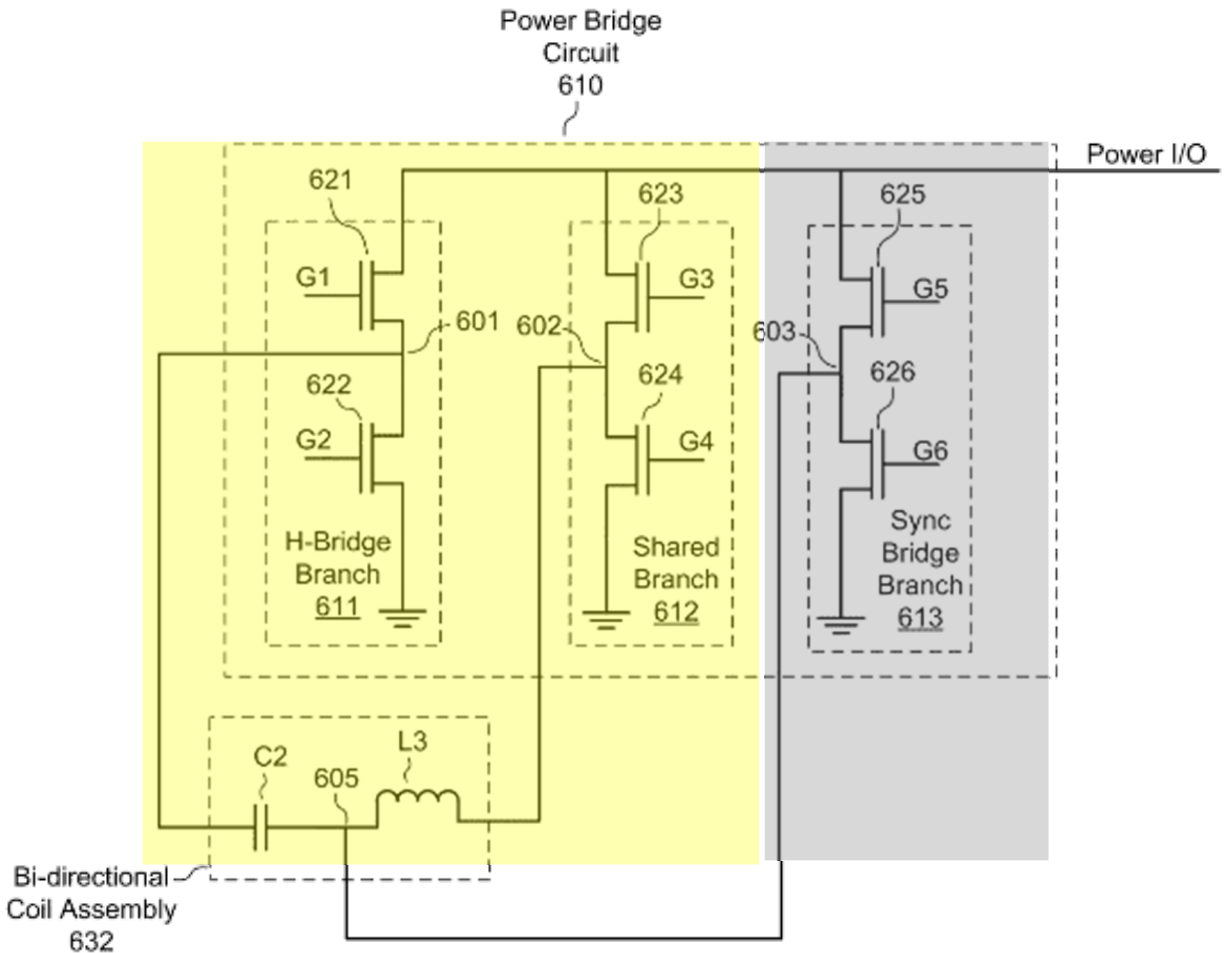


FIG. 6B

(Power Transmit Mode)

123. Chatterjee further discloses that in the power transmit mode, the H-bridge branch 611 and the shared branch 612 (with switches 621-624) are “operable to convert a received DC power signal to a high frequency power signal and to deliver the high frequency power signal to the bi-directional coil assembly,” i.e., as

an H-bridge inverter. *Id.* ¶83; *see also id.* ¶¶81-82, 3, 6 (prior art H-bridge inverter circuit).

124. Chatterjee also discloses that in the power receive mode, “the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 632 is the inductive coil L3.” Chatterjee(EX1003), ¶69, Fig. 6B (annotated).

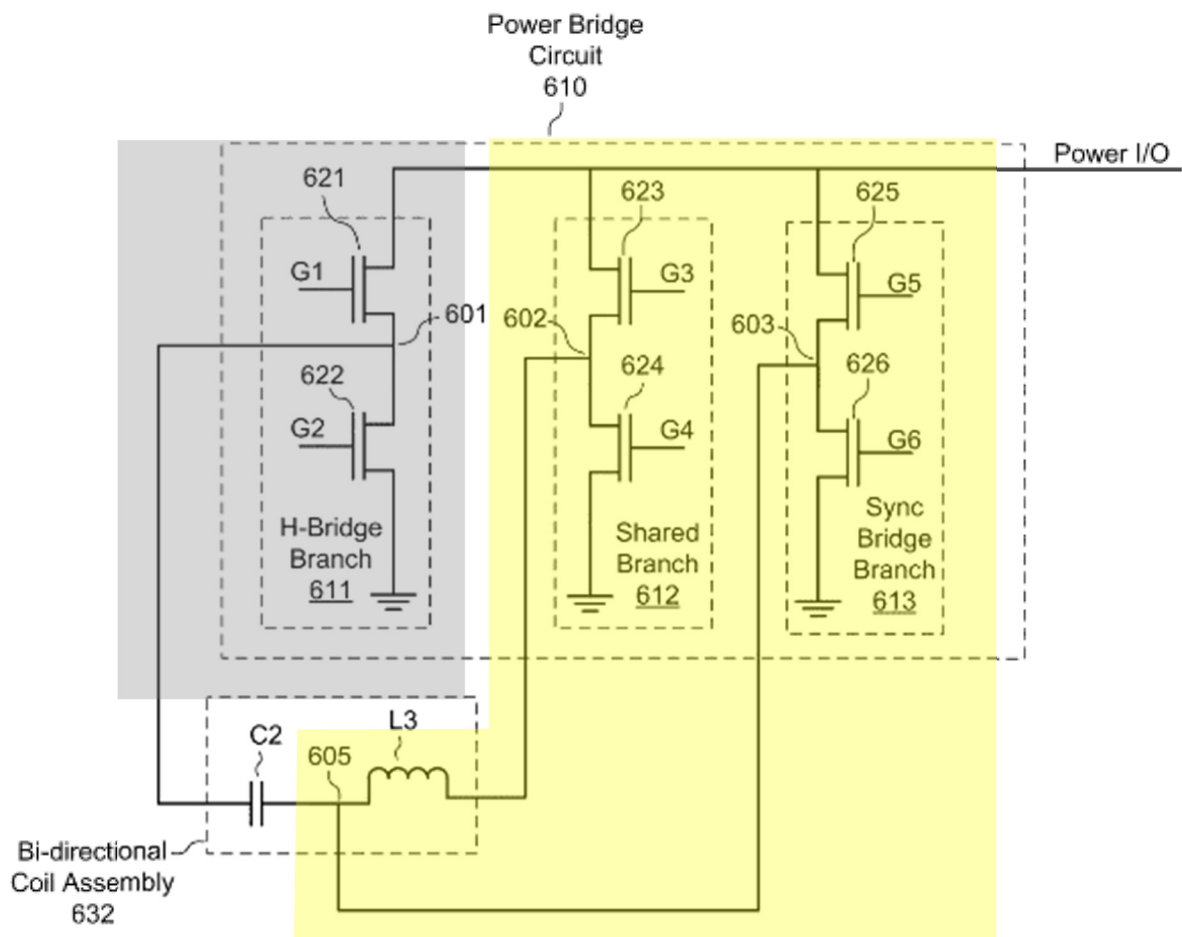


FIG. 6B

(Power Receive Mode)

125. Chatterjee further discloses that in the power transmit mode, the shared branch 612 and sync bridge branch 613 (with switches 623-626) are “operable to convert a high frequency power signal to a DC power signal and to deliver the DC power signal to the signal line Power I/O,” i.e., as a [rectifier](#). *Id.* ¶86; *see also id.* ¶¶83-84, 4, 7 (prior art synchronous bridge [rectifier](#) circuit), Fig. 2.

126. Accordingly, it is my opinion that Chatterjee’s [power bridge circuit](#) discloses the claimed “[switch network](#)” because it comprises switches operating as an inverter or a rectifier under different modes.

127. It is my opinion that Chatterjee’s power circuit 414 discloses the claimed “[filter capacitor](#).”

128. Chatterjee discloses a power circuit 414 “to handle current received in either the power transfer mode or the power receive mode,” Chatterjee(EX1003), ¶44, such as “to clamp current levels, regulate voltage levels or perform other treatment functions for incoming (power transmit mode) and outgoing power signal (power receive mode). Chatterjee(EX1003), ¶37. As explained above in Section V.B, Chatterjee’s Figure 10 discloses an embodiment of the power circuit 414, as shown in the annotated blue box below. The power circuit of Figure 10 comprises a decoupling circuit 1020 that “operates to act as a filter for certain signal frequencies and prevents those signals from passing through.” Chatterjee(EX1003), ¶89.

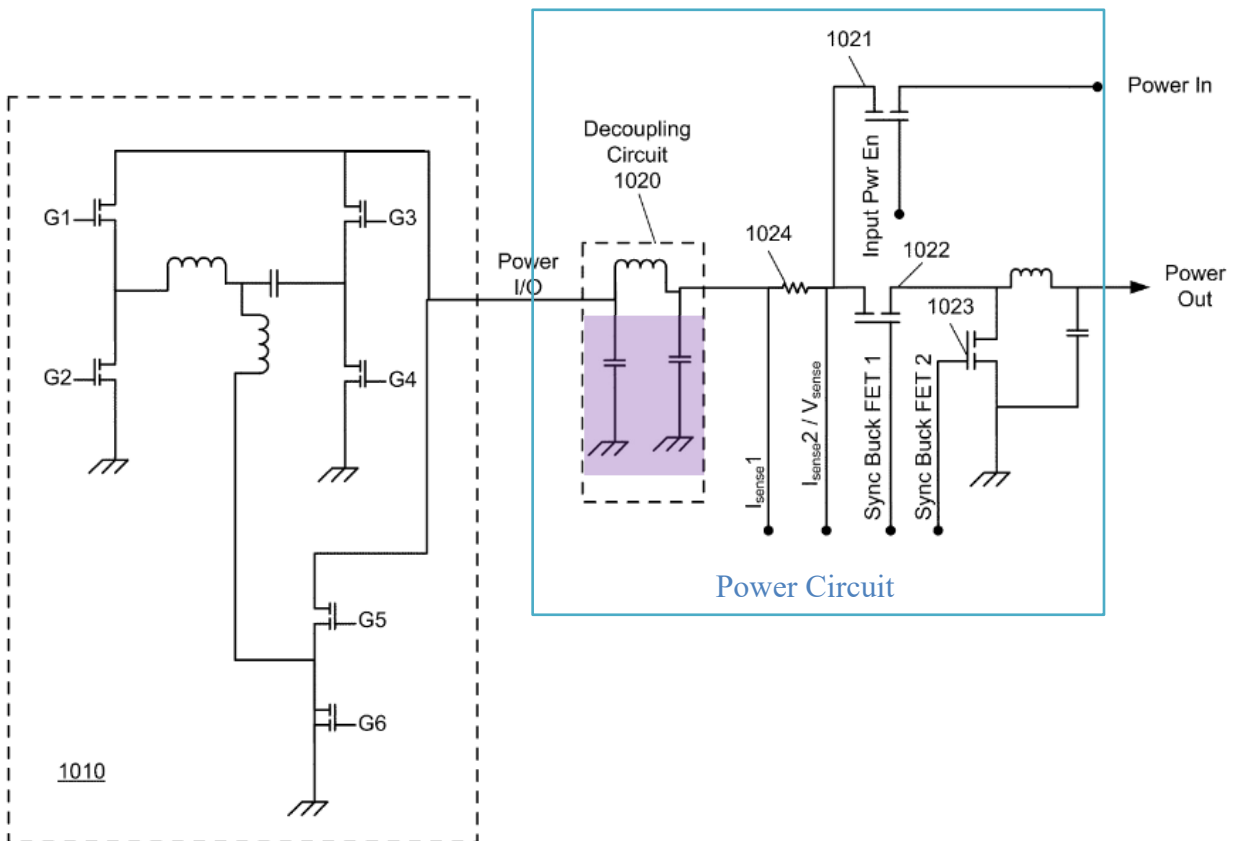


FIG. 10

Chatterjee(EX1003), Fig. 10 (annotated).

129. A POSA would have understood that the capacitors in the decoupling circuit disclose a **filter capacitor** because they operate to filter certain signal frequencies. Chatterjee(EX1003), ¶89. For instance, a POSA would have understood that rectifiers yield a unidirectional but pulsating current and voltage, i.e. at the node labeled “Power I/O.” A POSA would have further understood that to deliver power to a constant voltage source (such as a battery), only the DC portion of the current delivers net power, and electronic loads in a battery-operated device typically require a steady, constant DC voltage. For this reason, a POSA would have understood the

need to smooth the output of the rectifier with a filter, such as the “decoupling circuit” 1020 in Fig. 10, before providing it to charge a battery. A POSA would have understood that the decoupling network 1020 in Figure 10 diverts the AC signals away from the right portion of the power circuit. For instance, the majority of AC current from the coil assembly will be diverted through the decoupling circuit’s left capacitor to ground, rather than pass through the series inductor. This series inductor has an impedance that increases at higher frequencies ($Z_L = j\omega L$), whereas the capacitor has an impedance that decreases with frequency ($Z_C = 1/j\omega C$). In this manner, the DC component ($\omega = 0$) of the current from the coil assembly will be delivered to the power circuit on the right side of Figure 10. Therefore, a POSA would have understood that the capacitors in the decoupling circuit 1020 act as filter capacitors to filter out unwanted frequencies in the power signal at the “Power I/O” node.

130. Chatterjee also teaches that the power bridge circuit and bi-directional coil assembly of Figure 6B can be used with the power circuit described in Figure 10. Chatterjee(EX1003), ¶89 (“The power bridge circuit and bi-directional coil assembly combination [] may be any of the above described embodiments . . .”).

131. Accordingly, in my opinion, Chatterjee in view of the knowledge of a POSA renders obvious claim [1.b].

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

132. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [1.c]. Specifically, it is my opinion that Chatterjee's processor 413 teaches the claimed "*control logic circuit*"; and its communication circuit 415 comprises a modulator 416 and demodulator 417 that disclose the claimed "*modulator/demodulator circuit*." Chatterjee(EX1003), ¶¶51, 63, 69.

133. The '339 patent discloses an example of the claimed "*second circuitry*" in Figure 1, which comprises, *inter alia*, a control logic circuit 105 that controls the operation of the impedance network and the switch network; and a modulator/demodulator 103 that provides or receives a digital signal to the control logic circuit 105 for communication with a secondary wireless power receiver. '339 patent, 10:63-11:1 ("the control logic circuit 105 adjusts the impedance of the impedance network 101. . . the control logic circuit 105 adjusts the topology of the switch network 102"), 9:23-28 ("the control logic circuit 105 is configured to provide a pulse width modulated (PWM) signal to the first circuitry and provide/receive a digital signal to and from the modulator/demodulator circuit 103 for the communication link that exists between the dual mode wireless power receiver 100 and the secondary wireless power receiver 300), Fig. 1 (annotated).

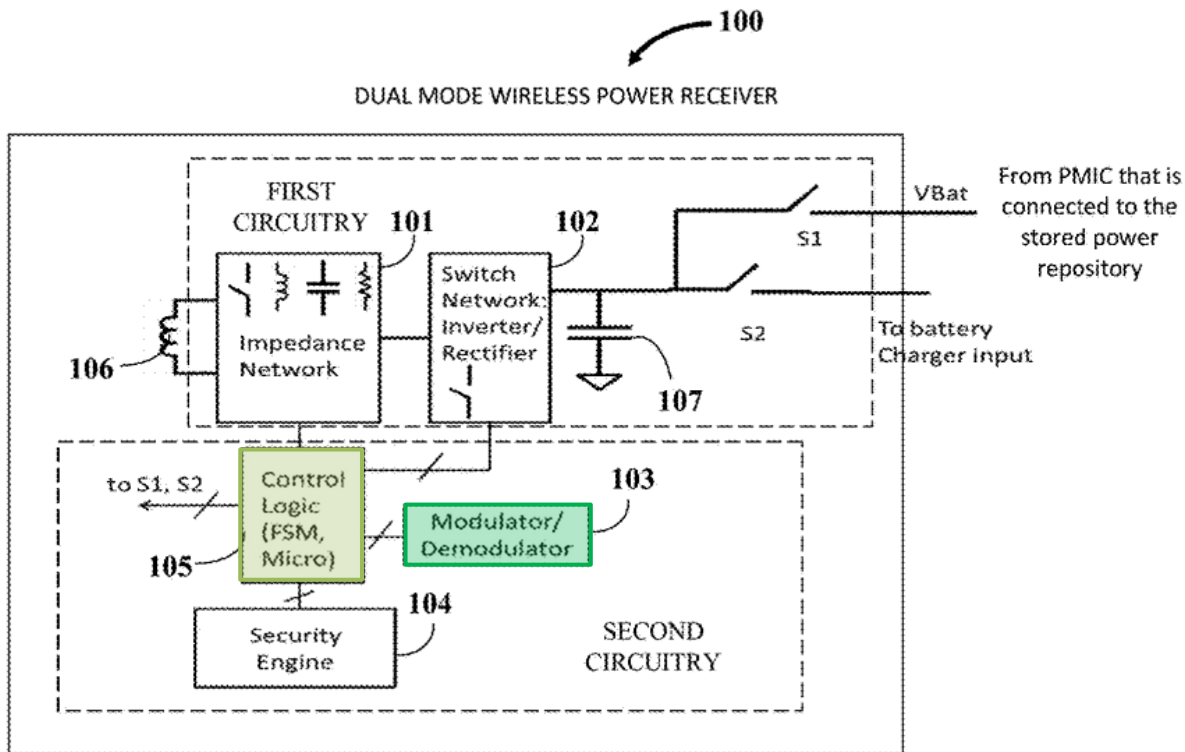


FIG. 1

134. The '339 patent discloses that its **dual mode wireless power receiver** comprises a **control logic circuit**, such as “a state machine, a microcontroller, etc.” '339 patent, 19:2. The **control logic circuit 105** disclosed in the '339 patent is configured to control the operation of the first circuitry such as by adjusting its impedance or topology. '339 patent, 9:23-24 (“the **control logic circuit 105** is configured to provide a pulse width modulated (PWM) signal to the first circuitry”); 10:64-65 (“the **control logic circuit 105** adjusts the impedance of the impedance network 101 of the first circuitry”); 10:66-11:1 (“the **control logic circuit 105** adjusts the topology of the **switch network 102** of the first circuitry”).

135. Like the '339 patent, Chatterjee's **processor 413** is "coupled to the **power bridge circuit 411** to control the operation of the **power bridge circuit 411** based on [a] determined mode of operation," as illustrated in Fig. 4 reproduced below. Chatterjee(EX1003), ¶55. Specifically, and as described above in claim [1.a], Chatterjee's **power bridge circuit** has three branches, and in different modes, a different branch is turned off to change the impedance of the bi-directional coil assembly and the topology of the **power bridge circuit**. Chatterjee(EX1003), ¶69. Chatterjee further discloses that "[t]he operation of the **power bridge circuit 610** is controlled by the signals G1-G6, which are transmitted by **control logic** coupled [to] the switches 621-626. Referring back to [FIG.] 4, ... the **control logic** may be ... **processor 413**." Chatterjee(EX1003), ¶63. Therefore, it is my opinion that a POSA would have understood that Chatterjee's **processor 413** teaches the claimed "*control logic circuit*" because Chatterjee teaches that the **processor 413** can be implemented as a microprocessor installed on a circuit board that embodies control logic for controlling the operation of the power bridge circuit. Chatterjee(EX1003), ¶63 ("the **control logic** may be ... **processor 413**"), ¶94 (describing "**circuit board, processor, memory**" are used to implement the claimed invention). As I explained previously, a POSA would have recognized that the wireless power charging process is established and controlled by ongoing communications of digital data between the power transmitter and receiver. For example, Chatterjee describes that "[t]he transfer

of identification and status information may occur as data transmission via the inductive link 430,” and is used to establish the operating mode of the inductive signal interface. Chatterjee(EX1003), ¶42. A POSA would have understood that such digital communication would be implemented in software, and that Chatterjee’s processor 413 provides the circuitry that embodies the control logic for controlling the operation of the power bridge circuit.

136. Chatterjee further discloses that its **inductive signal interface 410** includes “**a modulator 416 and a demodulator 417**” as part of the communication circuit. Chatterjee(EX1003), ¶51, Fig. 4.

137. Accordingly, it is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious the claimed “*second circuitry comprising: a **control logic circuit**; and a **modulator/demodulator circuit**.*”

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

138. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [1.d].

139. Chatterjee’s **power bridge circuit 411**, which as explained in claim [1.b] is part of the “first circuitry,” is configured to receive power in the power receive mode that was transmitted over an inductive link. Chatterjee(EX1003), ¶46 (“During the power receive mode of the **inductive signal interface 410**, the bi-directional coil assembly 412 receives power over the inductive link 430 from the **second electronic**

device 420. The power signal is transmitted in modulated form over the power bridge circuit 411, which performs rectification to output a DC current to the power circuit 414.”). It is my opinion that a POSA would have understood that Chatterjee thus teaches that the received power comes “*from a wireless power transmitter*” because it is transmitted wirelessly over an inductive link.

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

140. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [1.e].

141. As explained above in claim [1.c], Chatterjee’s processor 413 provides control signals G1-G6 to control the operation of the power bridge circuit which is part of the claimed “first circuitry.” Phinney(EX1002), ¶135. When the inductive signal interface is set to a power receive mode, processor 413 sends control signals G1 and G2 to turn off the H-bridge branch 611, and signals G3-G6 to operate the shared branch 612 and sync bridge branch 613, such that the capacitor C2 is not used as part of the circuitry, as shown below in the yellow-highlighted circuitry below. Chatterjee(EX1003), ¶69, Fig. 6B (annotated).

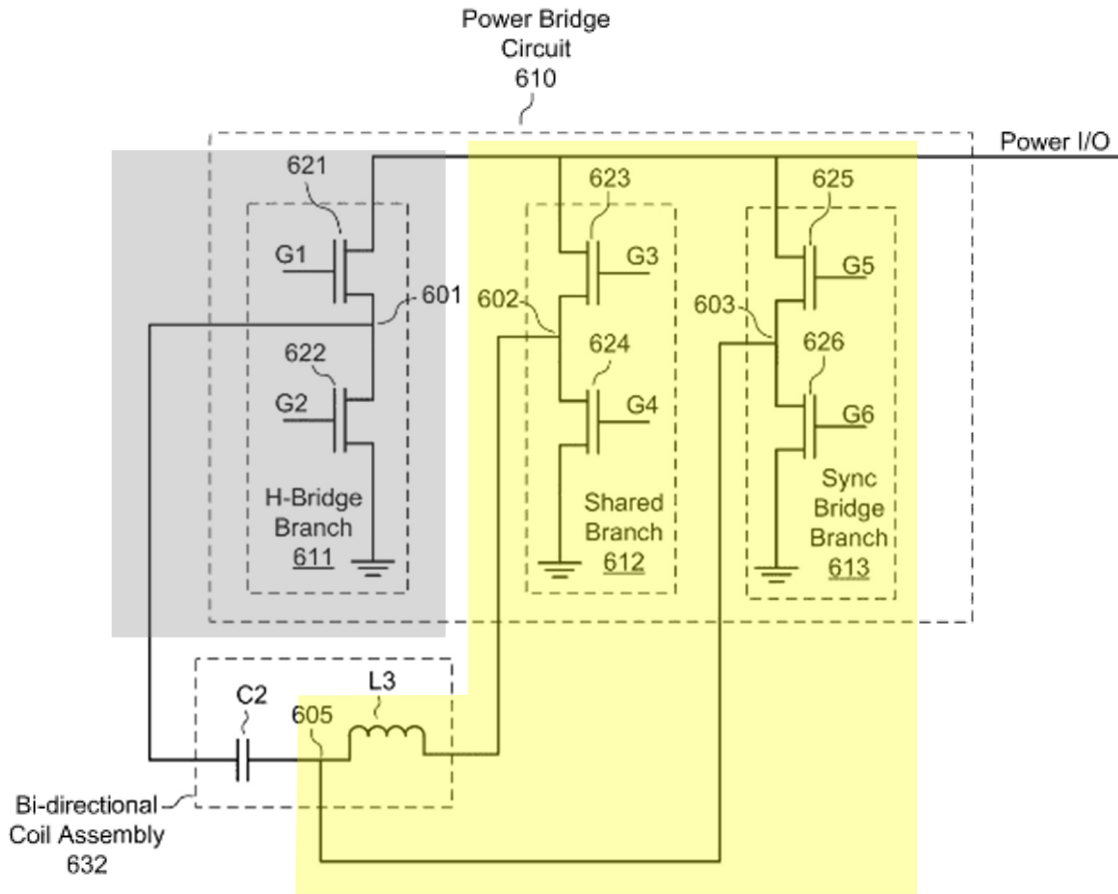


FIG. 6B

142. By sending control signals G1-G6, the processor 413 controls the power bridge circuit to “change the impedance of the bi-directional coil assembly.” Chatterjee(EX1003), ¶66. Specifically, a POSA would have understood that Chatterjee’s bi-directional coil assembly has different impedance in different modes because its impedance network — capacitor C2 between node 601 and 605 and the wire between node 603 and 605 — provides different impedance under different modes: in the power transmit mode, the impedance network provides capacitive reactance ($Z = -1/j\omega C$); and in the power receive mode, it does not ($Z = 0$).

143. Moreover, by sending control signals G1-G6, the **processor 413** also changes the topology of the **power bridge circuit** because the H-bridge branch 611 is disconnected and turned off, as shown in the gray area in the annotated Figure 6 above. Chatterjee(EX1003), ¶69.

144. In this power receive mode, Chatterjee discloses that switches 623-625 of the **power bridge circuit** rectify the alternating current received by the bi-directional coil assembly into a direct current at the Power I/O line, which is used to charge the **rechargeable battery**. Chatterjee(EX1003), ¶46 (“During the power receive mode of the **inductive signal interface 410**, the bi-directional coil assembly 412 receives power over the inductive link 430 from the **second electronic device 420**. The power signal is transmitted in modulated form over the **power bridge circuit 411**, which performs rectification to output a DC current to the power circuit 414. The power circuit 414 is configured to clamp current levels, regulate voltage levels, and perform other functions to transmit an outgoing power signal in the power receive mode. . . . the resulting power signal is . . . is routed to . . . charge a **rechargeable battery** within the electronic device 402.”), Fig. 10 (showing “Power I/O” connecting to the power circuit). In view of Chatterjee’s teaching, a POSA would have understood that the **power bridge circuit** (which is part of the “first circuitry”) is “*configured to . . . obtain a modified form of said received power*” because it rectifies the received alternating current into a DC signal, which is a

modified form of the received AC power. As I explained previously, the H-bridge (or “full bridge”) topology can act as a rectifier by turning on different pairs of diagonally opposed switches to connect the inductive coil (an AC source) in one of two polarities. *See* Chatterjee(EX1003), Fig. 9. A POSA would have recognized that when used as a synchronous rectifier, the switches can be controlled to reverse the connection polarity whenever the AC source has a negative value. In this manner, the AC voltage source is continuously re-connected to deliver a positive (e.g., rectified) voltage at the DC terminals.

145. It is also my opinion that a POSA would also have understood that the power circuit 414 (which is part of the “first circuitry”) is “*configured to . . . apply said modified form of said power to said load device*” because it receives the DC signal at the Power I/O line and transmits an outgoing power signal to charge rechargeable battery of the electronic device 402. For example, as shown in Figure 10 of Chatterjee, a POSA would have understood that power derived from the coil assembly would pass through the DC-DC switching power converter (including switches 1022, 1023 and their associated component) to the “Power Out” terminal. A POSA would have appreciated that this output power—which is a “modified form” because it is DC and not AC—is applied to the battery or the load device.

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

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

146. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious this limitation.

147. As explained above in claim [1.c], Chatterjee's **processor 413** provides control signals G1-G6 to control the operation of the **power bridge circuit** which is part of the claimed "first circuitry." When the **inductive signal interface** is set in a power transmit mode, **processor 413** sends control signals G5 and G6 to turn off the sync bridge branch 613, and signals G1-G4 to turn on the H-bridge branch 611 and the shared branch 612, such that **inductor L3** and **capacitor C2** are both used and connected in series, as shown below in the yellow-highlighted circuitry. Chatterjee(EX1003), ¶69, Fig. 6B (annotated).

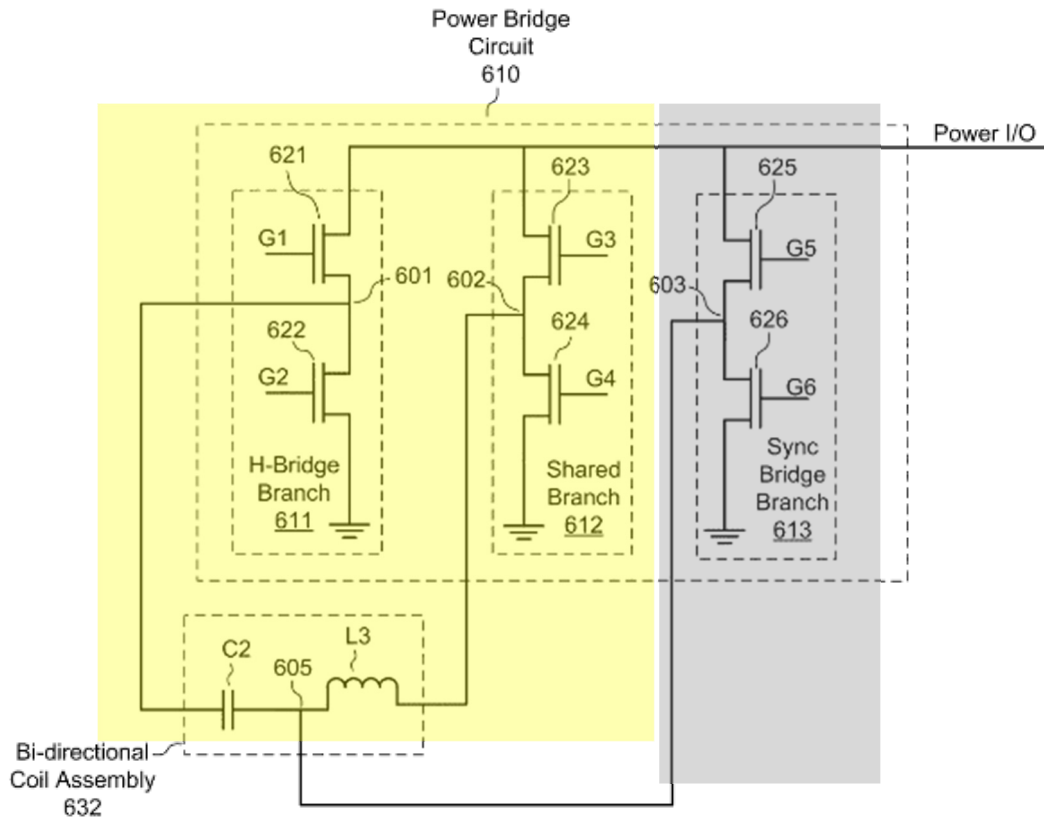


FIG. 6B

148. By sending control signals G1-G6, the processor 413 controls power bridge circuit to “change the impedance of the bi-directional coil assembly.” Chatterjee(EX1003), ¶66.

149. Moreover, by sending control signals G1-G6, the processor 413 changes the topology of the power bridge circuit because the sync branch 613 is disconnected and turned off, as shown in the gray area in the annotated Figure 6 above. Chatterjee(EX1003), ¶69.

150. As explained above in claim [1.p], in the power transmit mode, the inductive signal interface 410’s “power circuit [] handles incoming power signal

originating from a power source ..., the incoming power signal being used to transmit the power to the **second electronic device** [] over the inductive link.” Chatterjee(EX1003), ¶37. “The **power bridge circuit** [] is coupled to the power circuit [] to . . . convert signals from DC to high-frequency form over inductive link.” Chatterjee(EX1003), ¶38.

151. Therefore, it is my opinion that a POSA would have understood that the **power bridge circuit**, which as explained in claim [1.a] is part of the “first circuit,” is “*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***” because the switches of the **power bridge circuit** are controlled by the **processor 413** to change the impedance of the bi-directional coil assembly and the topology of the **power bridge circuit** such that the **power bridge circuit** operates as an inverter to transmit AC power to inductively charge a **second electronic device 420**. Chatterjee(EX1003), ¶¶37-38, 66, 69. A POSA would have appreciated that changing the interrelation of circuit components constitutes a change in circuitry topology. It changes how the high/low switch pairs operate and introduces into the circuitry passive components, such as capacitor C2, that are used in the coil assembly in one mode of operation but not the other.

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

152. It is my opinion that Chatterjee in view of Corbridge and the knowledge of a POSA renders obvious claim [1.g]. Specifically, Chatterjee discloses “*said second circuitry, on power-up of said **secondary wireless power receiver**, configured to identify a type of the **secondary wireless power receiver**,*” but it does not specifically teach “*said second circuitry . . . configured to . . . identify a wireless power protocol of said **secondary wireless power receiver**.*” This limitation is rendered obvious in view of the teachings of Corbridge.

153. As explained in claim [1.p], Chatterjee’s **inductive signal interface 410** has a power transmit mode in which it transmits power to “power-up” or charge a **second electronic device 420** over an inductive link 430. Chatterjee(EX1003), ¶37.

154. Chatterjee discloses that the electronic device 402 may control the **inductive signal interface 410** to operate in a power transmit mode, such as via “control signals [that] originate from [] stored or hardware parameters” or based on “a status of the electronic device 402.” Chatterjee(EX1003), ¶¶36, 43. As one example, Chatterjee discloses an embodiment of the **inductive signal interface 410** that is placed in a power transmit mode when the battery of the electronic device 402 is fully charged. Chatterjee(EX1003), ¶43 (“For example, if a status of a rechargeable battery (not shown) on the electronic device 402 indicates that the

rechargeable battery is not fully charged, the **inductive signal interface 410** can be configured to operate in a power receive mode, when it would otherwise operate in the power transmit mode.”).

155. As an example, the '339 patent describes that when the **dual mode wireless power receiver** powers-up (i.e., charges) the **secondary wireless power receiver** in a communication mode, its second circuitry is “configured to identify a type of said **secondary wireless power receiver**.” '399 patent, 4:23-26. Specifically, the '339 patent describes that in this mode, “the **secondary wireless power receiver 300** communicates its “type amongst other information” to the **dual mode wireless power receiver 100** over a communication link. *Id.* The '339 patent further describes that the communicated information is received by the **modulator/demodulator 103** and sent to the **control logic circuit 105** for processing. '339 patent, 9:22-26 (“In communication mode, the **control logic circuit 105** is configured to . . . receive a digital signal . . . from the **modulator/demodulator circuit 103**.”),

156. Like the '339 patent, Chatterjee discloses that its **inductive signal interface 410** is configured to receive “incoming modulated data signal . . . via the inductive link 430,” including the “**identification . . . information of . . . the second electronic device 420**.” Chatterjee(EX1003), ¶50 (“The incoming modulated data signal is received inductively via the inductive link 430”), ¶48 (“In some embodiments, **inductive signal interface 410** is configurable to transfer data as well

as power via the inductive link 430. . . . In an embodiment, data transmitted over the inductive link 430 includes data that corresponds to identification or status information of. . . the **second electronic device 420**.”); *see also id.* ¶42. Chatterjee further discloses that the identification information can be a “**type identification**” of the **second electronic device**. Chatterjee(EX1003), ¶35 (“. . . enable the first device [] to operate in both power receive and power transmit modes, depending on, for example, a **type identification** of the **second electronic device** []”); *see also id.* ¶31. Chatterjee teaches that the identification of the **second electronic device** is received by the **demodulator** 417 in the communication circuit 415 and sent to the **processor 413** for processing. Chatterjee(EX1003), ¶55 (“The **processor 413** may be configured to process identification and status information transmitted over the **inductive [link] 430** to determine a mode of operation of the **inductive signal interface 410**.”), ¶53 (“The communication circuit 415 transmits the **demodulated** data signal to the **processor 413** for processing”). Therefore, a POSA would have understood that Chatterjee discloses that the second circuitry of the **inductive signal interface 410** is “*configured to identify a type of*” the **second electronic device 420** based on the type identification information received over the inductive link. Chatterjee(EX1003), ¶¶35, 55.

157. Because Chatterjee discloses that the **processor 413** of the **inductive signal interface 410** processes data received over the inductive link,

Chatterjee(EX1003), ¶55 (“The **processor 413** may be configured to process identification and status information transmitted over the inductive [link] 430 The **processor 413** may also be configured to process communication data received from over the inductive link”), a POSA would have understood that the **processor 413** of the **inductive signal interface 410** must be configured to process data according to a particular “*wireless power protocol*.” See, e.g., Chatterjee(EX1003), ¶48 (“As described, the data that may be send over inductive link 430 may include a specific format and structure, under an inductive communication protocol that both devices share.”). A POSA would have appreciated that “data” in this passage includes, for example, “identification and status information,” which must have an agreed-upon timing and encoding to be interpreted correctly. A POSA would have recognized that these timing and encoding requirements —overlying the modulation of the inductive-link signal — constitute a protocol exchange, where modulated data has meaning because it adheres to a “specific format and structure.” *Id.* ¶48. Therefore, a POSA would have understood that Chatterjee discloses that when the **inductive signal interface 410** is placed in a power transmit mode such that it powers up a **second electronic device 420** via an inductive link 430, its second circuitry is configured to communicate with the **second electronic device 420** using a “*wireless power protocol*.” However,

Chatterjee does not expressly disclose the claimed second circuitry “*configured to identify a wireless power protocol of said secondary wireless power receiver.*”

158. Corbridge discloses circuitry that is “*configured to . . . identify a wireless power protocol of said secondary wireless power receiver*” and it would have been obvious to a POSA to improve Chatterjee’s **inductive signal interface** with these teachings from Corbridge, as explained below and in Section VIII.A.1.a. For example, Chatterjee expressly instructs a POSA to review Corbridge for “examples of the type of data that can be communicated over using the inductive signal interface.” Chatterjee(EX1003), ¶48.

159. Specifically, Corbridge discloses the specific sequence of signals communicated over the inductive link between a power supply device (PSD) and a power receiving device (PRD). Corbridge(EX1004), ¶109. Figure 11 of Corbridge discloses “steps performed on respective power supply and power receiving devices in enabling two such devices inductively link[ed] to one another under a controlled protocol or process.” Corbridge(EX1004), ¶109, Fig. 11.

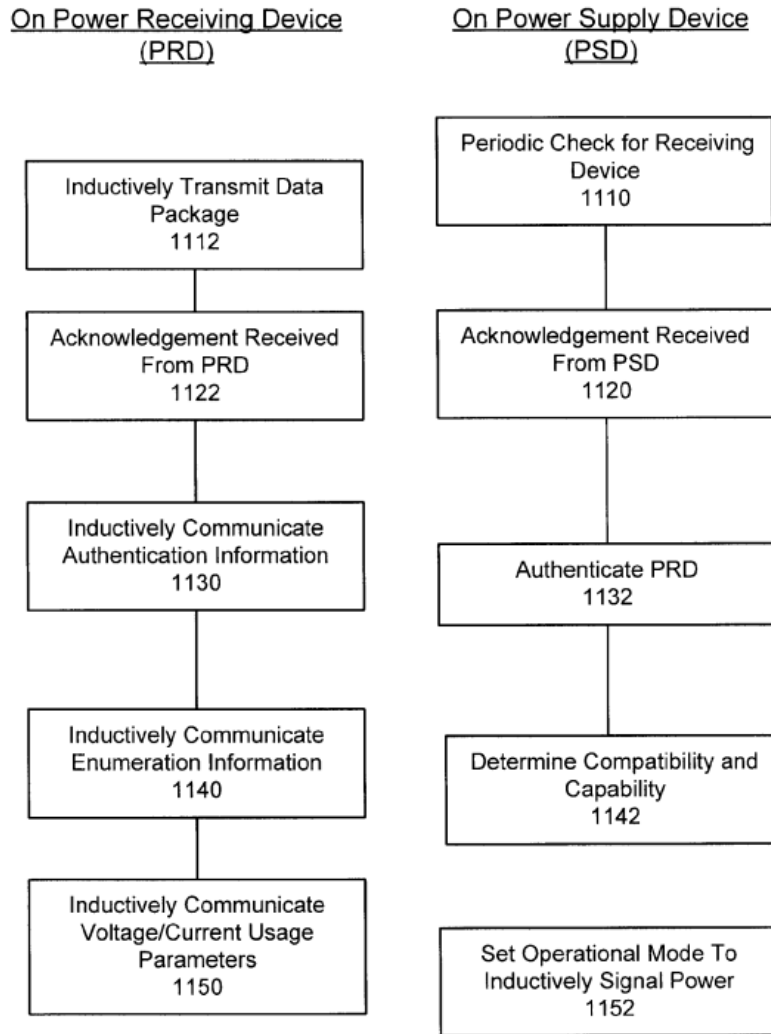


FIG. 11

160. Corbridge discloses that in a first step 1110, “the power supply device makes a period check as to whether the power receiving device is inductively linked;” and if “the power receiving device is placed on or near the power supply device, and the power receiving device triggers an inductive signal on the power supply device. As soon as the power receiving device is powered, it sends packets over the inductive communication link (e.g. three packets) until acknowledgement

is received (step 1120).” Corbridge(EX1004), ¶110. Thus, steps 1110 to 1120 of Corbridge teach a power supply device establishing an inductive link to “power-up” the power receiving device.

161. Corbridge then discloses that in a step 1140, “the power receiving device **communicates enumeration information**” to the power supply device, and that “**enumeration information** may [] enable one or both devices to identify the other device by type,” and it also “may be used to **enable devices to select . . . communication protocol . . .** of the two devices to communicate or transfer power.” Corbridge(EX1004), ¶112. Therefore, a POSA would have understood that Corbridge teaches that the power receiving device provides enumeration information to the power supply device in step 1140 so that the power supply device may identify the communication protocol of the power receiving device. A POSA would have understood that “enumeration” encompasses exchange of information that establishes capabilities (and potential compatibility issues) prior to the controlled exchange of power. *Id.* ¶112. A POSA would have recognized that because enumeration (step 1140) establishes a framework for subsequent operation, it precedes operational transfer of voltage and current (step 1150) during power exchange. *Id.* Fig. 11, ¶113.

162. Corbridge further discloses that communication between a power supply device and a power receiving device may be implemented via circuits, such

as a signal handler 620 in a dock that “includes circuits and elements” and “may communicate or receive data using a power signal carried over an inductive signal path,” Corbridge(EX1004), ¶¶69, 71, and power communication circuits 728 and a signal processor 740 in “a mobile computing device . . . having components for implementing an inductive signal transfer system in combination with . . . a dock” that may “handl[e] incoming and outgoing signals using the inductive signal path.” Corbridge(EX1004), ¶80, 84, Fig. 7A.

163. It is my opinion that a POSA would have found it obvious to improve Chatterjee’s **inductive signal interface 410** such that it implements the sequence of signaling that is disclosed in Corbridge. Specifically, it is my opinion a POSA would have found it obvious to implement control logic in Chatterjee’s **processor 413** of the **inductive signal interface 410** such that the **inductive signal interface** is improved by performing the steps of Corbridge’s power supply device in the power transmit mode, and to implement the **second electronic device 420** such that it performs the steps of Corbridge’s power receiving device for reasons stated in Section VIII.a.1. The proposed combination of Chatterjee and Corbridge would result in an improved **inductive signal interface 410** having its communication circuit 415 receive enumeration information from the **second electronic device 420**, and its **processor 413** configured to process the enumeration information to be able to identify a wireless power protocol for the two devices to communicate, thus being configured

to “*identify a wireless power protocol of said **secondary wireless power receiver***” on power-up of the **secondary wireless power receiver**.

a. Motivation to Combine Chatterjee and Corbridge

164. As explained above, Chatterjee discloses an inductive signal interface that is part of an electronic device that selectively operates in a power transmit mode in which it transmits power from a battery of the electronic device to inductively charge another device, and a power receive mode in which it inductively receives power to charge up the battery of the electronic device. Chatterjee(EX1003), ¶¶2, 29, 4, 47, 89. Chatterjee discloses the structure and circuitry of the inductive signal interface that that can operate in both the power transmit and power receive modes. *Id.* ¶¶41, 46, 47, 66, 69, Figs. 4, 6B, 10. Chatterjee further discloses that the inductive signal interface may receive information communicated from a **second electronic device** while charging the **second electronic device**. *Id.* ¶¶41, 55. However, certain claims of the ’339 require to “*identify a protocol of*” the **second electronic device**, which is not explicitly disclosed in Chatterjee. ’339 patent(EX1001), claim 1.

165. Corbridge discloses “steps performed on respective power supply and power receiving devices in enabling two such devices inductively link to one another under a controlled protocol or process.” Corbridge(EX1004), ¶109.

166. Corbridge then discloses that in a step 1140, “the power receiving device **communicates enumeration information**” to the power supply device, and

that “enumeration information may [] enable one or both devices to identify the other device by type,” and it also “may be used to **enable devices to select . . . communication protocol . . .** of the two devices to communicate or transfer power.” *Id.* ¶112.

167. It is my opinion that a POSA would have found it obvious to improve Chatterjee’s **inductive signal interface 410** such that it performs the steps of Corbridge’s power supply device, and to implement the **second electronic device 420** such that it performs the steps of Corbridge’s power receiving device. The proposed combination of Chatterjee and Corbridge would result in an improved **inductive signal interface 410** having its communication circuit 415 receive enumeration information from the **second electronic device 420**, and its **processor 413** configured to process the enumeration information to be able to “*identify a wireless power protocol*” for the two devices to communicate.

168. It is my opinion that such a combination would have involved the mere application of a known technique—Corbridge’s teachings regarding identifying a wireless power protocol—to Chatterjee’s **inductive signal interface 410** that is ready for improvement. Chatterjee’s system is similar to Corbridge’s because both are wireless power transfer systems, and Chatterjee’s **inductive signal interface 410** in the power transmit mode functions similar to Corbridge’s power transmitting device, and its **second electronic device 420** functions similar to Corbridge’s power

receiving device. And such a combination would have resulted in simply applying Corbridge's teachings about identifying a wireless protocol in Chatterjee's inductive signal interface in the same way as it functions in Corbridge. A POSA would have appreciated that controlled exchange of power needs to be preceded by data communication to establish the capabilities of the primary and secondary (i.e., receiving devices). For instance, without an agreed-upon method of communicating, or an exchange about what power levels are required, a POSA would recognize that wireless power cannot be sent in a controlled, safe, and effective manner. For this reason, a POSA would have known to combine Chatterjee's device with Corbridge's enumeration step, *see* Corbridge(EX1004), Fig. 11, in order to select "performance level or operations, functionality, communication protocol or other aspects for the two devices to communicate or transfer power." *Id.* ¶112.

169. It is my opinion that a POSA would also have been motivated to make such a combination because Chatterjee and Corbridge are both directed to the same field of endeavor, i.e., wireless power charging. *Supra* Sections V.B and V.C. Moreover, Chatterjee expressly teaches a POSA to apply Corbridge's signaling technique in its bi-directional inductive power interface. Specifically, Chatterjee teaches that "[i]n power transmit mode, the electronic device 402 may signal data to enable a data loop in which the second device (as the power receiver) to signal back real-time information about its power needs," and that Corbridge discloses

“[s]pecific examples of the type of data that can be communicated over using the inductive signal interface,” including “data to implement parts of the communication protocol, such as detecting presence of the second device, authenticating itself and/or the second device, and enumerating itself,” and specifically incorporates Corbridge “by reference in its entirety for all purposes.” Chatterjee(EX1003), ¶48.

170. It is my opinion that a POSA would have had a reasonable expectation of success in applying Corbridge’s signaling sequence in Chatterjee’s **inductive signal interface**. A POSA would have understood that Chatterjee’s **processor 413** is typically implemented as a programmable microprocessor and would have been familiar with how to program the processor to control data exchange across the inductive link. *See* Corbridge(EX1004), ¶30 (“The processor 740 is programmed to implement a protocol for controlled use of power and exchange of data across the inductive link.”).

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

171. It is my opinion that Chatterjee in view of Corbridge and the knowledge of a POSA renders obvious claim [1.h].

172. As explained above in claim [1.g], Chatterjee discloses that its communication circuit 415 is configured to receive data from said **secondary wireless power receiver**, and its **processor 413** is configured to process that data in accordance with a wireless power protocol. Chatterjee(EX1003), ¶51 (“The

communication circuit 415 is coupled to the bi-directional coil assembly 412 in order to . . . receive data over the inductive link 430.”), ¶55 (“The processor 413 may be configured to process identification and status information transmitted over the inductive [link] 430 to determine a mode of operation of the inductive signal interface 410.”); ¶48 (“As described, the data that may be send over inductive link 430 may include a specific format and structure, under an inductive communication protocol that both devices share.”); 53 (“The communication circuit 415 transmits the demodulated data signal to the processor 413 for processing.”).

173. A POSA would have understood that processing the data received over the inductive ink by processor 413 would involve receiving and interpreting the data in accordance with a wireless power protocol. Chatterjee(EX1003), ¶48 (“As described, the data that may be send over inductive link 430 may include a specific format and structure, under an inductive communication protocol that both devices share.”). Specifically, in the proposed combination of Chatterjee and Corbridge, the improved inductive signal interface that implements the sequence of signaling would include a processor 413 that would receive enumeration information from the second electronic device that allows the processor 413 to confirm that it supports the same wireless power protocol, and thus would be able to interpret data in the wireless power protocol about, e.g., the second electronic device’s power needs. Corbridge(EX1004), Fig. 11 (Step 1142, “determine compatibility and capability”);

Chatterjee(EX1003), ¶48 (“the **second device** (as the power receiver) to signal back real-time information about its power needs”). Therefore, it is my opinion that a POSA would have found that the teachings of Chatterjee and Corbridge render obvious a **processor 413** (which is part of its “second circuitry”) “*configured to receive and interpret data from said **secondary wireless power receiver** in said identified wireless power protocol*” because it interprets received data, such as information about identification, status information, or power needs, in the identified wireless power protocol.

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

174. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [1.i].

175. As an example of claim [1.i], the '339 patent discloses that the second circuitry interprets, for example, a request from the **secondary wireless power receiver** to perform a function such as to “increase the transmitted power, decrease the transmitted power, maintain the transmitted power, turn off the transmitted power, etc.” '339 patent, 3:47-56.

176. Chatterjee discloses that the **processor 413**, which is part of the second circuitry, is “configured to process identification and status information transmitted over the inductive [link] 430 to determine a mode of operation of the **inductive signal**

interface 410.” Chatterjee(EX1003), ¶55. A POSA would thus have understood that the processor 413 is configured to set the inductive signal interface 410 in, for example, a power transmit mode, based on the interpretation of identification and status information. Since Chatterjee includes an inductive signal interface that selectively operates in a power transmit mode or a power receive mode, *see* Chatterjee(EX1003), Abstract, ¶¶2, 29, 42, a POSA would have understood that a crucial part of the signaling exchange is to determine whether the secondary wireless power receiver can act as a consumer or source of wirelessly transmitted power. Therefore, a POSA would have known that interpretation of data from the secondary wireless power receiver enables Chatterjee’s inductive signal interface to adjust the timing of control signals (e.g., G1-G6 in Figure 6) to change, for example, the direction of power flow.

177. A POSA would also have understood that when the processor 413 sets the inductive signal interface 410 in a power transmit mode, it performs a “*function associated with said transmitted power in conjunction with said first circuitry.*” For example, the processor 413 would control the power bridge circuit (which is part of the first circuitry) such that the first circuitry continues to operate in the power transmit mode and transmit power over the inductive signal interface. *See* Chatterjee(EX1003), ¶63 (“The operation of the power bridge circuit 610 is controlled by the signals G1-G6, which are transmitted by control logic coupled [to]

the switches 621-626. Referring back to [FIG.] 4, ... the **control logic** may be ... **processor 413**.”). As another example, the processor 413 would also receive from the **second electronic device 420** “real time information about [it] power needs.” Chatterjee(EX1003),¶48 (“In power transmit mode, the electronic device 402 may signal data to enable a data loop in which the **second device** (as the power receiver) to signal back real-time information about its power needs.”) A POSA would have appreciated receiving information about the power receiver’s power needs enables the inductive signal interface to “adjust the level of the transmitted power signal to fit the needs of the power receiving device.” Chatterjee(EX1003),¶48. A POSA would have further recognized that Chatterjee describes a controlled power transfer technique, in which the power receiver sends “real time information about its power needs,” and the power transmitter is able to adjust, for example, the switching operations to adjust its power output based on the received power needs. Therefore, a POSA would have understood that Chatterjee teaches “*said second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry*” because Chatterjee’s **processor 413** is configured to control the operation of the **power bridge circuit** so that the inductive signal interface continues to transmit power in a controlled manner to the second electronic device.

2. Claim 2

[2] wherein said **switch network** of said first circuitry is configured as one of an inverter and a rectifier

178. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [2].

179. As explained in claim [1.b], Chatterjee's **power bridge circuit** is configured as an inverter in the power transmit mode, and a rectifier in the power receive mode. Chatterjee(EX1003), cl. 4 ("two of the three branches operate to form a synchronous bridge **rectifier** circuit while the **inductive signal interface** operates in the power receive mode"), cl. 3 ("two of the three branches operate to form an **H-bridge circuit** while the **inductive signal interface** operates in the power transmit mode"); ¶3 ("an **H bridge inverter circuit** [] for transferring power from a DC supply [] to an AC load 115");

3. Claim 3

[3] wherein said **impedance network** of said first circuitry comprising of elements that are one of chosen a priori with fixed values and tuned during operation over a range of values

180. I have been asked to assume that claim [3] can be met by disclosure of either one of "*elements that are . . . chosen a priori with fixed values*" and "*elements that are . . . tuned during operation over a range of values.*"

181. It is my opinion that Chatterjee in view of knowledge of POSA renders obvious claim [3]. As a preliminary matter, the impedance network identified in

claim [1.b] includes an electrical circuit element (a capacitor), and a POSA would generally understand that such an element can be fixed or variable, with no third alternative.

182. As explained above in claim [1.b], Chatterjee discloses an “impedance network” by way of disclosing a capacitor C2 in the bi-directional coil assembly. Chatterjee(EX1003), ¶66, Fig. 6B. A POSA would have found it obvious that the capacitance of capacitor C2 can be fixed because Chatterjee’s inductive signal interface adjusts the impedance by changing whether components (such as the capacitor C2) are used under different modes, and does not need tuning for example the values of those components. A POSA would have appreciated that in order to provide variable capacitance, a capacitor could be provided with a varactor (whereby different capacitance values would be realized by an analog control voltage) or switched-capacitance structure (whereby different capacitance values would be realized by digital control signals and switches). More generally, a POSA would have known that a variable capacitor could be depicted schematically as an arrow, usually shown diagonally across the capacitor element. No such drafting convention, varactor, or switch-capacitor structure is shown, e.g., for capacitor C2 in the bi-directional coil assembly. Chatterjee(EX1003), ¶66, Fig. 6B. A POSA would therefore have understood that Chatterjee teaches an impedance network comprising of elements that have fixed values.

4. Claim 5

[5] wherein said first circuitry is further comprising one of switch_configuration_A and switch_configuration_B:

said switch_configuration_A comprising first switch and second switch, said first switch operationally connecting and disconnecting said dual mode wireless power receiver with said stored power directly or via intermediate circuitry, and said second switch operationally connecting and disconnecting said dual mode wireless power receiver with said load;

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

183. I have been asked to assume that claim [5] can be met by disclosure of either one of one of “switch_configuration_A” and “switch_configuration_B.”

184. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [5] because it discloses at least “switch_configuration_A.”

185. As an example of claim 5, the '339 patent describes the switch_configuration_A as comprising two switches—switch S1 and switch S2—each controlling a current pathway by which the dual mode wireless power receiver connects to the battery, as shown in Figure 1. '339 patent, Fig. 1 (annotated).

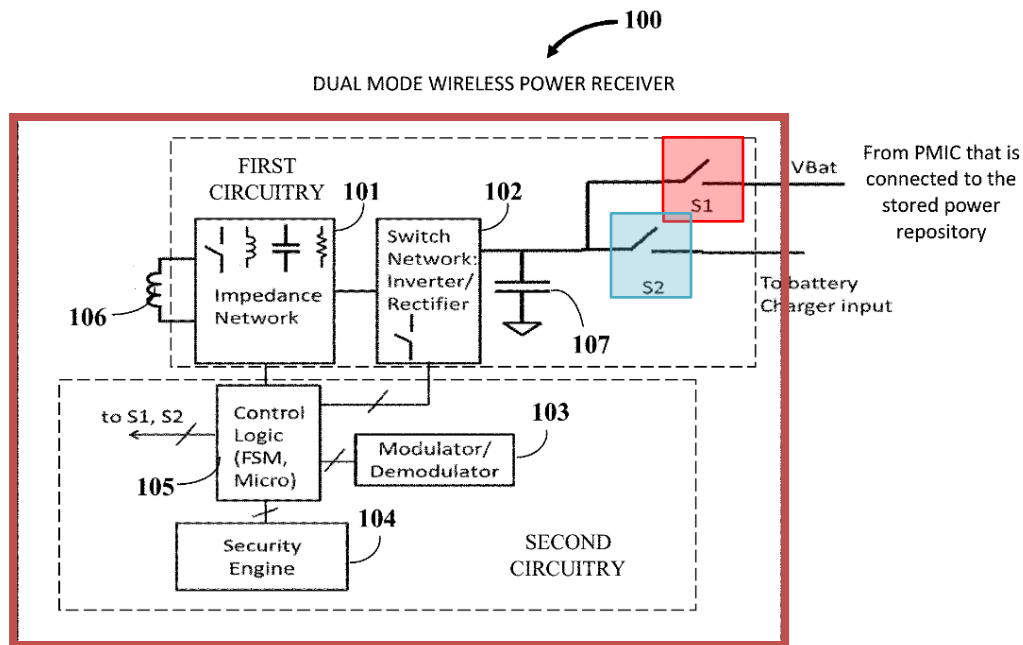


FIG. 1

Switch S1 is connected to the “PMIC that is connected to the stored power repository,” and switch S2 is connected to the “battery charger input.” ’339 patent, Fig. 1. When the dual mode wireless power receiver 100 is in the charging mode, “switch S1 is open and switch S2 is closed to direct the rectified and filtered power to the load device.” ’339 patent, 8:39-40. When the dual mode wireless power receiver 100 is in the communication mode, “switch S1 is closed and switch S2 is kept open to direct the power from the battery via the inverter to [] a coil.” ’339 patent, 8:52-55.

186. Like the ’339 patent, Chatterjee discloses an embodiment of the power circuit 414 in Figure 10 (annotated in blue box as explained above in Section V.b)

that includes two current pathways that connects the **inductive signal interface** to the **battery** of the electronic device 402. Chatterjee(EX1003), Fig. 10 (annotated).

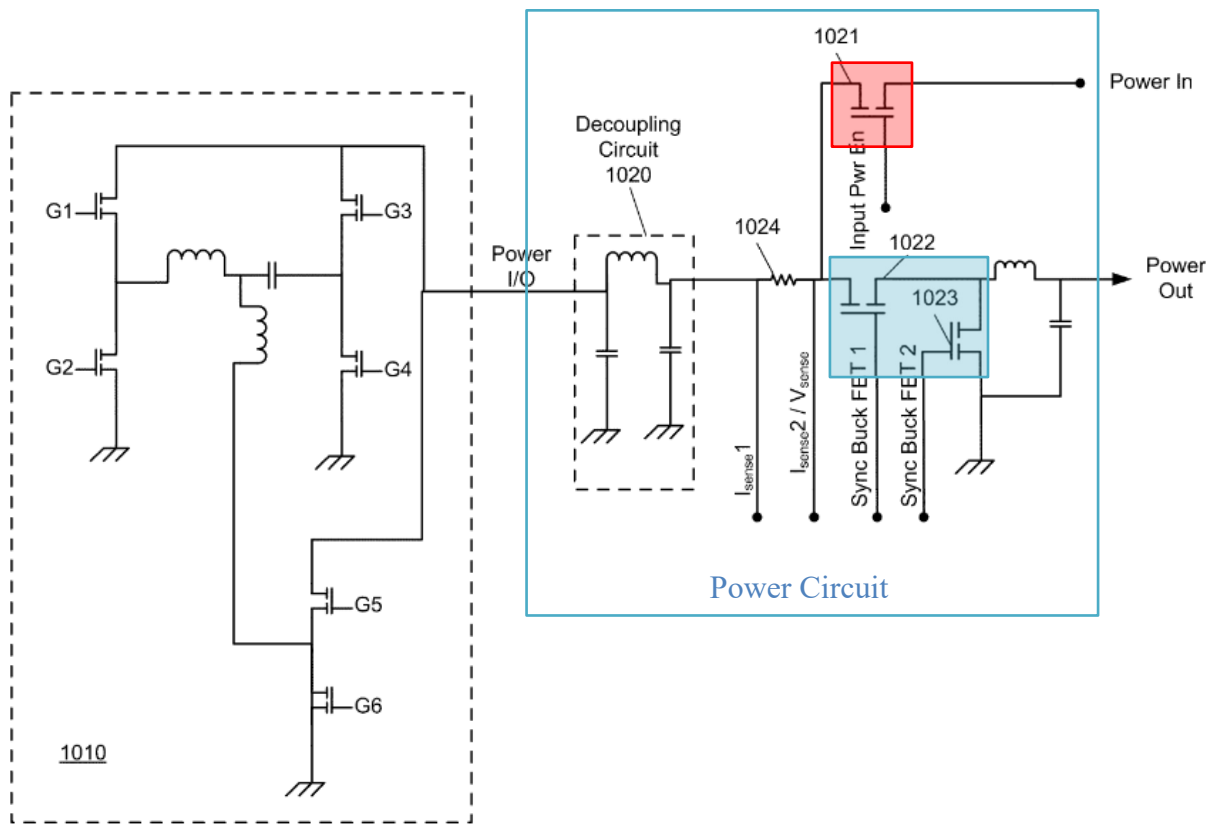


FIG. 10

The first pathway includes a **switch 1021** that “operates to couple a **power signal line Power In** to the resistor 1024 in order to deliver power to the **power bridge circuit** and bi-directional coil assembly combination 1010.” Chatterjee(EX1003), ¶89. The second pathway includes “two **transistors 1022 and 1023** [that] are coupled as illustrated to act as a voltage and current regulator for outgoing current from the **power bridge circuit** and bi-directional coil assembly combination 1010.” Chatterjee(EX1003), ¶89. A POSA would have recognized that **transistors 1022 and**

1023, “controlled by signals Sync Buck FET 1 and Sync Buck FET 2, respectively,” operate as part of a DC-to-DC buck converter circuit to lower the DC voltage for charging the battery. Chatterjee(EX1003), ¶89.

187. As explained above in section V.B, a POSA would have understood that Chatterjee’s power circuit of Figure 10 can be used with the power bridge circuit and bi-directional coil assembly of Figure 6B because that is explicitly taught in Chatterjee. Chatterjee(EX1003), ¶89 (“The power bridge circuit and bi-directional coil assembly combination [] may be any of the above described embodiments.”). A POSA would have appreciated that when charging a secondary device, Chatterjee’s inductive signal interface “deliver[s] power to the power bridge circuit and bi-directional coil assembly combination 1010” that is derived from the “Power In” node on the right side of Figure 10. *Id.* Likewise, a POSA would have appreciated that when acting as a power receiver, Chatterjee’s inductive signal interface consumes and/or stores power via the “Power Out” node a “voltage and current regulator for outgoing current from the power bridge circuit and bi-directional coil assembly combination 1010.” *Id.*

188. Therefore, it is my opinion that a POSA would have understood that in the power transmit mode, switch 1021 is connected and to deliver power from the battery to the power bridge circuit to charge the second electronic device 420, thus “connecting . . . said dual mode wireless power receiver with said stored power”;

and in the power receive mode, [transistors 1022/1023](#) operate synchronously as a part of a DC-DC buck converter to lower the voltage out of the power bridge circuit to charge the [battery](#) of the electronic device 402, thus “*connecting . . . said [dual mode wireless power receiver](#) with [said load](#).*” *Id.* A POSA would have recognized that the term “buck” refers to an exemplary type of switching power converter that converts a DC voltage at its input to a lower DC voltage at its output. Referring to Chatterjee’s Figure 10, a POSA would have recognized that the input of the buck converter is the V_{sense} node at the left (drain) terminal of transistor 1022, and that the flow of power is from left to right through the buck converter (which in addition to [transistor 1022](#), includes the [low-side switch 1023](#), and the adjacent inductor/capacitor network leading to the “Power Out” terminal).

189. A POSA would also have understood that [switch 1021](#) can be connected to the [battery](#) directly to “transmit the power signal received from ... [battery](#),” or via intermediate circuitry that can “treat the incoming power signal” from the [battery](#). Chatterjee(EX1003), ¶¶37, 47.

190. A POSA would have further found it obvious that because the inductive signal interface operates “in either a power transmit mode or a power receive mode,” Chatterjee(EX1003), ¶30, its Power I/O line either transmits power out of the [battery](#) or to the [battery](#), and thus the two current pathways —controlled by [switch 1021](#) and [transistor 1022/1023](#) respectively— are not connected at the same time. In other

words, **switch 1021** is disconnected to disconnect the **dual mode wireless power receiver** from the **battery “Power In” node** in the power receive mode, and **transistors 1022/1023** are not in operation to disconnect the **dual mode wireless power receiver** from the **battery “Power Out” node** in the power transmit mode, such that the battery only supplies or receives power in one mode, but not both. Thus, it is my opinion that **switch 1021** teaches “*said **first switch** operationally connecting and disconnecting said **dual mode wireless power receiver** with said **stored power** directly or via intermediate circuitry,*” and **transistor 1022/1023** teach “*said **second switch** operationally connecting and disconnecting said **dual mode wireless power receiver** with said **load**.*”

5. Claim 7

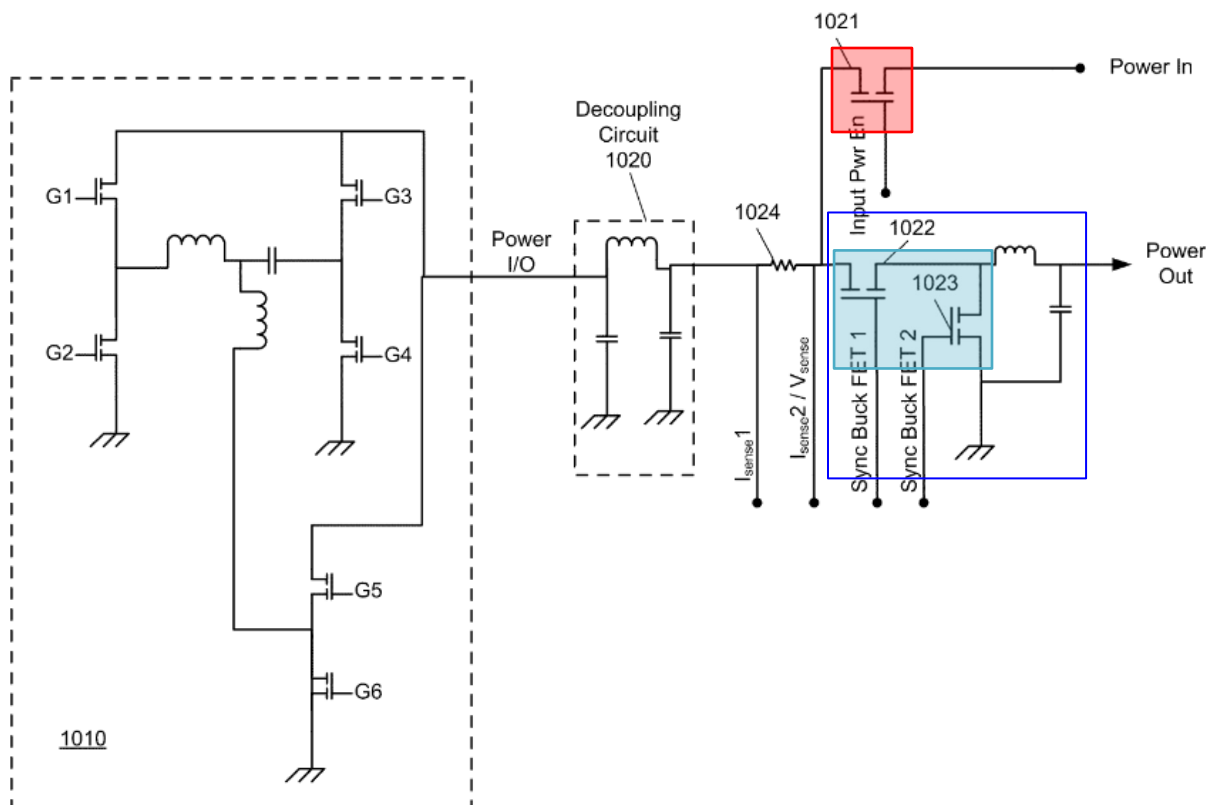
[7] The dual mode wireless power receiver of claim 1, wherein said first circuitry is further comprising a **switch that connects and disconnects said **dual mode wireless power receiver** with said **stored power**, said connection and disconnection to said **stored power** being direct or indirect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

191. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [7].

192. As explained above in Claim 5, Chatterjee’s **switch 1021** discloses “said first circuitry is further comprising ... said **first switch** operationally connecting and disconnecting said **dual mode wireless power receiver** with said **stored power** directly or via intermediate circuitry” because **switch 1021** is part of

the power circuit 414 that is part of the first circuitry, and it operates to connect and disconnect the **inductive signal interface 411** with the **battery** of the electronic device 402, either directly to “transmit the power signal received from ... **battery**,” or via intermediate circuitry that can “treat the incoming power signal” from the **battery**. Chatterjee(EX1003), ¶¶37, 47, 89, Fig. 10. Therefore, a POSA would have understood that **switch 1201** discloses “*said first circuitry is further comprising a **switch** that connects and disconnects said **dual mode wireless power receiver** with said **stored power**, said connection and disconnection to said **stored power** being direct or indirect via other intermediate circuitry.*”

193. Chatterjee’s Figure 10 also discloses “**a voltage and current regulator**” as indicated in the blue highlighted box below. Chatterjee(EX1003), ¶89 (“Two transistors 1022 and 1023 are coupled as illustrated to act as a **voltage and current regulator** for outgoing current from the power bridge circuit and bi-directional coil assembly combination 1010.”).



194. As explained above in claim 5, transistor 1022/1023 of the voltage and current regulator disclose “first circuitry is further comprising . . . said second switch operationally connecting and disconnecting said dual mode wireless power receiver with said load” because transistor 1022/1023 operate synchronously as a DC-to-DC buck converter in the power receive mode to connect the inductive signal interface with the battery of the electronic device 402 for regulating the power received over the inductive link for charging the battery, and do not operate in the power transmit mode to disconnect the inductive signal interface with the battery.

Chatterjee(EX1003), ¶89. Therefore, a POSA would have understood that the

voltage and current regulator of Figure 10 discloses “a *power regulation circuitry that connects and disconnects said dual mode wireless power receiver with said load*” because the voltage and current regulator connects the inductive signal interface with the battery when transistor 1022/1023 are in operation, and disconnects the inductive signal interface with the battery when transistor 1022/1023 are not in operation. Chatterjee(EX1003), ¶37, 47, 89, Fig. 10.

6. Claim 9

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

195. It is my opinion that Chatterjee in view of the knowledge of a POSA renders obvious claim [9].

196. Chatterjee’s inductive signal interface comprises a power circuit 414 that “may serve to clamp current levels, regulate voltage levels or perform other treatment functions for incoming (power transmit mode) and outgoing power signal (power receive mode),” and thus discloses a “*power regulation circuitry.*” Chatterjee(EX1003), ¶38.

197. The power circuit 414 “*connects . . . said dual mode wireless power receiver with said load*” in a power receive mode, and “*connects . . . said dual mode wireless power receiver with said stored power*” in a power transmit mode.

Chatterjee(EX1003), ¶¶38, 89, Figs. 4, 10. In a power receive mode, the power circuit 414 “outputs power received over the inductive link to another component that is on the first electronic device [], or alternatively connected to the electronic device (e.g. rechargeable battery).” Chatterjee(EX1003), ¶38. In a power transmit mode, the power circuit 414 “transmit[s] the power signal received from a power source (e.g. battery, wall outlet) of the first electronic device [].” Chatterjee(EX1003), ¶38.

198. Moreover, and as described in claim [5.a], Chatterjee discloses an embodiment of the power circuit 414 in Figure 10 including switch 1021 that operationally “connects and disconnects” the inductive signal interface with the stored power in the battery “directly or via intermediate circuitry,” and a DC-to-DC buck converter with transistors 1022 and 1023, that operationally “connects and disconnects” the inductive signal interface with the battery as a load. See also Chatterjee(EX1003), ¶89. Thus, a POSA would have understood Chatterjee’s power circuit 414 to disclose a “power regulation circuitry that connects and disconnects said dual mode wireless power receiver with said load and connects and disconnects said dual mode wireless power receiver with said stored power, said connection and disconnection to said stored power being direct or indirect via other intermediate circuitry.”

IX. OBJECTIVE INDICIA OF NON-OBVIOUSNESS

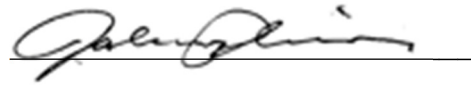
199. I am not aware of any objective indicia of non-obviousness that would make claims 1-3, 5, 7, and 9 of the '339 patent non-obvious over the prior art considered herein. In my opinion, any possible objective indicia of non-obviousness would not overcome the prior art that clearly demonstrates that the subject matter of claims 1-3, 5, 7, and 9 of the '339 patent would have been obvious to a POSA as of August 12, 2012.

200. I reserve the right to supplement my opinions as appropriate if WiPQTUS alleges or offers any purported evidence of any such objective indicia of non-obviousness.

201. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 13th day of October 2023.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Joshua Phinney", is written over a horizontal line.

Joshua Phinney, Ph.D.