

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.
Petitioner,

v.

WIPQTUS INC.
Patent Owner.

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

Inter Partes Review No. IPR2024-00023

DECLARATION OF DR. RANDAL H. DIREEN IN SUPPORT OF
PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	QUALIFICATIONS	1
III.	COMPENSATION	2
IV.	MATERIALS CONSIDERED	2
V.	UNDERSTANDING OF THE LAW	4
A.	Legal Standards	4
1.	Claim Construction	5
2.	Burden of Proof.....	6
3.	Anticipation.....	6
4.	Obviousness	7
B.	Priority Date	10
C.	Level of Skill in the Art.....	10
VI.	THE CHALLENGED PATENT	11
A.	Level of Skill in the Art.....	12
B.	The Claims That are the Subject of the Petition	13
C.	File History.....	13
D.	Effective Filing Date of Claims 1, 2, and 3.....	14
VII.	BACKGROUND OF THE ART	21
A.	Ad Hoc Wireless Power Transfer.....	22
B.	Power Transfer Between Two Coils Using a Magnetic Field .	23
C.	Power Transfer Between Two Capacitors Using an Electric Field	28
D.	Brief History of Wireless Power Transfer Standards.....	32
VIII.	OVERVIEW OF GROUND 1 AND ITS REFERENCES	35
A.	Chatterjee.....	36

B.	Corbridge.....	36
IX.	CLAIM CONSTRUCTION IS REQUIRED FOR SEVERAL CLAIM TERMS	36
A.	Term 1 - Impedance Network	37
1.	Impedance	37
2.	The Power Transfer Element (Coil or Capacitor) is Not Part of the Impedance Network	40
3.	Impedance Network	42
4.	Construction	49
B.	Term 2 - Limitation [1.e] –.....	49
C.	Term 3 - Switch Network.....	52
1.	Switch.....	52
2.	Switch Network.....	53
3.	Proposed Construction – “Switch Network”	58
D.	Summary	58
X.	ANALYSIS OF PETITIONER'S GROUND 1 USING THE PROPER CONSTRUCTIONS PROVIDED	59
A.	Overview of Ground 1.....	59
B.	Differences Between Claim 1 and Chatterjee	63
1.	Coil.....	63
2.	Limitation [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 "is Not Met by Chatterjee	72
3.	"Switch Network" and Chatterjee	86
4.	Limitations 1(g) – 1(i) Not Met by Chatterjee.....	87
C.	Differences Between Claim 1 and Corbridge.....	88
D.	Comments Regarding "Knowledge of POSA"	88

E. Conclusion – Ground 1 Does not Render Claim 1 Obvious.... 90

I. INTRODUCTION

1. I have been retained by counsel for WiPQTUS Inc. (“WiPQTUS”) in the above-captioned matter as an independent consultant to offer opinions regarding the patentability of the claims in U.S. Patent No. 10,038,339 (“the ’339 Patent” or “the challenged patent”).

2. In the preparation of this Declaration, I have confined my analysis to the materials and opinions that were available at the time of the preparation of this Declaration – supplemented with my own knowledge and experience in the field. Should new materials, analyses, or opinions be introduced subsequent to the filing of this Declaration, I reserve the right to provide supplementary Declarations to the extent necessary to address any such newly introduced items.

3. If requested, I am prepared to explain (in a deposition or at a trial before the Patent Trial and Appeal Board (the “Board”)) the technology disclosed in the challenged ’339 Patent – including the state of the art in the relevant timeframe. Similarly, I am prepared to explain the technology disclosed in the prior art references cited herein. This may include, among other things, background information wireless power transfer and related technological aspects.

II. QUALIFICATIONS

4. My qualifications to testify as an expert in electronics technology are set forth in my *curriculum vitae* attached as Appendix A – which includes a listing

of cases in which I have provided expert testimony. I have over 20 years of experience as an engineer, scientist, and consultant in the electronics industry, including in the areas of electronic design, layout, structure, and operation, in RF technology for wireless communications, in technology development, and in technical and business development. I have extensive experience (in both engineering and in litigation support) with both wireless technologies and power-management technologies.

5. My curriculum vitae contains further details regarding my experience, education, publications, and other qualifications that allow me to render expert opinions in connection with this proceeding.

III. COMPENSATION

6. I am being compensated for my work in this matter at an hourly rate of \$550 for consulting services. My compensation does not depend on the content of my opinions or the outcome of this proceeding.

IV. MATERIALS CONSIDERED

7. In preparing this declaration, I reviewed and considered the *Petition for Inter Partes Review of U.S. Patent No. 10,038,339*, No. IPR2024-00023 and its exhibits which are as follows, as well as other materials referenced in the body of this declaration:

Exhibit	Description
EX1001	U.S. Patent No. 10,038,339
EX1002	Phinney Expert Declaration
EX1003	Chatterjee US2011/0018356 ("Chatterjee")
EX1004	Corbridge US2010/083012 ("Corbridge")
EX1005	Phinney CV
EX1006	FH 15095070
EX1007	FH 13964310
EX1008	WPT SysDescrWPT-Vol 1, Part 1, 1.0.3
EX1009	IPR2020-01141, Paper 12, Institution Decision
EX1010	Docket Control Order, 23cv00054
EX1011	IPR2020-01141, Paper 12
EX1012	IPR2019-01393, Paper 24, Institution Decision
EX1013	IPR2020-00505, Paper 11
EX2002	U.S. Patent No. 9,343,929 (the "'929 Patent")

8. In addition, I have reviewed the *Decision Granting Institution of Inter Partes Review 35 U.S.C. § 314* issued by the Board on March 14, 2024.

9. In addition to the Exhibits listed above, EX10001 - 14 and Exhibit EX2002, I also rely on the following new Exhibits submitted with this Declaration:

Exhibit	Description
EX2004	Provisional Application No. 61/682,312 (the "'312 Provisional")

Exhibit	Description
EX2005	Redline comparison of '312 Provisional to '929 Patent
EX2006	Redline comparison of '310 Application to '339 Patent

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

V. UNDERSTANDING OF THE LAW

A. Legal Standards

11. I am not an attorney. However, I understand and have been informed of several legal principles, which I have employed in forming my opinions in this declaration. In addition, I am familiar with these legal principles as a result of my experience as an expert in other matters involving infringement/non-infringement and/or validity/invalidity.

12. I understand and have been informed that each patent claim is considered separately for purposes of patentability. I also understand and have been informed that a dependent claim that depends from another claim includes all of the limitations of the claim from which it depends.

1. Claim Construction

13. I understand and have been informed that the claims of the challenged patent in this proceeding are to be construed using the same claim construction standard that would be applied in a district court.

14. I understand and have been informed that claim construction is a matter of law for the arbiter of law to decide. Claim terms should be given their ordinary and customary meaning within the context of the patent in which the terms are used, *i.e.*, the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention in light of what the patent teaches.

15. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood that disputed claim language to mean. Such sources include the words of the claims themselves, the structure of the claim itself, the remainder of the patent's specification, including the drawings, the prosecution history of the patent (all considered "intrinsic" evidence), and "extrinsic" evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art. I have been further informed that the meaning of a claim term may also be guided by "extrinsic evidence," such as

contemporaneous dictionaries and treatises, as well as the testimony of technically skilled witnesses such as myself.

16. I understand that words or terms should be given their ordinary and customary meaning. The specification must be consulted to determine whether the patentee has acted as his-or-her own lexicographer (*i.e.*, provided its own special meaning to any disputed terms). In addition, I understand that the specification and prosecution history must be consulted to determine whether the inventor(s) intentionally disclaimed, disavowed, or surrendered any claim scope.

2. Burden of Proof

17. I understand and have been informed that the petitioner in an *inter partes* review bears the burden of establishing unpatentability by “a preponderance of the evidence.” I have been further informed and understand that, to prove an assertion by “a preponderance of the evidence,” the party with the burden of proof must demonstrate that it is more likely than not that the assertion is true.

3. Anticipation

18. I understand and have been informed that a patent claim is unpatentable if it is “anticipated” by prior art. I understand and have been informed that a reference anticipates a claim if the reference discloses each limitation of the claim at issue.

4. Obviousness

19. I understand and have been informed that a patent claim is unpatentable if it would have been obvious to a person of ordinary skill in the art (“POSITA”) at the time of the claimed invention. I have been further informed that a claimed invention is not patentable if differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the pertinent art. I understand and have been informed that factors relevant to the determination of obviousness include the scope and content of the prior art, the level of ordinary skill in the art at the time of the invention, differences between the claimed invention and the prior art, and “secondary considerations” or objective indicia of non-obviousness.

20. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. When two references are combined, a rationale for combining the references must be given. I also understand that a claim can be obvious in light of a single reference, without the need to combine references - if the elements of the claim that are not found explicitly or inherently in the single reference, where the missing limitation(s) can be supplied by the knowledge of one skilled in the art; this includes the common sense of one of skill in the art. I also understand that “hindsight reconstruction” cannot be used to

combine references together to reach a conclusion of obviousness. Where only a single reference is combined with the “common sense” knowledge of one skilled in the art, a reasoned analysis and evidentiary support is required – as opposed to a bare assertion.

21. I understand and have been informed that a patent claim composed of several limitations is not obvious merely because each limitation was independently known in the prior art; hindsight reasoning is not an appropriate basis for combining references to form an obviousness combination.

22. I understand and have been instructed that the Supreme Court addressed the obviousness standard in *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), in which the Court elaborated upon the framework for analyzing obviousness that it had set forth in previous cases. I understand that in *KSR*, the Supreme Court rejected the Federal Circuit’s rigid application of the teaching, suggestion, or motivation (“TSM”) test for obviousness – that is, 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 so as to arrive at the claimed invention. Nevertheless, TSM remains as a suitable rationale to support a conclusion of obviousness.

23. I understand and have been instructed that *KSR* recognized that, in addition to the TSM test, other rationales may be used to justify the conclusion of obviousness - including at least the following:

- (a) combining prior art elements according to known methods to yield predictable results (*KSR* at 1731);
- (b) simple substitution of one known element for another to obtain predictable results (*KSR* at 1731);
- (c) use of known techniques to improve similar devices (methods, or products) in the same way (*KSR* at 1731);
- (d) “obvious to try” in the narrow circumstances “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions” (*KSR* at 1742);
- (e) 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 would have been predictable to one of ordinary skill in the art (*KSR* at 1461); and
- (f) recourse to “common sense,” provided that where there is an identifiable “reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does” (*KSR* at 1741). The bare assertion of “common sense” to modify a single reference is not enough. The Federal Circuit requires more than the bare assertion. *See, e.g., DSS Technology Management, Inc. v. Apple*, 885 F.3d 1367, 1374 (Fed. Cir. 2018).

B. Priority Date

24. I understand and have been informed that a U.S. patent may claim “priority” to the filing date of one or more earlier filed applications. I understand and have been informed that the priority date, also called the “effective filing date,” is the earliest filing date to which a claim is entitled – and that this date is relevant for determining what qualifies as prior art. I understand that a claim must have written description support in the application(s) to which it claims priority to be entitled to an earlier effective filing date. I understand and have been informed that the priority date determination is done on a claim-by-claim basis, and that claims in the same patent may have different priority dates. I understand that the "written description" requirement is met when the specification of an application describes the invention and manner of process of making and using it, in such full, clear, concise, and exact terms to enable an ordinarily skilled artisan to practice the invention as set forth in the claim under consideration. In other words, the earlier specification must show that the inventor possessed the invention stated in the later-filed claims.

C. Level of Skill in the Art

25. I understand and have been informed that the level of ordinary skill in the relevant art at the time of the invention is relevant to inquiries such as the

meaning of claim terms, the meaning of disclosures found in the prior art, and the reasons one of ordinary skill in the art may have for combining references.

26. I understand and have been informed that factors that may be considered in determining the level of ordinary skill include: (1) the type of problems encountered in the art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) education level of active workers in the relevant field. I have been further informed that a POSITA is also a person of ordinary creativity.

VI. THE CHALLENGED PATENT

27. U.S. Patent No. 10,038,339 (“the ’339 Patent” or “the challenged patent”) is entitled “Dual Mode Wireless Power.” The ’339 Patent was filed on April 10, 2016, as a continuation-in- part of application No. 13/964,310, which was filed on August 12, 2013 (which was eventually issued as U.S. Patent No. 9,343,929 (“the ’929 Patent”)). *See* Exhibit 2002.

28. It is my understanding that the ’339 Patent claims priority to the date of the filing of the Provisional Patent Application No. 60/682,312 filed August 13, 2012. ’339 Patent, Col. 1, ll. 7-10. Submitted herewith as Exhibit 2004 is a copy of Provisional Patent Application 61/682,312 as downloaded from the uspto.gov patent center (<https://patentcenter.uspto.gov/applications/61682312/ifw/docs?application=>).

29. As noted by the Petitioner in the Petition (at p. 7, n. 1), the references relied upon by Petitioner predate August 13, 2012, the date Provisional Application No. 60/682,312 was filed.

A. Level of Skill in the Art

30. The challenged patent pertains generally to the field of wireless power transfer, and more particularly to the circuitry used to drive and control such wireless power transfer. A person of ordinary skill in the art in the technology field of the '339 Patent at the time of the alleged invention would have had a bachelor's degree in electrical engineering or a similar discipline, along with at least two years of circuit design experience. A Master's or Ph.D. degree in a relevant field may substitute for some work experience and vice versa. I was at the time of the alleged invention at least a POSITA in the art relevant to the challenged patent. Further, based on my experience, I understand and know of the capabilities of a POSITA in August 2012, and I am familiar with how a POSITA would have understood and used the terminology found in the challenged patent at the time of its earliest priority date, August 2012, and with the state of the art at that time.

31. I have reviewed the Declaration of Petitioner's Expert Dr. Phinney (Ex. 1002) – and while he has provided a definition of a POSITA that is slightly different from what I have stated above, for the purpose of this Declaration, I will use Dr. Phinney's definition as provided in Paragraph 65 (Ex. 1002) of his

Declaration. At the time of the inventions of the '339 Patent, August 2012, I was at least a POSITA, as defined by Dr. Phinney.

B. The Claims That are the Subject of the Petition

32. In reviewing both the Petition and Declaration of Petition's Expert Dr. Phinney (Ex. 1002), I understand that the Petitioner seeks *inter partes* review of six claims of the '339 Patent - Claims 1, 2, 3, 5, 7, and 9. Of these claims, Claims 2, 3, 4, 7, and 9 are dependent claims that depend from Claim 1. I have been instructed that if Claim 1 is valid, then there is no need to consider Claims 2, 3, 4, 7, and 9 since dependent claims are more narrow than the claim from which they depend. Therefore, my analysis will focus primarily on Claim 1 with only limited observations on the dependent claims; however, in future declarations, reports, and testimony in this proceeding and in any other relate proceedings, I reserve the right to provide further and more-detailed analysis of any asserted claims (either independent or dependent).

C. File History

33. The application which led eventually to the issuance of the '339 Patent was filed with the USPTO on April 10, 2016; the application was published on April 6, 2017 as US2017/0098957. As correctly noted in the Petition, both the '399 Patent and its parent (the '929 Patent) were allowed in the first office action.

D. Effective Filing Date of Claims 1, 2, and 3

34. I have been asked to opine on the effective filing dates for Claims 1, 2, and 3. As I stated above, it is my understanding that a claim, when issued from a continuation in part application, is entitled to claim as its effective filing date the earliest filing date of the application(s) in its chain. Here, the earliest application to which the '339 Patent claims priority is U.S. Provisional Application No. 61/682,312 (the "312 Provisional") filed on August 13, 2012. *See* '339 Patent, p. 2. The '929 Patent also claimed priority to the '312 Provisional. '929 Patent, Col. 1, ll. 6 - 8.

35. To evaluate whether the '312 Provisional contains sufficient written description for Claims 1, 2, and 3, I first reviewed the '312 Provisional, and compared it to the '339 Patent. Since patents are presumed to be valid, presumably Claims 1, 2, and 3 are supported by the written description found in the '339 Patent. I also wanted to understand what material was added to the disclosure of the '312 Provisional to arrive at the application for the '339 Patent.

36. I first compared the drawings of the '312 Provisional to the drawings of the '339 Patent. Figures 1 - 2A are materially the same. *See also* '929 Patent, Figures 1-2A. Figure 2B purports to show the Dual Mode Wireless Power Receiver (DMWPR) in "Charging Mode.," that is, in the receiving power mode. Figure 2B of the '312 Provisional is slightly different as to Figure 2B in the '929

and '339 Patents. First and last "step" represented by a box are the same. The text of the middle two boxes is slightly different, but not in what I would consider a material way. I note that "adjusts impedance" appears in all versions of Figure 2B, and that this is shown as being done in the charging mode.

37. Figure 3 is identical in all of the '312 Provisional, the '929 Patent, and the '339 Patent. Figure 4A in the '312 Provisional is slightly different in the third "box" from Figure 4A in the '929 Patent and '339 Patent. The former states "maintains power on seeing Rx, the latter states "maintains power on receiving messages with valid Rx type." Figures 4B-D in the '312 Provisional are different from the corresponding Figure in the '929 and '939 Patents in the same way as Figure 4A. Figures 5A - 5B are substantially the same, with the '929 and '339 Patents having the additional language "FROM THE PMIC ... " next to VBat. Figures 6A, 6B, 7A, and 7B all purport to show a "switch network." '312 Provisional, ¶¶ [0018-21]; '339 Patent, Col. 7, ll. Ll. 4 – 15. The slight variations between these drawings of a switch network are immaterial changes.

38. In addition to comparing the drawings, I also compared the specification of Application No. 113/964,310, which issued as the '929 Patent to the '312 Provisional. A redlined comparison is submitted herewith as Exhibit 2005.

39. I also compared the '310 Application to Application No. 15/095,070, which issued as the '339 Patent. As shown in Exhibit 2006, the '070 Application contains new material that was added to the '310 Application. As to the drawings, Figures 8 through 10H were added. While some lesser changes were made before, all of the material after Col. 17, l. 30 was added. Other changes are shown in the redline of Exhibit 2006.

40. In the following chart, the support for each of the limitations in Claims 1 and 2 as found in the '312 Application is shown:

Ref. No.	Claim 1	'312, Claim 1	'312 Spec
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	A dual mode wireless charging receiver configured to selectively apply a received power to a load device and utilize at least a part of said power to power-up, communicate, and charge a secondary wireless power receiver, said dual mode wireless charging receiver comprising:	[0002] ("The actions and transactions are, for example...").

	mode wireless power receiver comprising:		
1.a	one of coil and capacitor electrodes;		Figs. 1, 2A, 5A, 5B (element 106); p. 8, ¶ [0023] ("The coil ... is used to wirelessly transmit ... power to the secondary wireless power receiver 300 via a magnetic field..."); pp. 10 - 11 ¶ [0027] ("receiver coil 106"); p. 12, ¶ [0030].
1.b	a first circuitry comprising: [i] an impedance network;	a first circuitry comprising: an impedance network;	Abstract; p. 2, ¶ [0004]; p. 4, ¶ [0007]; p. 8, ¶ [0023].
1.b	a switch network;	a switch network;	Abstract; p. 2, ¶ [0004]; p. 4, ¶ [0007]; p. 8, ¶ [0023]; p. 11, ¶ [0029]; p. 12, ¶ [0030]; p. 13, ¶ [0033]; p. 14, ¶ [0036]; p. 16, ¶ [0039], p. 18, ¶ [0041]; p. 19, ¶¶ [0043 - 46]; p. 20, ¶ [0047].
1.b	a filter capacitor;	a filter capacitor; and one or more switches;	Abstract; p. 2, ¶ [0004]; p. 4, ¶ [0007]; p. 8, ¶ [0023];
1.c	a second circuitry comprising:	a second circuitry comprising: ["a security engine" omitted]	Abstract ("control logic circuit"); p. 2, ¶ [0004]; p. 4, ¶ [0007]; p. 9, ¶ [0024] and [0025]; p. 11, ¶ [0029]; p. 14, ¶

	a control logic circuit; and	a control logic circuit; and	[0036]; p. 16, ¶ [0039]; p. 18, ¶ [0041].
1.d	said first circuitry configured to receive said power from a wireless power transmitter;	said first circuitry configured to receive said power from a wireless power transmitter;	p. 2, ¶ [0004] ("In the charging mode, dual mode wireless charging receiver configures the first circuitry to receive the power..."); p. 4, ¶ [0007].
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;	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;	p. 2, ¶ [0004] ("change the impedance of the impedance network ... to obtain a modified form of the received power"); p. 4, ¶ [0007]; p. 13, ¶ [0032].
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 first circuitry, based on an input from said control logic circuit, configured to change said topology of said switch network and	p. 2, ¶ [0004] ("to change the topology ... to transmit at least part of modified power to secondary wireless power receiver to power-up the secondary

	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 impedance of said impedance network to transmit at least part of said modified power to said secondary wireless power receiver to power-up said secondary wireless power receiver;	wireless power receiver"); p. 5, ¶ [0007]
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;	said second circuitry configured to identify a type of said secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver;	pp. 2 - 3, ¶ [0004]. pp. 4 - 5, ¶ [0007], pp. 12 - 13, ¶ [0032], pp. 14 - 15, ¶ [0036]; pp. 16 - 17, ¶ [0039]; pp. 17 - 18, ¶ [0041]; p. 13, ¶ [0032]; p. 14, ¶ [0036]; p. 16, ¶ [0039]; p. 18, ¶ [0041].
1.h	said second circuitry, configured to receive and interpret data from said secondary wireless power receiver in said identified wireless power protocol;	said second circuitry, on power-up of said secondary wireless power receiver, configured to perform one of: receiving and interpreting said data from said secondary wireless power receiver in said identified	Abstract; pp. 3 - 4, ¶ [0005], pp. 5 - 6, ¶ [0008]; p. 8, ¶ [0023]; p. 10, ¶ [0026]; pp. 13 - 14, ¶ [0034]; pp. 16 - 17, ¶ [0039]

		wireless power protocol; ["providing authentication information..." and "initiating exchange of said authentication information..." omitted].	
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.	receiving and interpreting a request from said secondary wireless power receiver and performing a function associated with said transmitted power in conjunction with said first circuitry.	pp. 17 - 18, ¶ [0041] (re. "functions").
2	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.	2. The dual mode wireless charging receiver of claim 1, wherein said first circuitry is configured as one of an inverter and a rectifier.	p. 3, ¶ [0004]; p. 8, ¶ [0023]; p. 11, ¶ [0029]; p. 19, ¶ [0042]; p. 19, ¶¶ [0045 - 45]

41. As I reviewed the '312 Provisional Application including the portions cited above, I found that '312 Provisional describes the inventions Claims 1 and 2 and manner of making and using it in such full, clear, concise, and exact terms to

enable an ordinarily skilled artisan to practice the invention, and that the inventors possessed the inventions of these Claims as of the time of filing the '312 Provisional.

42. In contrast, I did not find any support for Claim 3 in either the '312 Provisional or the '310 Application. Claim 3 is as follows:

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

'339 Patent, Col. 27, ll. 47 – 51.

43. The only support for the phrase "a priori with fixed values" and "tuned" in reference to elements of the impedance network are as follows: '339 Patent, Col. 22, ll. 11 - 12; l. 55; Col. 24, ll. 7 - 8; Col. 24, l. 46; Col. 25, l. 18; l.

55. All of these references are found in the material that was added to the disclosure found in the '312 Provisional and the '310 Application.

44. In conclusion, based on my analysis described above, it is my opinion that the effective filing date for Claims 1 and 2 is August 13, 2012. Further, it is my opinion that the effective filing date for Claim 3 is April 10, 2016.

VII. BACKGROUND OF THE ART

45. Before considering the '339 Patent in detail, some background on the technology of the '339 Patent should be considered; this involves both the basic

notions and physics of wireless power transfer, and the various structures and circuit elements that are used to practically perform wireless power transfer.

46. In my background explanation of the technical issues associated with the '339 Patent and the Petition, I will assume that a person of ordinary skill in the art (POSITA) would have been familiar with the relevant aspects of electricity, magnetism, capacitors, inductors, magnets, electrical and magnetic forces, the basic behavior of capacitors, inductors, transformers, current-carrying coils, and so forth. Here, I will touch on those topics, but not delve into a detailed discussion of those topics. I reserve the right to provide further explanations to the Board should that become necessary or desirable.

47. Further, I will assume (and assert) that a POSITA would have been familiar with the details of both transformers and magnetic permeability as well as the details of electric fields in capacitors. However, for these topics, I will provide some background explanations since it is the details of these topics in particular that illuminate the technology underlying the '339 Patent.

A. Ad Hoc Wireless Power Transfer

48. The '339 Patent involves wireless power transfer; in more detail, this involves two different methods of carrying out such wireless power transfer. One method involves the transfer of power via the formation of an *ad hoc* transformer by placing two coils in close proximity to each other, while the other method

involves the transfer of power via formation of an *ad hoc* capacitor by placing two metal plates in close proximity to each other; each of these methods will be considered separately here.

B. Power Transfer Between Two Coils Using a Magnetic Field

49. As noted above, one method of wireless power transfer described in the '339 Patent involves the transfer of that power by placing two coils in close proximity to each other so as to form an *ad hoc* transformer.

50. A transformer is a basic device that is well-known to those of skill in the relevant arts. The operating principles of a transformer are based on the law of induction elucidated by Michael Faraday — a law that was incorporated into the larger framework of what are known as Maxwell's equations describing electromagnetism, as published in the paper "A Dynamical Theory of the Electromagnetic Field" by James Clerk Maxwell in 1865.

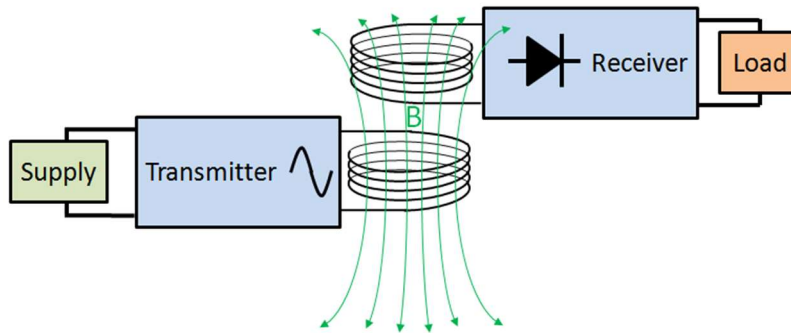
51. A basic transformer consists of two coils of wire that are in close proximity to each other; they may or may not be in direct physical contact, but they are not electrically connected in such a way that current can flow between them by conduction. When the transformer is operated under proper conditions, an electric current is applied to one coil as an energy input; that energy is transferred (via a magnetic field) to the second coil across the gap between them, with direct electrical contact being unnecessary for this energy transfer. The name

“transformer” is based on the ability of the device to be constructed so as to convert (i.e., transform) an input voltage into a different output voltage (or, of course, the same output voltage); this particular property will be explained in more detail below but it is worth mentioning here that transformers are very important in the structure and operation of power grids, as transformers are used to “step down” or “step up” voltages so that, for example, the high voltage produced at a generating station can be “stepped down” for (e.g.) power supply to a household electrical system.

52. A transformer can be thought of as being an energy-transfer device where energy input into one side of the basic circuit is transferred to the other (output) side. The input side is referred to as the “primary” side and the output side is referred to as the “secondary” side. Based on the design of the transformer (e.g., number of turns in each coil), a voltage applied to the primary side can be transformed into a different voltage at the secondary side, hence the name transformer.

53. When an alternating current (AC) is applied to the primary coil, a corresponding AC (i.e., time varying) magnetic field will be created by the primary coil. If a second coil is within proximity of the first coil, and the magnetic fields of the AC field travel go through the second inductor, by Faraday’s law of induction

an electromotive force will be induced onto the second coil. If a load is connected across the second coil, current will flow through it (*see image below*).¹



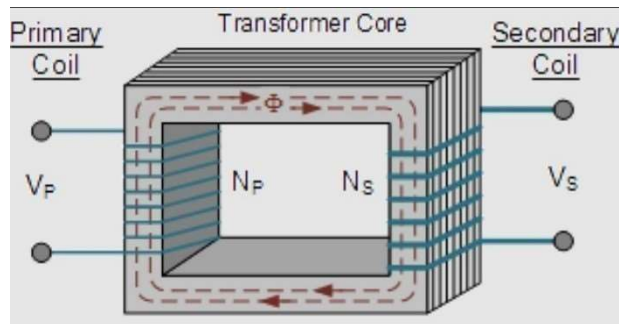
Thus, the current in the primary coil induces a corresponding current in the secondary coil (if a load is present) — and a corresponding voltage on the secondary side of the transformer. In this basic form, energy will be transferred from the primary (i.e., transmitter) side of the transformer to the secondary (i.e., receiver) side.

54. For completeness, it should be noted that the magnetic field of the primary coil will spread widely in space; as a result, only a small amount of that magnetic field will actually be present inside the secondary coil which causes the

1

https://www.richtek.com/en/Design%20Support/Technical%20Document/~/_media/Richtek/Design%20Support/Technical%20Documentation/AN036/EN/Version11/image002.png?file=preview.png

transfer of power to be inefficient. To ameliorate this problem, many transformers include what is known as a “magnetic core” or “transformer core.”²



The magnetic core is generally formed using what is known as a “ferromagnetic material” which has the effect of holding the magnetic field lines inside itself. In this way, the magnetic field lines of the primary coil are channeled almost completely through the secondary coil, thereby greatly improving the efficiency of the transfer of power. Nearly all transformers (whether fixed or *ad hoc*) use a magnetic core for this reason.

55. Returning to the figures of the transformers above, there are a number of turns in the coils on both the primary side and the secondary side. From basic theory, it can be shown that for an ideal transformer the input primary-side voltage will differ from the output secondary-side voltage if the number of turns in the two coils differ from each other. The relationship between the voltages and the number of turns in the coils is given by:

² <https://www.electronics-tutorials.ws/wp-content/uploads/2018/05/transformer-trans1.gif>

$$\frac{V_s}{V_p} = \frac{N_s}{N_p},$$

where N_s and N_p are the number of turns in the respective coils, V_p is the primary voltage, and V_s is the secondary voltage. If the number of turns on the secondary side is larger than the number of turns on the primary side, then the secondary voltage (V_s) will be larger than the primary voltage (V_p). If, on the other hand, the number of turns on the secondary side is smaller than the number of turns on the primary side, then the secondary voltage (V_s) will be smaller than the primary voltage (V_p). Of course, if the number of turns on the secondary side is the same as the number of turns on the primary side, then the secondary voltage (V_s) will be the same as the primary voltage (V_p); in this particular configuration, power is transferred across the transformer, but the “input” voltage and the “output” voltage are the same (i.e., the transformer transfers power, but does not change the voltage).

56. Further, it can be shown that the current in these situations will be induced in the opposite fashion:

$$\frac{I_s}{I_p} = \frac{N_p}{N_s},$$

57. A transformer is an energy-transfer device which serves to transfer energy from the primary side to the secondary side. It is well-known from the second law of thermodynamics that all energy transfers are inefficient — that is,

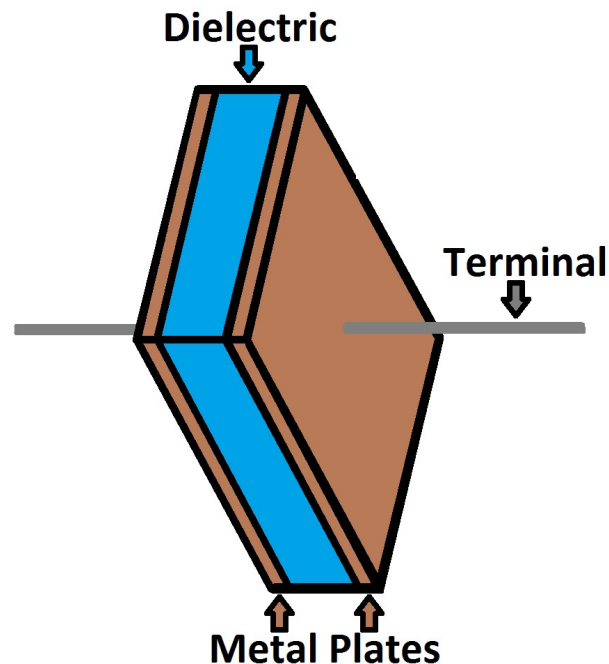
the output energy can at theoretical-best be equal to (but not exceed) the input energy; however, in practice, the output energy is always to some degree less than the input energy. Thus, in practice, the efficiency of power transfer in a transformer is a very important metric for any transformer. As noted earlier, a magnetic core is frequently used in a transformer for the purpose of improving the efficiency of power transfer. In addition, the optimal alignment of the coils (with respect to each other) is a critical issue in transformers – and is obviously even more important to the efficiency of *ad hoc* transformers used for wireless power transfer, as *in situ* positioning of the two coils with respect to each other is the defining event for the creation of that *ad hoc* transformer – and is thus crucial to its efficiency.

C. Power Transfer Between Two Capacitors Using an Electric Field

58. As noted above, a second method of wireless power transfer described in the '339 Patent involves the transfer of that power by placing metal plates in close proximity to each other so as to form an *ad hoc* capacitor.

59. A capacitor is a simple electronic device; it consists of two metal plates that are placed in close proximity to each other, but which are not in contact.

The gap between the two metal plates can simply be air, or it can be filled with an insulating material that is known as a dielectric or dielectric material.^{3,4}

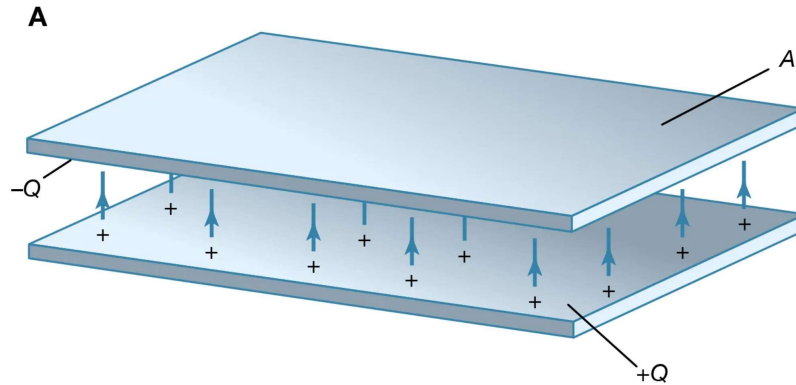


60. A capacitor operates by charge (either negative or positive) being forced onto one plate of the capacitor; this causes an “image charge,” of the same concentration but opposite polarity, to appear on the other plate of the capacitor.⁵

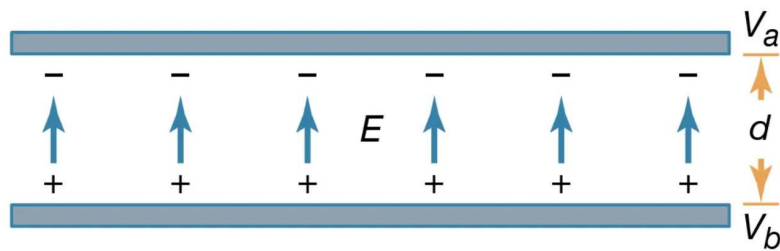
³ <https://cdn.sparkfun.com/assets/a/f/3/b/2/51969be3ce395f662c000000.png> .

⁴ For completeness, air behaves as a dielectric material in this situation – but solid materials other than air are more-commonly given the name “dielectric material.”

⁵ <https://cdn.britannica.com/35/235-050-1AC9B4FA/capacitor-conducting-plates-each-area-part-B.jpg> .



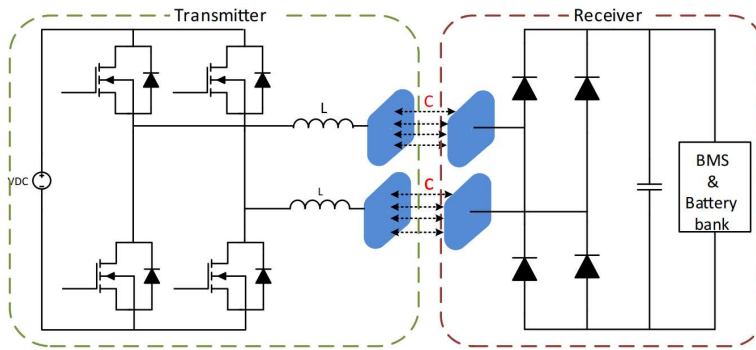
These opposing-charge concentrations on the opposing plates cause an electric field to form in the region between the plates.⁶



61. If an AC signal is applied to the capacitor, that AC signal will be able to traverse the capacitor – so that the AC signal will cross the capacitor from one side to the other; this process can also be described as amounting to energy being transferred from the “transmitting” side of the capacitor to the “receiving” side of the capacitor.

⁶ <https://cdn.britannica.com/35/235-050-1AC9B4FA/capacitor-conducting-plates-each-area-part-B.jpg> .

62. As noted above, wireless power transfer can be implemented by placing two metal plates in close proximity to each other – to create an *ad hoc* capacitor. An example of such a wireless power transfer circuit is provided here⁷:



The metal plate(s) of the “transmitter” are placed in close proximity to the metal plate(s) of the “receiver” to form a capacitor (or multiple capacitors). As described above, when an AC signal is applied to the plate(s) of the transmitter, the energy in that AC signal will traverse the capacitor and be received by the “receiver.” In this way, power is transferred wirelessly from the transmitter to the receiver.

63. As with the formation of an *ad hoc* (coil-based) transformer discussed above, the efficiency of power transfer using capacitors is also a strong function of the positioning of the two metal plates of that *ad hoc* capacitor with optimal positioning being strongly desired for the operating state of the *ad hoc* capacitor.

⁷ Taken (Figure 2) as exemplary from C. Panchal, S. Stegen, and J. Lu, “Review of Static and Dynamic Wireless Electric Vehicle Charging System,” *Engineering Science and Technology, an International Journal* vol. 21, pp. 922 – 937 (2018).

D. Brief History of Wireless Power Transfer Standards

64. Dr. Phinney attempts to give the impression that at the time of the '339 Patent (2012), wireless power transfer technology was a mature and well-developed technology. Ex. 1002, ¶¶ 22-42. However, this was not the case. As I will explain below, in 2012 various companies were developing numerous wireless power transfer technologies, and various standards committees had been set up for the purposes described earlier; at that time, no clear winner (or winners) had yet emerged from among the possible candidates in either technology or standards. While today the WPC's standards (including the "Qi" standard) are by far the dominant set of standards in the space, as of August 2012 this was not the case.

65. Around the period 2007 - 2010, serious interest developed in finding ways of deploying wireless power transfer for the charging of various electronic devices. This offered the promise of being able to dispense with charging cables for the charging of various electronic devices. Various candidate technologies were under development, and several standards organizations emerged in order to attempt to formulate standards so that there could (and would) be interoperability between-and-among the products of the member companies.

66. In 2008, the Wireless Power Consortium (WPC) was formed as an industry group that was comprised of many of the largest electronics-product manufacturers and many of their suppliers; as examples of both of these categories,

Logitech and Texas Instruments were founding members of the WPC. As described just above, the primary goal of the WPC was the formulation of standards that would be available for use by at least the WPC member companies.

67. However, the WPC was not the only industry consortium that was formed for this purpose. There were other groups formed which proceeded to work toward similar goals with respect to wireless charging of electronic devices. In addition, many companies were developing their own wireless power transfer technology – with that technology, at least for the time being, being kept as a proprietary technology of the developer.⁸

68. By 2012, there were at least three other industry consortia in existence and formed for the same purposes (as detailed above) for which the WPC was formed.⁹

69. One such consortium was the “Power Matters Alliance” (PMA).¹⁰ This consortium was founded by Powermat Technologies – which had been

⁸ Oftentimes, a technology will remain proprietary - but be “standardized” to the degree necessary for its use by partners and customers; and, of course, sometimes a proprietary technology is transferred into a more-formalized “standards committee” setting – even if the technology in fact remains proprietary to the originator or the associated standards committee.

⁹ Not surprisingly, many companies were members of more than one such consortium.

¹⁰ https://en.wikipedia.org/wiki/Power_Matters_Alliance

founded in 2006. The PMA consortium was co-founded in 2012 by Powermat and the consumer-products giant Proctor & Gamble. In 2015, PMA merged with another consortium, the Alliance for Wireless Power (A4WP – see below) to form the AirFuel Alliance. <https://airfuel.org/about/>. Powermat Technologies Ltd. appears to be the company is referenced in the Paragraph [0001] of the '312 Application. *See* Ex. 2004 ("PowerMat Ltd.").

70. Another such consortium was the aforementioned Alliance for Wireless Power (A4WP). This consortium was founded in 2010 at the instigation of Qualcomm, when Qualcomm acquired WiPower, which was a spinoff from the University of Florida that had been founded in 2004. As noted above, in 2015 the A4WP consortium merged with the PMA consortium to form the AirFuel Alliance.

71. A third such consortium was the Wireless Charging Technology consortium, which was initiated by Intel as a result of Intel's development of a particular wireless charging technology.¹¹

72. In addition, in 2012, at least two companies were developing their own wireless power transfer technology.

¹¹ https://www.legitreviews.com/idf-2012-intel-wireless-charging-technology-wct_2034

73. One example was WiTricity, which was an MIT spinoff that was founded in 2007. WiTricity’s focus was (and still is) on wireless charging of electric vehicles (EVs.). <https://witricity.com/>

74. Another example was PowerbyProxi, which was founded in 2007, and was a spinoff from the University of Auckland (New Zealand). PowerbyProxi was a member of WPC, but was also developing its own technology for the wireless charging of “larger” devices – that is, “larger” than *e.g.*, a mobile phone or a laptop, but smaller than an EV. PowerbyProxi was acquired by Apple in 2017. <https://www.reuters.com/article/idUSKBN1CU18N/>.

75. Thus, in 2012, wireless power transfer was emerging with many companies developing technology, and many industry consortia in existence for the purpose of creating standards that would allow product interoperability among the products of the member companies. The ’339 Patent must be reviewed against this background.

VIII. OVERVIEW OF GROUND 1 AND ITS REFERENCES

76. The Petitioner provided a single asserted ground of unpatentability—based on two prior art references in combination with some ill-defined knowledge of a POSITA. Ex 1002, ¶ 91. Dr. Phinney asserts that a “POSA would have found [the Claims] to be obvious over Chatterjee in view of Corbridge in further view of the knowledge of a POSA.” Ex. 1002, A brief overview of each of the Chatterjee

and Corbridge references will be provided here. As I will point out with respect to several limitations discussed below, Dr. Phinney does not explain what “knowledge of a POSA” he relies upon aside from bare assertions.

A. Chatterjee

77. The Chatterjee reference (“Chatterjee”) is U.S. Published Application No. 2011/0018356, titled “Power Bridge Circuit for Bi-Directional Wireless Power Transmission.” The publication date is listed as January 27, 2011; this publication date makes Chatterjee prior art to the ’339 Patent.

B. Corbridge

78. The Corbridge reference (“Corbridge”) is U.S. Published Application No. 2010/0083012 titled “Inductive Signal Transfer System for Computing Devices.” The publication date is April 1, 2010. This publication date makes Corbridge prior art to the ’339 Patent.

IX. CLAIM CONSTRUCTION IS REQUIRED FOR SEVERAL CLAIM TERMS

79. It is my conclusion and opinion that at least the claim terms “impedance network” and “switch network” of Claim 1 of the ’339 Patent require construction because standing alone they do not have a “plain and ordinary meaning” (*i.e.*, “ordinary and customary” meaning) standing in isolation apart from the specification. I will explain my specific reasonings below, along with proposed constructions (and support for those proposed constructions).

80. As I explained briefly above and will explain in more detail below, at least the claim terms “impedance network” and “switch network” of Claim 1 of the ’339 Patent are simply not well-known in the art.

A. Term 1 - Impedance Network

81. This claim term contains two words, “impedance” and “network.” The word “impedance” has a well-known meaning in the art. The word “network” means many things in different contexts. It is to the electrical arts what the word “assembly” is to the mechanical arts, simply, two or more components connected together to accomplish some useful purpose. However, adding “impedance” in front of “network” does not provide any useful information beyond conveying that the two or more components have something to do with impedance, but that is true of all analog electrical components. The phrase “impedance network” does not conjure a well-known structure or class of structures in the mind of a POSITA. Rather, a POSITA trying to understand the scope of Claim 1 would turn to the intrinsic evidence to further understand the phrase.

1. Impedance

82. First, consider the well-known (in the art) term “impedance.”

83. “Impedance” has a general definition across a wide number of fields; in the most general sense,¹²

¹² <https://www.merriam-webster.com/dictionary/impedance> .

something that impedes: HINDRANCE.

As an example, this term is encountered in audio engineering:¹³

[T]he ratio of the pressure to the volume displacement at a given surface in a sound-transmitting medium.

84. The '339 Patent involves electronics and electrical circuits, the type of “impedance” at issue in the '339 Patent is sometimes referred to more narrowly as the *electrical* impedance; this is also a well-known term of the (electrical) art, which can be generically defined¹⁴ as:

[T]he apparent opposition in an electrical circuit to the flow of an alternating current that is analogous to the actual electrical resistance to a direct current and that is the ratio of effective electromotive force to the effective current.

85. From this definition, in electronics and electrical circuits, impedance is of importance in situations where AC signals (rather than DC voltages and currents) are being analyzed. At this level of detail, the impedance amounts to a combination of the resistance of some circuit element combined with the reaction that element has from an AC signal. This reaction effect is in fact known to a POSITA as *reactance*. The impedance of a circuit element is the combined effect of resistance and reactance at a particular AC frequency and is often represented

¹³ <https://www.merriam-webster.com/dictionary/impedance>.

¹⁴ <https://www.merriam-webster.com/dictionary/impedance>.

mathematically as a complex number. The real part of the complex number corresponds to resistance and the imaginary part corresponds to reactance:

$$Z = R + iX ,$$

where Z is the impedance, R is the resistance, and X is the reactance.

86. It is well-known that the terminal behavior of an electrical component can be described by an impedance.

87. The impedance of a resistor, for example, is described by the well-known Ohm's Law:

$$Z_R = R = \frac{V}{I}$$

where R is the resistance of the resistor, V is the voltage applied to the resistor, and I is the current through the resistor. In general, the resistive portion of an impedance represents the mechanism by which energy is lost from an electrical system.

88. As another example, the impedance of an inductor is given by:

$$Z_L = i\omega L ,$$

where ω is the (radial) frequency of the signal and L is the inductance of the inductor. The impedance of a capacitor is given by:

$$Z_C = \frac{1}{i\omega C} ,$$

where C is the capacitance of the capacitor. Generally, purely reactive components such as inductors and capacitors represent the portions of an electrical system that store energy rather than dissipate it.

89. Under suitable conditions, even components such as diodes, transistors and operational amplifiers can have a terminal behavior described by an impedance. However, such devices are known as “non-linear” devices and cannot generically be described by a single impedance. Impedance is most naturally associated with passive electronic components such as resistors, capacitors, inductors, etc., like those discussed in the examples above.

90. Regardless of the kind of electrical component that an impedance might be associated with, the term “impedance” is well-defined in the art. Generally, it is the sum of a resistance plus a reactance (times the imaginary number i) at a particular frequency.

2. The Power Transfer Element (Coil or Capacitor) is Not Part of the Impedance Network

91. As an initial matter, it is clear from the structure of Claim 1 itself that the power transfer element (either a coil or a capacitor) is *not* part of the impedance network. This is clearly illustrated, for example, in Figure 1 of the '339 Patent:

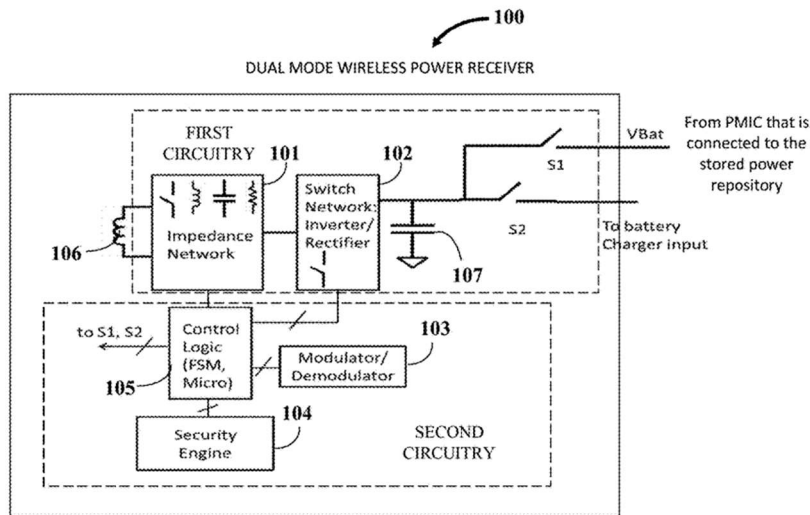


FIG. 1

See also Fig. 1, '312 Provisional.

92. The power transfer coil element 106 appears in several other of the Figures in the '312 Provisional as well as the '339 Patent and appears in the same way in relation to the impedance network 101. The specification of the '339 Patent consistently describes element 106 (18 times) as being the "receiver coil," which is clearly distinct from the "impedance network" 101. '339 Patent, Col. 10, ll. 26, 29; Col. 21, ll. 38, 61; Col. 22, ll. 8, 38, 52; Col. 23, ll. 13, 27, 57; Col. 24, ll. 4, 28, 43; Col. 25, ll. 1, 15, 38, 52; Col. 26, l. 5; See also Exhibit 2004, Figs. 1, 2A, 5A, 5B (element 106); p. 8, ¶ [0023] ("The coil ... is used to wirelessly transmit ... power to the secondary wireless power receiver 300 via a magnetic field..."); pp. 10 - 11 ¶ [0027] ("receiver coil 106"); p. 12, ¶ [0030].

93. Thus, the '312 Provisional and the '339 Patent make it abundantly clear that the power transfer element (such as the depicted coil) is *not* part of the impedance network described in the specification of the patent.

94. For completeness, it can also be seen from Figure 1 of the '312 Provisional and the '339 Patent that the switch network 102 is also separate from the power transfer element 106.

3. Impedance Network

95. While the term “impedance” is well-defined in the art, the term “network” is not well-defined – as examination of even a simple set of dictionary-provided definitions¹⁵ can attest. Thus, it is not surprising that the term “impedance network” is not well-defined in the art. Within the art of electrical engineering, there are multiple concepts of a “network.” For example, in circuit theory there is the concept of a network that is composed of interconnected components having impedance. Although it is not common terminology in the art, such a network could be regarded as an “impedance network.” However, another example of a network within the art, is a system having multiple interconnected terminals, each of which has an associate (and measurable) impedance. This is a well-known kind of network associated with RF (Radio Frequency) engineering.

¹⁵ See, e.g., <https://www.merriam-webster.com/dictionary/network> .

Such a network may not have any internal components having impedance, but the terminal of the network itself is defined by impedances and can thus potentially be regarded as an “impedance network.” The examples above are not meant to be limiting, as one skilled in the art could imagine other kinds of networks that could also be regarded as “impedance networks.” The term “impedance network” is ambiguous and, therefore, a POSITA would have to determine its meaning by reviewing the context in which it is used in the surrounding claims, drawings, and specification.

96. Despite the ambiguity of the term “impedance network,” the term “network” itself has meaning within the art of electrical engineering. With respect to the examples described above, a POSITA would understand that a “network” refers to multiple entities that are interconnected in some way. Whether, for example, those entities are two or more interconnected electrical components or two or more interconnected terminals. It would be clear to a POSITA that a single resistor or capacitor by themselves could not be regarded as a “network.”

97. In this case, a POSITA would construe the term “impedance network” by first examining the specification of the ’339 Patent.

98. With respect to the ’339 Patent, a POSITA would find that the patentee provided an explanation of the term “impedance network” in the specification:

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

'339 Patent, Col. 9, ll. 4-14 (emphasis added).

99. Turning to the '312 Provisional Application, a POSITA would find the following description of “impedance network,” which is identical to the passage set forth above from the '339 Patent:

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

Ex. 2004, '312 Provisional, ¶ [0024] (emphasis added); *see also* Ex. 2002, '929 Patent, Col. 6, l. 1 - Col. 7, l. 7.

100. As is clear from this section of the specification, the “impedance network” is composed of an interconnection of passive electronic components, active electronic components, and/or electronic switches. Furthermore, the

sentence – “[t]hese electronic components in combination are utilized to vary impedance of the dual model wireless power receiver” – makes clear that multiple components of the “impedance network,” one of which must be a passive component such as a capacitor, are used in combination to vary the impedance. From this section of the specification, a POSITA would understand that the “impedance network” is an entity consisting of two or more components, one or more of which must be passive components, and additional components used for the purpose of varying impedance.

101. As noted above, “network” refers to two or more connected components. Furthermore, the sentence – “these electronic components in combination are utilized to vary impedance of the dual model wireless power receiver” – uses the phrase “these components,” and furthermore, states that such components are utilized to vary impedance. Hence, a POSITA would understand that the phrase “one or more” modifies just the phrase that follows, “passive electronic components,” and NOT the entire string of nouns separated by semicolons – i.e., “active electronic components... ; electronic switches.” Taking the above description in total, a POSITA would understand that it would be absurd to construe “impedance network” as simply a single standalone passive component like a capacitor. Not only would a single component, like a capacitor, make little

sense in context with the word “network,” it would also have a fixed impedance, which violates the requirement that the impedance must be variable.

102. I also note the limitation (designated by the Board as [1.e] in its Decision, which limitation I will discuss in more detail below), “said first circuitry, based on an input from said control logic circuit, *configured to change impedance of said impedance network* and topology ... to obtain a modified form of said received power, and apply said modified form of said power to said load device.” Thus, from the structure of Claim 1, it is clear that the impedance network must be capable of being varied during at least the receiving power mode of operation.

103. The POSITA would also review the figures to understand “impedance network.” In doing so, the POSITA would be further informed by the illustration of "Impedance Network" shown in Figures 1; 3; 5A; 5B (of both the ‘312 Provisional and the ‘939 Patent). Therein, the "impedance network" is illustrated as:

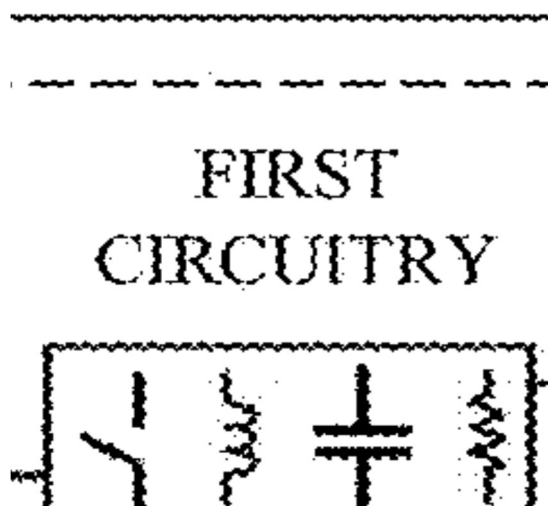


Fig. 1, element 101. Taking the four symbols shown in the box labelled "Impedance Network," from left to right, a POSITA would understand the illustrations therein to mean a switch, an inductor, a capacitor, and a resistor.

104. Further, dependent Claim 3 also supports a construction of "impedance network" to mean "two or more electrical components:

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

'339 Patent, Col. 27, ll. 47 – 51.

105. As stated in Claim 3, the impedance network must be comprised of "elements." The plural indicates two or more. The use of the verb "are" reflects the plural nature of "elements." "A priori" simply means "relating to or derived by reasoning from self-evident propositions."¹⁶ This word – a priori – modifies "chosen." The word "values," that is, the thing that must be chosen for the "elements," is plural. The phrase "and tuned during operation over a range of values" further restricts the collection of elements – they must be "tunable during operation." Thus, Claim 3 merely places an additional restriction on the impedance network, wherein the component parts of the "impedance network"

¹⁶ Merriam-webster.com/dictionary/a%20priori.

such as the passive devices that have values must be chosen “a priori,” and the devices must be “tunable during operation.”

106. The analysis contained in Dr. Phinney’s declaration highlights the fact that construction of Claim 3 is necessary. At Paragraph 180 of his Declaration, Dr. Phinney provides an analysis of Claim 3 of the ’339 Patent – via first reproducing (correctly) the main content of this claim:

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.

107. However, Dr. Phinney’s analysis (which begins at the aforementioned Paragraph 180) begins with the following statement:

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.*”

108. This is a somewhat remarkable statement as the claim clearly uses the word “and” (which means that *both* described features must be present). However, Dr. Phinney states that he was “asked to assume” that the disclosure can be met by *either one of these features being present*. This amounts to changing the “and” in the claim to “or” – which amounts to rewriting the claim, and then analyzing the rewritten claim (rather than analyzing the claim as written).

109. It is my understanding that this is improper as the claim must be analyzed as written and not rewritten to mean something else.

4. Construction

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

B. Term 2 - Limitation [1.e] –

111. Limitation [1.e] is as follows:

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

Ex. 1001, '339 Patent, Claim 1, ll. 20 - 25.

112. This limitation identically appeared in the original claim 1 found in the '312 Provisional:

said first circuitry, based on an input from said control logic circuit, configured to change impedance of said impedance network and topology of

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

Ex. 2004, '312 Provisional, Claim 1, p. 22 (top).

113. Claim 1 is written from a particular view point, which is that the "dual mode wireless power receiver" is first described as being configured to receive power (limitations [1.p] and [1.d]). The preamble states: "a dual mode wireless power receiver configured to selectively apply a received power... ." '339 Patent, Col. 27, ll. 1 - 2; '312 Provisional, p. 21, Claim 1, preamble. As explained in the '312 Provisional, in Figure 2B, the "switch network is configured as a rectifier by default." Ex. 2004, '312 Provisional, Fig. 2B (top left box). Therefore, limitation [1.e] must be read in the context of the preamble and limitation [1.d].

114. The limitation [1.d] that precedes limitation [1.e] is "said first circuitry configured to receive said power from a wireless power transmitter." In view of the fact that the dual mode wireless power receiver is claimed as being in the receiving a charge mode in limitation [1.d], limitation [1.e] should be interpreted as adding additional limitations related to dual mode wireless power receiver while in the charging mode.

115. The limitation that follows, [1.f], addresses changing the dual mode wireless power receiver from the receiving mode to the communicating/providing power mode to "secondary wireless power receiver."

116. The last three claim limitations [1.g] - [1.i], recite certain functions of the dual mode wireless power receiver once the receiver has been configured to communicate and transmit power mode to the secondary wireless power receiver.

117. In addition, limitation [1.f] concerns changing between the receiving power mode to the communication/transmitting power mode.

118. Read in the light of surrounding claim language, it would be clear to the POSITA that limitation [1.e] requires that the "impedance of the impedance network" be capable of changing while in the receiving power mode.

119. The specification further supports this understanding. For example, in the "Summary of the Invention" section of the '312 Provisional, the following description is found:

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

Ex. 2004, '312 Provisional, p. 2., [0004]; *see also* '339 Patent, Col. 2, ll. 39 - 50.

120. In addition, the specification states in connection with the description of "impedance network" that its impedance must be capable of being varied or adjusted. For example, "[t]hese electronic components in combination are utilized to vary impedance of the dual mode wireless power receiver 100 prior to transmitting

power to a secondary wireless power receiver 300.” Ex. 2004, '312 Provisional, [0024]. The specification further explains: “[t]he dual mode wireless charging receiver 100 powers up and adjusts the impedance network 101 of the first circuitry.” '312 Provisional, pp 11 - 12.

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

C. Term 3 - Switch Network

122. As I will detail below, while each of these terms “switch” and “network” alone were well-known in the art, the full term “switch network” was not well-known in the art.

1. Switch

123. “Switch” has a general definition across a wide number of fields; however, as the '339 Patent involves electronics and electrical circuits, the type of “switch” at issue in the '339 Patent is a well-known term of the (electrical) art, which can be generically defined¹⁷ as:

[A] device for making, breaking, or changing the connections in an electrical circuit.

¹⁷ <https://www.merriam-webster.com/dictionary/switch>

A POSITA would understand that the term “connections” in this definition can apply to electrical connections (e.g., those implemented with digital logic or even discrete components such as transistors) and/or mechanical connections (e.g., relays). The simple definition above is suitable for purposes here – regarding the use of “switch” in the ’339 Patent and the ’312 Provisional.

2. Switch Network

124. While the term “switch” is well-defined in the art, the term “network” is not (as I discussed in the section above construing “impedance network”). A standard definition is not available within the many disciplines of electronics and electrical engineering; therefore, the term is ambiguous. For example, a “switch network” could refer to a discrete set of interconnected switches. This kind of “switch network” could be used to implement logical functionality such as AND or OR gates, or perhaps higher-level functionality such as power inversion, rectification, or something in between. However, another common kind of network in the (electrical) art is a network used to switch packets of information from one place to another. Often packet switching is associated with a computer network whereby information in the form of packets is transferred between computers using hardware such as a network switch. Although it is not common to do so, such a network could be regarded as a “switch network.” Often packet switching is associated with an interconnected set of computers, but packets can

also be transferred from place to place within a single chip. To a POSITA a “switch network” could be a system for transferring packets of information within a single microchip. These examples are not meant to be limiting, because of the ambiguity of the term “switch network,” other examples could be imagined by a POSITA. The ambiguity shows that the term “switch network” must be construed in the context of the specification.

125. In the ‘312 Specification, the following statement appears in Paragraph [0004]:

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

Exhibit 2004, ¶ [0004]. Subsequent passages in the ‘312 Provisional make it clear that it is the switch network that is configured as either an inverter or rectifier depending upon the mode of operation. *E.g.*, Exhibit 2002, Exhibit 2004, ¶¶ [0023]; [0029]; [0044], [0045], [0046], [0047].

126. With respect to the ’339 Patent, the patentee provides an explanation of the term “switch network” at numerous points in the specification. Early on, the specification states that:

mitter. The first circuitry, based on an input from the control logic circuit is configured to change the impedance of the impedance network and topology of the switch network to obtain a modified form of the received power, and apply the modified form of the power to the load device, for example, a Charge Management Integrated Circuit (CMIC), a Power Management Integrated Circuit (PMIC), a simple battery charger, a battery, a capacitor, etc., that consumes or stores or enables the storage of the modified power. In the communication mode, the dual mode wireless power receiver configures the first circuitry, based on an input from the control logic circuit, to change the topology of the switch network and the impedance of the impedance network to transmit a part of the stored power to the secondary wireless power receiver to power-up the secondary wireless power receiver. The second circuitry is configured to identify a type of the secondary wireless power receiver and identify a wireless power protocol of the secondary wireless power receiver. The switch network of the first circuitry is configured as an inverter or a rectifier depending upon the mode of operation of the dual mode wireless power receiver. In the charging mode, the switch network is configured as a rectifier to convert alternating current to direct current (ac-to-dc). In the communication mode, the switch network is configured as an inverter to convert direct current to alternating current (dc-to-ac).

'339 Patent, Col. 2, ll. 42 – 67. Further instances explaining the switch network of the '339 Patent are also be found, for example, at 3:63-66, 8:37-39, 8:47-51, 10:52-55, 11:24-29, 12:1-7. Regarding the highlighted part of the excerpt from the specification provided above, note that the switch network is configured to be either a rectifier *or* an inverter depending on the mode of operation. This is consistent with the depiction provided by Figure 1:

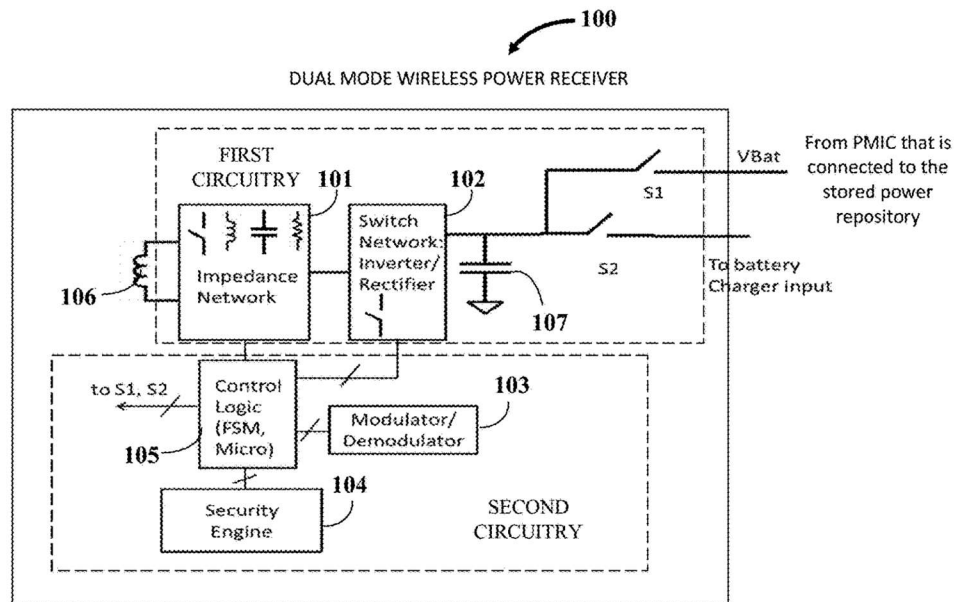


FIG. 1

Element 102 is named “Switch Network: Inverter/Rectifier,” which comports with the explanation in the specification (quoted above) that the “switch network” will be configured as either an inverter or a rectifier. Additional figures comport similarly: Figures 1, 5A. Exhibit 1001, Exhibit 2004. Further, the “switch network” is described in some figures as being in one mode or another and, thus, is configured to be either an inverter or a rectifier. For example, the switch network is shown as being configured as an inverter in Figures 4A-D, 5B, 7A-B, while the switch network is shown as being configured as a rectifier in Figures 2B and 6B.

Id.

127. An inverter and rectifier are well-known devices in electrical engineering used to modify current. The function of an inverter is to convert DC to

AC, and the function of a rectifier is to convert AC to DC. An example of an inverter is a device that draws DC power from a car battery and then converts DC to a 60 Hertz AC source that is compatible with the US standard utility power. An appliance such as a toaster can be plugged into this kind of inverter to receive AC power in the same way it could be plugged into a household wall socket. An example of a rectifier is a Full Wave Bridge Rectifier¹⁸, which takes AC power from a household wall socket and converts it to DC so that a device can draw power in DC form. The above two examples are not meant to limit what either an inverter is, or a rectifier is. A POSITA will have invariably been exposed to these devices in all kinds of electronic devices.

128. Broadly, inverters and rectifiers belong to a more general class of devices that modify the form of electrical power. For example, and not as a limitation, a device can be constructed using the same components present in a “switch network” that could convert power in the form of DC to a power signal that is the combination of AC and DC (i.e., an AC signal with a DC component). Thus, a “switch network” (as it has been inferred from the specification) can modify the form of the power coming into it and apply that power in a different form.

¹⁸ See for example: <https://www.electrical4u.com/full-wave-rectifiers/>

3. Proposed Construction – “Switch Network”

129. Therefore, the term “switch network” should be construed. Further, based upon the above description of what a “switch network” is in the context of the ’339 Patent and/or the ’312 Provisional, this term should be construed as: “an interconnected combination of two or more switches configurable to modify the form of power.” Furthermore, this interconnected combination must be separate from the “impedance network” and the “coil.”

D. Summary

130. In summary, I have not undertaken to review and construe every limitation in the Claims. However, in the event of institution, I will do so if I am asked to do a full analysis.

131. In conclusion as to claim construction, my analysis above demonstrates that the POSITA reviewing the ’339 Patent and would understand that:

- (1) the material terms “impedance network” and “switch network” are ambiguous and require construction before one can analyze these terms in either a validity analysis or an infringement analysis;
- (2) the “impedance network” is separate from the power transfer element (such as the power transfer coil) used to receive or transmit power; the power transfer element is also separate from the “switch network”;

- (3) the “impedance” of the “impedance network” must be capable of being controllably varied while receiving power (in the power-receiving mode);
- (4) “Impedance network” means “a collection of two or more electrical components from the list (1) one or more passive components; (2) active components; and (3) switches”; and
- (5) “switch network” means “an interconnected combination of two or more switches configurable to modify the form of power,” and is separate from the “impedance network.”

X. ANALYSIS OF PETITIONER'S GROUND 1 USING THE PROPER CONSTRUCTIONS PROVIDED

132. Having first properly construed at least the terms above, I will now perform the step of identifying differences between each of the references of Petitioner's Ground 1 – Chatterjee and Corbridge. I will also address any particular allegations that I can find regarding the "knowledge of POSA." Once I have addressed the differences, I will consider Claim 1 as a whole to determine whether the POSITA would find the invention of Claim 1 obvious.

A. Overview of Ground 1

133. To better understand the Petitioner's Position, the following is a summary of the Petitioner's and Dr. Phinney's allegations:

OVERVIEW OF PETITIONER’S ALLEGATIONS OF OBVIOUSNESS				
Pet. No.	Claim 1	Chatterjee	Corbridge	Knowledge of POSA
1.p	[I] A dual mode wireless power receiver configured to selectively apply a received power to a load device and	Just Chatterjee. (p. 16); Ex. 1002, ¶ 93.		

	utilize at least a part of the stored power to power-up a secondary wireless power receiver and communicate with said secondary wireless power receiver to cause an action or transaction or charge said secondary wireless power receiver's load device, said dual mode wireless power receiver comprising:			
1.a	[2] one of coil and capacitor electrodes;	Just Chatterjee (p. 22) (“expressly discloses coil”); Ex. 1002, ¶ 102.		
1.b	[3] a first circuitry comprising: [i] an impedance network;	Just Chatterjee (p. 25) (“Chatterjee’s bi-directional coil assembly discloses the claimed “impedance network”); Ex. 1002, ¶¶ 108, 110.		
1.b	[ii] a switch network;	Just Chatterjee (pp. 25; 32) (“its power bridge circuit discloses claimed “switch network”); Ex. 1002, ¶ 116.		
1.b	[iii] a filter capacitor;	Just Chatterjee (p. 25) (“its power circuit discloses the claimed “filter capacitor”); Ex. 1002, ¶ 127.		
1.c	[4] a second circuitry comprising: [i] a control logic circuit; and	Just Chatterjee (p. 35) (“Chatterjee’s processor 413 teaches the claimed ‘control logic circuit’”); Ex. 1002, ¶ 132.		

1.c	[ii] a modulator/demodulator circuit;	Just Chatterjee (p. 35; also 38) (“its communication circuit 414 comprises a modulator 416 and demodulator 417”); Ex. 1002, ¶ 132.		
1.d	said [3] first circuitry configured to receive said power from [5] a wireless power transmitter;			“Chatterjee in view of the knowledge of the POSA renders obvious this limitation.” (p. 39); Ex. 1002, ¶ 139.
1.e	said [3] 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;			“Chatterjee in view of the knowledge of POSA renders obvious this limitation.” (p. 40); Ex. 1002, ¶ 140.
1.f	said [3] 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 [6] secondary wireless power receiver to power-up said secondary wireless power receiver;			“Chatterjee in view of the knowledge of POSA renders obvious this limitation.” (p. 43); Ex. 1002, ¶ 146.
1.g	said [4] second circuitry, on power-up of said [6] secondary wireless power receiver, configured to identify a type of said		“Chatterjee in view of Corbridge and the knowledge of POSA renders	

	secondary wireless power receiver and identify a wireless power protocol of said secondary wireless power receiver;		obvious Limitation [1.g.].” (p. 46); Ex. 1002, ¶ 152.	
1.h	said [4] second circuitry, configured to receive and interpret data from said [6] secondary wireless power receiver in said identified wireless power protocol;		“Chatterjee in view of Corbridge renders obvious this limitation.” (p.55); Ex. 1002, ¶ 171.	
1.i	said [4] second circuitry, based on said interpretation, configured to perform a function associated with said transmitted power in conjunction with said first circuitry.			“Chatterjee in view of knowledge of POSA renders obvious this limitation.” (p. 57); Ex. 1002, ¶ 174.

B. Differences Between Claim 1 and Chatterjee

134. As shown in the chart immediately above, Dr. Phinney alleges that the preamble of Claim 1 and limitations 1(p) – 1(c) are met by Chatterjee. I disagree.

1. Coil

135. Dr. Phinney asserts that "Chatterjee in view of the knowledge of the POSA renders obvious claim [1.a.] because it discloses a *coil*." I would agree that Chatterjee expressly discloses an induction coil used to receive or transmit power. The coil in Chatterjee is shown as part of element 412 that Chatterjee refers to a "Bi-directional Coil Assembly." The "Bi-directional Coil assembly," referenced as element 412, of Chatterjee is shown in the following diagram:

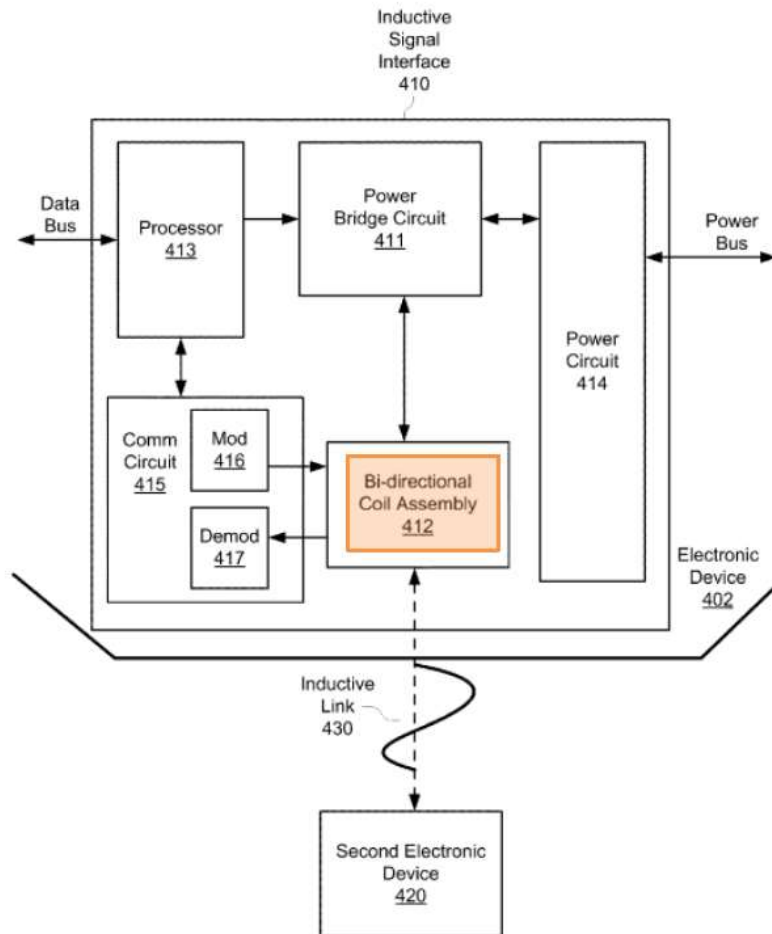


FIG. 4

Ex. 1002, ¶ 104 (showing Fig. 4 of Ex. 1003 with highlighting). The name “coil assembly” alone suggests that the induction coil is part of the named assembly.

More detailed drawings and text of Chatterjee confirm this.

136. Beginning with the abstract of Chatterjee, the “coil assembly” “has one or more inductive coils.” Ex. 1003, Abstract. This same statement is found under “Detailed Description,” “[a]n inductive signal interface includes a coil

assembly which has one or more inductive coils.” Ex. 1003, ¶ 0030; *see also* ¶

0033. The “Bi-Directional Coil Assembly” is described as:

[t]he bi-directional coil assembly 412 operates in a similar fashion the bi-directional coil assembly 312 of Fig.3 to transmit and receive the power signal. The bidirectional coil assembly 412 is also coupled to the communication circuit 415 to receive and transmit modulated data signals.

Ex. 1003, ¶00045. Also, “[d]uring the power receive mode, of the inductive signal interface 410, the bi-directional coil assembly 412 receives power over the inductive link 430 from the second electronic device 420.” Ex. 1003, Para. [0046].

“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.” Ex. 1003, ¶0047. “Fig. 6A illustrates a circuit level embodiment of the power bridge circuit 311, 411, 511 and the bi-directional coil assembly 312, 412, 512 of Figs. 3, 4, and 5 respectively.” Ex. 1003, ¶0061. Dr. Phinney relies on element 412. Ex. 1002, ¶¶ 104 – 106.

137. Dr. Phinney did not discuss any of the more detailed Figures 6A-6D in connection with “coil.” Ex. 1002, ¶¶ 104 – 106. While these Figures 6A – 6D will be discussed in more detail below, I will now use Figure 6A to make a point regarding “coil,” but the same point applies to all of these Figures 6A – 6D. Figure 6A is as follows:

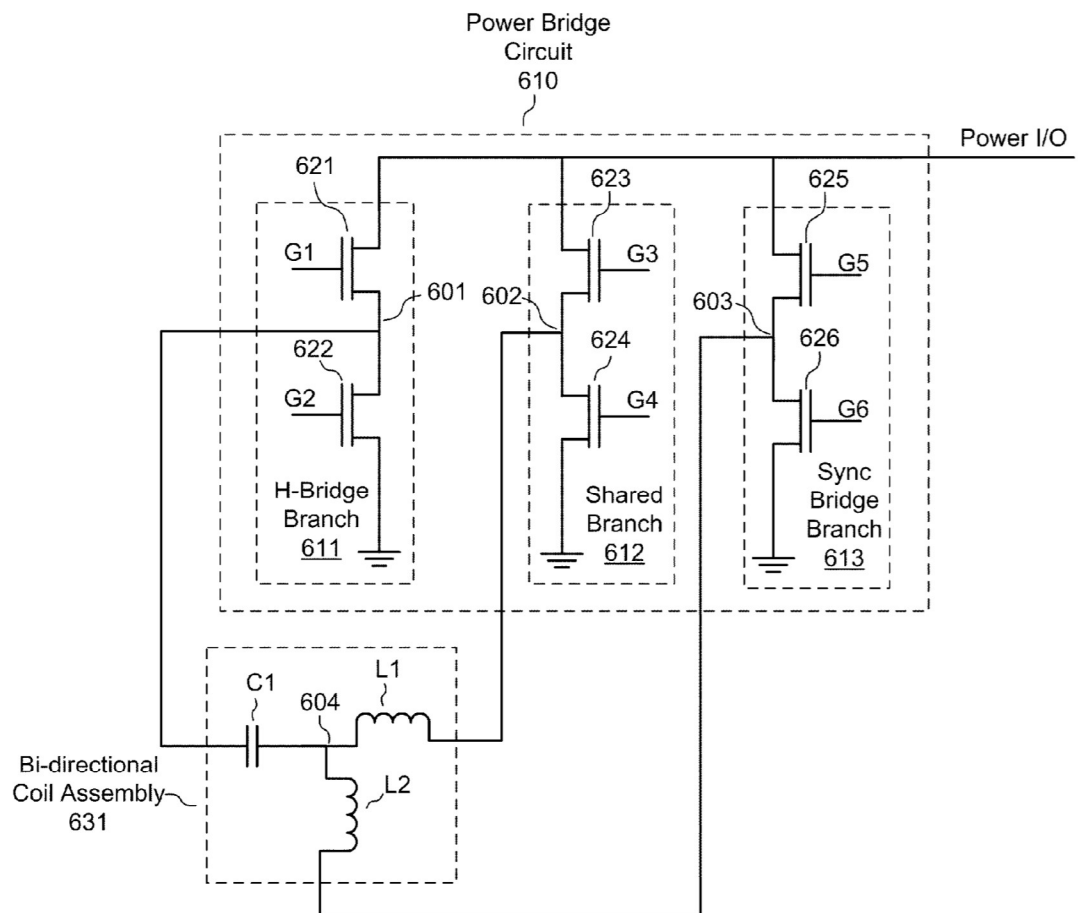


FIG. 6A

This Figure is described in relevant part to “Bi-directional Coil Assembly 631” as follows: “The bi-directional coil assembly 631 is coupled to all three branches of the power bridge circuit and includes a capacitor C1 and two inductive coils L1 and L2.” Ex. 1003, ¶. 62.

138. As shown and explained in Chatterjee, the two inductor coils L1 and L2 are used to receive or transmit power. Ex. 1003, ¶ 62. Thus, I agree that these coils L1 and/or L2 meet the limitation "coil" of Claim 1, but I disagree that these

coils are part of the "impedance network" of the "first circuitry." See Decision, p. 50. As I explained above, the "coil" of Claim 1 is independent and apart from the "first circuitry" including the "impedance network."

139. Dr. Phinney does not cite to any of the more detailed Figures 6A - D in asserting that the "coil" limitation is met. Ex. 1002, ¶¶ 101 – 106. These Figures 6A – 6D are discussed below.

2. "Impedance Network" is Not Disclosed in Chatterjee

140. Dr. Phinney asserts that "Chatterjee's bi-directional coil assembly 412 discloses the claimed 'impedance network.'" Ex. 1002, ¶¶ 108; 110; 115. I disagree.

141. As an initial matter, Dr. Phinney's analysis is flawed because he provided no construction of the term "impedance network." As I explained above, a POSITA would need to first construe the term "impedance network" before undertaking either an infringement or validity analysis.

142. As noted above, a POSITA would understand "impedance network" to mean *“a collection of two or more electrical components from the list (1) one or more passive components; (2) active components; and (3) switches. Further, “impedance network” does not include the induction coil used to transmit and receive power. Further, as required by limitation [1.e]), the impedance of the impedance network must be capable of being controllably varied during at least*

the receiving power mode. Using this construction, Chatterjee's "bi-directional coil assembly 412" does not meet the limitation "impedance network."

143. Dr. Phinney relies on Fig. 6B to assert that element 632, the Bi-Directional Coil Assembly, meets the limitation "impedance network." Ex. 1002,

¶¶ 113 – 115. Dr. Phinney stated his conclusion as to limitation [1.b] as follows:

"[t]herefore, 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 be selectively connected with the inductive coil under different modes to provide variable impedance under different modes." Ex. 1002, ¶ 115. I disagree.

144. As to "impedance network," Dr. Phinney relies on Figure 6B. Ex. 1002, ¶ 113.

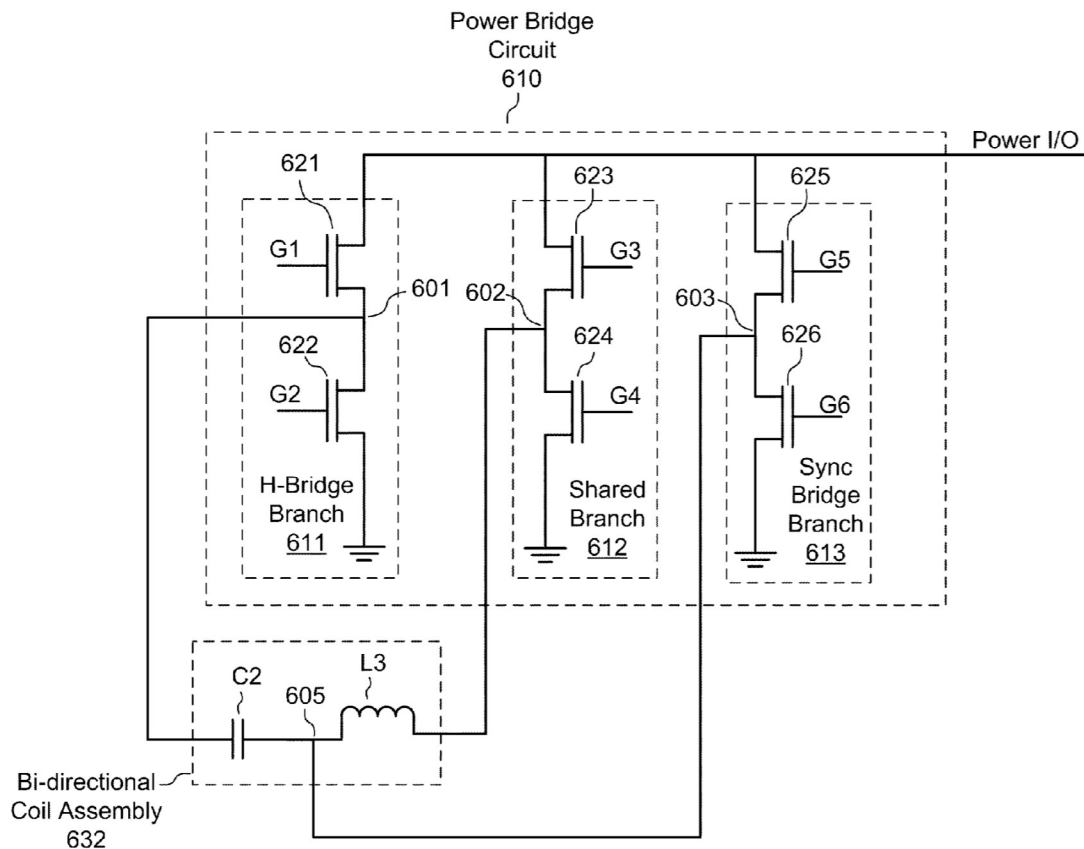


FIG. 6B

Dr. Phinney highlighted C2 and 605 of the Bi-Directional Coil Assembly but omitted L3 in his identification of the “impedance network.” Ex. 1002, ¶ 113.

145. Figure 6B is described as follows: "FIG. 6B is [sic] illustrates the power bridge circuit of FIG. 6A coupled to another bi-directional coil assembly under another embodiment." Ex. 1003, ¶ 0012. Later in the specification, the following description is given: "FIG 6B illustrates the power bridge circuit 610 pf FIG. 6A coupled to another embodiment of the bi-directional coil assembly. The

bi-directional coil assembly 632 includes a capacitor C2 and an inductive coil L3."

Ex. 1003, ¶ 0068. L3 is used to receive and transmit power. ¶¶ 0068, 0069.

146. As shown and explained in Chatterjee, the two inductor coils L1 and L2 in the embodiment of Fig. 6A and the coil L3 in the embodiment of Fig. 6B are used to receive or transmit power. Thus, I agree that these coils L1 and/or L2 in Fig. 6A or coil L3 in Figure 6B meet the limitation "coil" of Claim 1, but disagree that these coils are part of the "impedance network" of the "first circuitry." As I explained above, the "coil" of Claim 1 is independent and apart from the "first circuitry" including the "impedance network."

147. It appears that Dr. Phinney excluded L3 in Figure 6B in identifying the "impedance network," but instead relied upon C2 and "a wire with no impedance." Ex. 1002, ¶ 115. As an initial matter, a POSITA would not regard a "wire" as an "electrical component." A wire does not belong to the "electrical components (from the list (1) one or more passive components; active components; and switches)." A POSITA would understand that ideal wires (such as those shown in FIG. 6B above) are the objects that connect electrical components together and are not "components" themselves.

148. As I noted above, the "coil" of Claim 1 is separate from the "impedance network." Dr. Phinney seems to implicitly acknowledge this by referring only to "a capacitor C2 with capacitive impedance and a wire" as the

"impedance network." Ex. 1002, ¶115. However, a single capacitor does not constitute an "impedance network" under the construction that I have given. Therefore, it is my opinion that the limitation "impedance network" is missing from Chatterjee.

149. The Board relied on Dr. Phinney's statement, "[t]herefore, it is my opinion that Chatterjee's bid-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 be selectively connected with the inductive coil under different modes to provide variable impedance under different modes.*" Ex. 1002, ¶ 115; Decision, p. 53. I disagree that C1 of Figure 6B or the other circuits shown in Figures 6A; 6C; 6D "provide variable impedance under different modes. The Board referenced Figures 6C and 6D in stating: "even if the claimed 'impedance network' requires 'two or more electrical components,' as Patent Owner contends, Chatterjee teaches the claimed 'impedance network.'" Decision, p. 60. I disagree.

150. Figure 6B on which Dr. Phinney relied shows only a single capacitor C1. Hence, the Board appears to believe that the circuits of Figures 6A, 6C, and 6D because they show more than one capacitor. However, Claim 1 via limitations [1.e] and [1.f] requires certain functionality that could not be accomplished using merely two or more capacitors. That is, for the circuit to be operable as claimed, a

POSITA would know that merely selecting two or more passive elements alone from the list provided above in my definition of “impedance network.” For the circuit to be operable, it would need one of an active component or a switch, separate from any switch of the “switch network.” I will address the circuits of Figures 6A – 6D immediately below in discussing limitation [1.e].

2. **Limitation [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 "is Not Met by Chatterjee**

151. Dr. Phinney asserts that “Chatterjee’s bi-directional coil assembly discloses the claimed “impedance network.”” Petition, p. 25; Ex. 1002, p. 53, ¶ 107. This assertion is not correct for the reasons just shown, including (1) the coil used to transfer power is not separate from the alleged “impedance network” as Claim 1 requires, and (2) excluding the coils L1 and L2 or L3, the single capacitor (C1 or C2) does not constitute an “impedance network,” which requires two or more components... .”

152. In addition to these differences, the limitation 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” is not met by Chatterjee. As to this limitation, Petitioner and its expert allege as follows in reference to Figure 6B:

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 ...; and in the power receive mode, it does not... .

EX1002, ¶142 (emphasis added); Petition, p, 41. As shown in the bolded portion, Petitioner concedes that its alleged “impedance network” – “the capacitor C2 between node 601 and 605 and the wire between node 603 and 605 -- is not capable of changing its impedance in *the same mode* of operation, the receiving power mode, as required by this limitation of Claim, limitation [1.e]. The construction of this limitation [1.e] is further set forth and explained above in connection with my construction of “impedance network.” Limitation 1.e is not met by the “Bidirectional Coil Assembly” of Chatterjee.

153. Petitioner and Dr. Phinney relied upon Figure 6B. EX1002, ¶142 (emphasis added); Petition, p, 41. In reviewing the Decision, I noted that the Board in its discussion of “impedance network” referenced all of Figs. 6A – 6D. Decision, pp. 57 – 60. The following is an explanation of the circuits shown in Figures 6A – 6D.

154. As I will now explain, a POSITA would understand that none of the circuits shown in Figures 6A – 6D satisfy limitation [1.e] as none of them has an “impedance network” capable of being varied during at least the receiving power mode of operation.

155. In the following drawings, I will illustrate the configuration of each of the circuits of Figs. 6A – 6D of Chatterjee in the receiving power mode (this is the mode that is the subject of limitation [1.e]).

156. The circuit of Fig. 6A in the receiving power mode is highlighted in the image below.

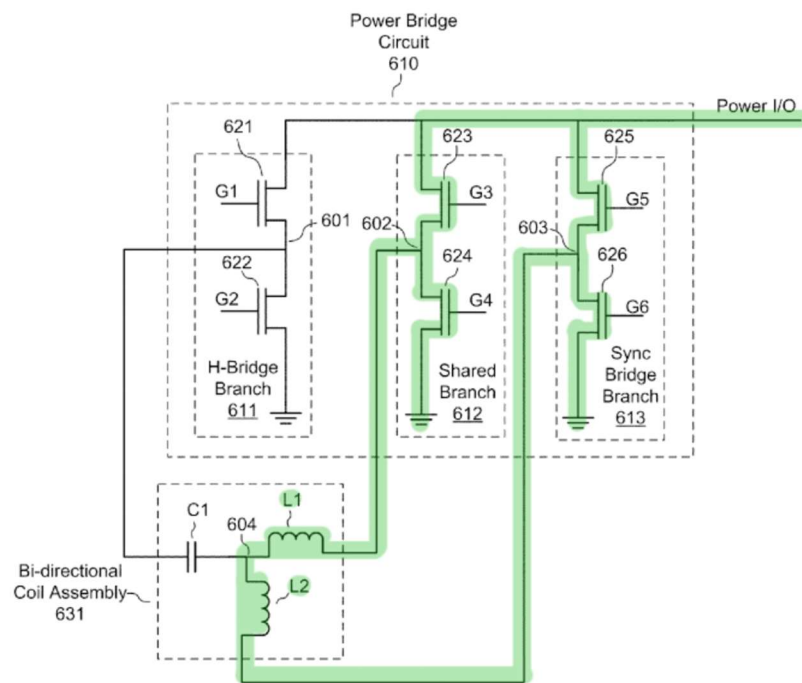


FIG. 6A

This is confirmed in Ex. 1003, ¶ 65, “In this mode of operation [the power receive mode] of the inductive signal interface, the signals G1 and G2 de-asserted [sic]

such that the switches 621 and 622 of the H-bridge branch 611 are in the off state. Thus, the H-bridge branch 611 is off while the sync bridge branch 613 and the shared branch 612 are active.” Ex. 1003, ¶ 65. In this configuration the capacitor C1 of the above circuit in the “receiving power mode” is not part of the circuit used for the purpose of receiving power. This is further confirmed in Ex. 1003 paragraph 65, “By turning off the H-bridge branch 611, current flow through capacitor C1 is turned off and current flow through the bi-directional coils assembly 631 is directed through the series combination of inductive coils L1 and L2.” A POSITA would understand that passive components (such as capacitors, inductors, and resistors) that do not have current flowing through them cannot contribute to a circuit's impedance and, therefore, cannot be used to modify the form of received power, which is required by limitation [1.e]. The only passive components contributing to received power within the bi-directional coil assembly are the coils L1 and L2, which, as I explained above, cannot constitute an “impedance network,” since they make up the “coil” required by Claim 1, which is separate from the “impedance network.” Dr. Phinney has apparently conceded that the coils used to receive wireless power cannot be part of the impedance network by his exclusion of L3 in his discussion of Fig. 6B. Ex. 1002, ¶ 142; *see also* Petition, p. 41. Even if they could be considered part of the impedance network, there is no disclosure in Chatterjee to suggest that, in the circuit of Fig. 6A, L1 and

L2 are in any way configurable to be changed while power is being received as required by the limitation [1.e]. A POSITA would understand L1 and L2 to have fixed values for impedance.

157. The circuit of Fig. 6B in the receiving power mode is highlighted in the image below.

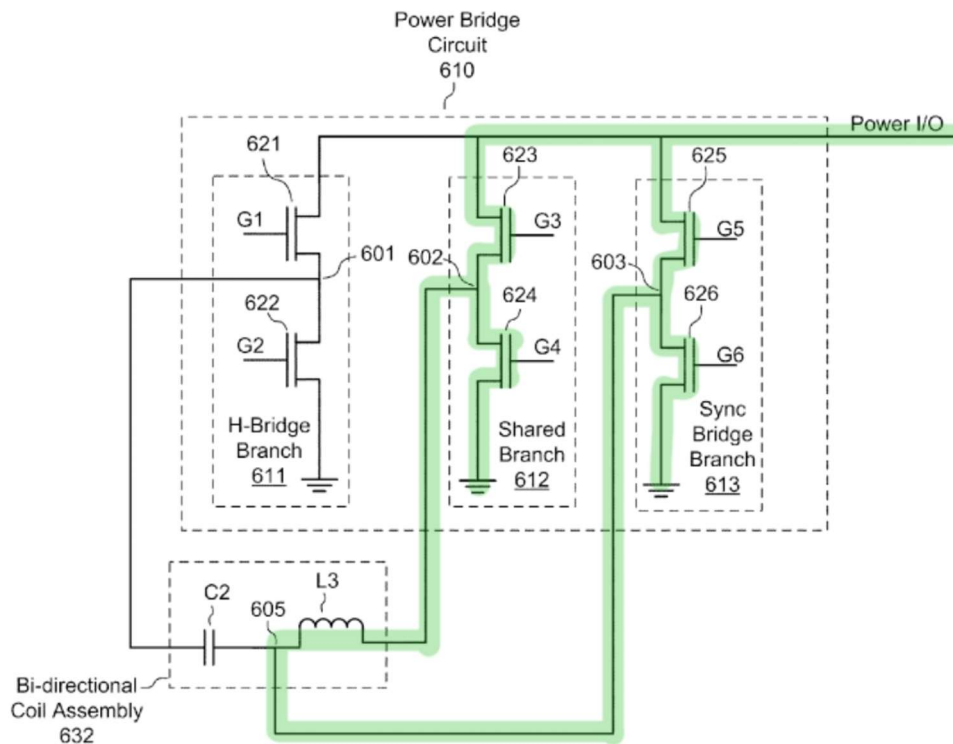


FIG. 6B

The configuration of the circuit in this figure is nearly identical to that of Fig. 6A. The difference is that there is a single coil, L3, in the circuit rather than the series of inductors L1 and L2 from Fig. 6A. The capacitor C2 is not part of this receiving power mode circuit configuration used to modify the form of received power.

Again, the “coil” that receives power is not part of the “impedance network” as I have construed the terms above. Therefore, the circuit of Fig. 6B has no “impedance network” in the receiving power mode. Even if L3 could be considered the impedance network, it is in no way configurable to be changed.

158. The circuit of Fig. 6C in the receiving power mode is highlighted in the image below.

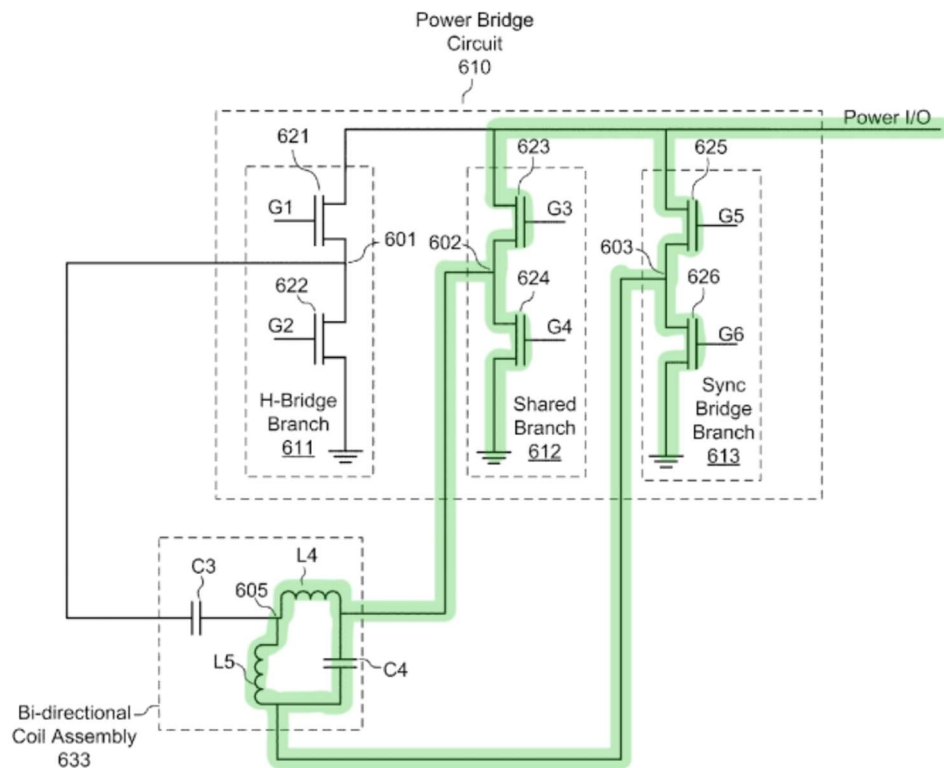


FIG. 6C

The configuration is confirmed in Ex 1003, ¶ 71: “In the power receive mode, the H-bridge branch 611 is turned off and the current path through the bi-directional coil assembly 633 is the series combination of the inductive coils L4 and L5 in parallel with the capacitor C4.” A POSITA would understand that C3 has no

current flowing through it in the receive mode and therefore is not part of the receive mode circuit. It is not capable of modifying the form of received power required by limitation [1.e]. The inductors L4 and L5 make up the “coil” that receives wireless power. Exhibit 1002, ¶ 104. The capacitor C4 is the only remaining passive component that could be considered a part of an “impedance network” that modifies a form of received power. It would be clear to a POSITA that in the circuit of Fig. 6C, the capacitor C4 cannot be configured to have its impedance changed during the receiving power mode as required by the limitation [1.e]. For example, the symbol used for C4 would communicate to the POSITA that this is a capacitor having fixed value. While devices exist that provide adjustable capacitance, the symbol for such devices is different than that used in Fig. 6C.

159. The circuit of Fig. 6D in the receiving power mode is highlighted in the image below.

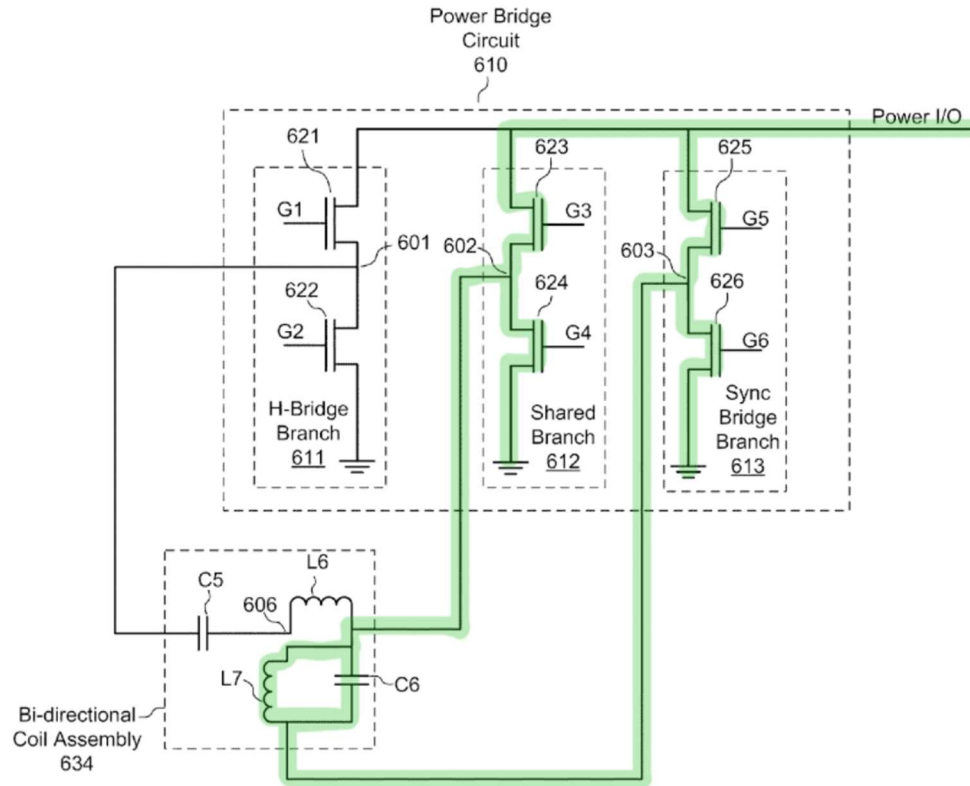


FIG. 6D

The configuration of the circuit in this figure is very similar to that of Fig. 6C. The difference is that current flows through the parallel combination of L7 and C6 and does not flow through the additional inductor L6. The capacitor C5 and inductor L6 do not contribute to the received power because no current flows through them in the receiving power mode. L7 is the “coil” described by Dr. Phinney. Exhibit 1002, ¶ 104. Again, the coil L7 cannot be counted as part of the “impedance network” since Claim 1 requires a separate coil. The capacitor C6 is the only remaining passive component that could be considered as part of an “impedance network” that modifies a form of received power from the limitation [1.e].

However, evident from the circuit in Fig. 6D, C6 is in no way configured to have its impedance changed as required by the limitation [1.e].

160. The additional bi-directional coil assemblies identified in Fig. 7C-7F additionally do not meet limitation [1.e] for similar reasons that were described above. In each of the cases, at most one capacitor is contributing to the circuit in the receiving power mode. In none of the cases are the components configured to have their impedances changed as required by limitation [1.e].

161. In the following drawings, I will illustrate the configuration of each of the circuits in Chatterjee in the communication/transmitting power mode. This is the mode associated with the “change of topology of said switch network and said impedance of said impedance network to transmit...” set forth in limitation [1.f]. Limitations [1.g] – [1.i] concern the communication/transmitting power mode.

162. The circuit of Fig. 6A in the transmitting power mode is highlighted in the image below.

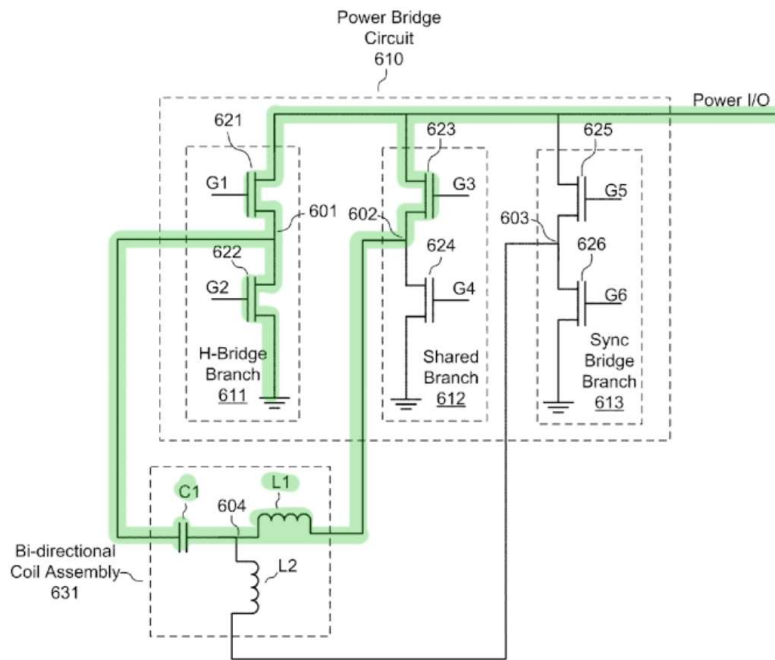


FIG. 6A

This is confirmed in Ex. 1003, paragraph 64: “In the power transmit mode, G5 and G6 are de-asserted by the control logic so that the switches 625 and 626 in the sync bridge branch 613 are in an off (i.e. open) state.” In this configuration the inductor L2 of the above circuit in the “transmitting power mode” is not part of the circuit used to transmit power. This is further confirmed in Ex. 1003 paragraph 64, “Accordingly, current flow through the inductor L2 is turned off.” A POSITA would understand that passive components (such as capacitors, inductors, and resistors) that do not have current flowing through them cannot contribute to a transmitted power. The inductor L1 in the circuit is the “coil”, which as Dr. Phinney has pointed out cannot be part of the impedance network. The capacitor

C1 is the only remaining passive component that could be considered as part of an “impedance network” from the limitation [1.f] used to transmit stored power. However, a single capacitor does not meet the proper construction of “impedance network” as I explained above.

163. The circuit of Fig. 6B in the transmit power mode is highlighted in the image below.

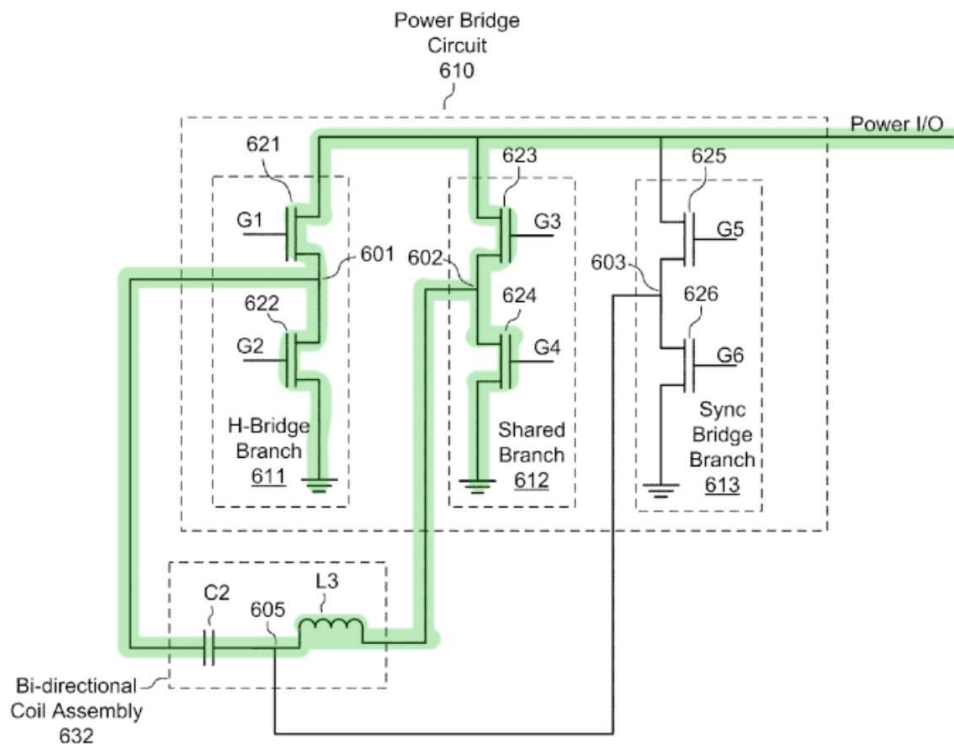


FIG. 6B

164. The configuration of the circuit in this figure is nearly identical to that of Fig. 6A. The difference is that there is a single coil, L3, in the circuit rather than the series of inductors L1 and L2 from Fig. 6A. The capacitor C2 is the only

remaining passive component that could be considered as part of an “impedance network” from the limitation [1.f] used to transmit stored power. However, a single capacitor does not meet the proper construction of “impedance network” as I explained above.

165. The circuit of Fig. 6C in the transmit power mode is highlighted in the image below.

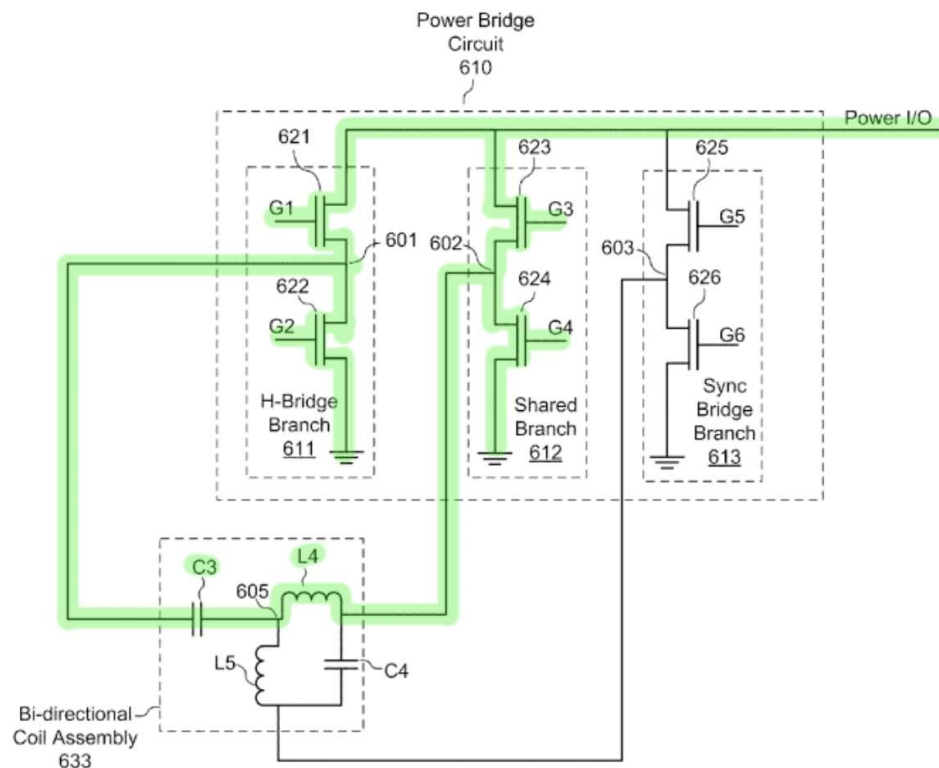


FIG. 6C

The configuration is confirmed in Ex 1003 paragraph 71, “In the power transmit mode, the sync bridge branch 613 is turned off and the current path through the bi-directional coil assembly 633 is the series combination of the capacitor C3 and the inductive coil L4.” Ex 1003, ¶ 71. A POSITA would understand that C4 and L5

are not part of the circuit used to transmit power in this transmit power mode because the current path is C3 and L4. In this transmit mode, L4 is the “coil” described by Dr. Phinney. Ex. 1002, ¶ 104. Therefore, C4 is the only candidate for meeting “impedance network” used to transmit power. However, a single capacitor does not meet the proper construction of “impedance network” as I explained above.

166. The circuit of Fig. 6D in the transmit power mode is highlighted in the image below.

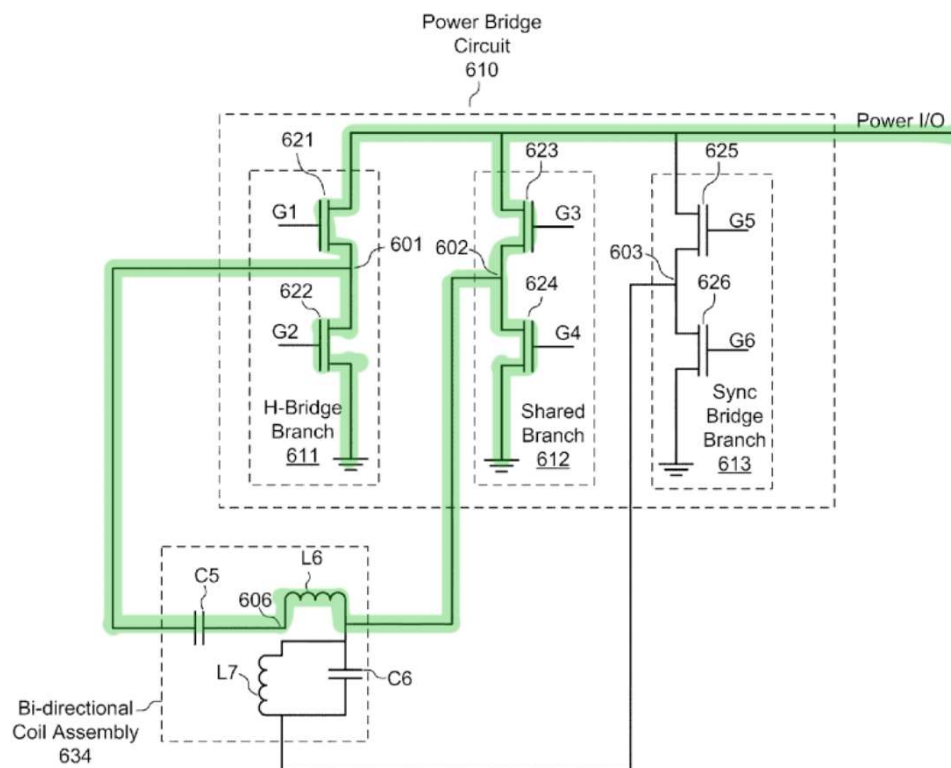


FIG. 6D

The configuration of the circuit in this figure is very similar to that of Fig. 6C.

Current flows through the series combination of capacitor C5 and inductor L6. L7

and C6 are not part of the circuit used for transmitting power for reasons described earlier. L6 is the “coil” described by Dr. Phinney. Therefore, C4 is the only candidate for meeting “impedance network” that transmits power. However, a single capacitor does not meet the proper construction of “impedance network” as I explained above.

167. The additional bi-directional coil assemblies identified in Fig. 7C-7F additionally do not meet the “impedance network” limitation for similar reasons that were described above. In each of the cases, at most one capacitor is part of the circuit that transmits power in the transmit power mode. However, a single capacitor does not meet the proper construction of “impedance network” as I explained above.

168. In conclusion, the circuits shown above of Figs. 6A – 6D have no capability to, “based on input from said control logic circuit,” “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” as required by limitation [1.e]. As I explained above (Section IX(B) above), limitation [1.e] pertains to functionality of the dual mode wires power receiver while it is in the receiving power mode. Chatterjee does not disclose any circuit that meets limitation [1.e], nor is such functionality described therein. Chatterjee does not meet limitation [1.e].

3. "Switch Network" and Chatterjee

169. Dr. Phinney asserts that "Chatterjee's power bridge circuit 411 discloses the claimed 'switch network.'" Ex. 1002, ¶ 116. I disagree.

170. For the reasons explained above, the term “switch network” should be construed. Further, based upon the above description of what a “switch network” is in the context of the '339 Patent, this term should be construed as “an interconnected combination of two or more switches configurable to modify the form of power.” Furthermore, this interconnected combination must be separate from the “impedance network” and the “coil.”

171. A problem with Dr. Phinney's analysis is that he failed to first construe the limitation. In addition, Dr. Phinney failed to address limitation [1.e], which I discussed above. Limitation [1.e] as requires that “based on input from said control logic circuit,” the “first circuitry” is “configure to change topology of said switch network” “to obtain a modified form of said received power.” As I explained above, limitation [1.e] pertains to changes made while the dual mode wireless power receiver is in the receiving power mode. Dr. Phinney only addressed the changing of the topology of the alleged switch network as being between the two modes, power receiving and power transmitting. Ex. 1002, ¶ 121. This is the functionality recited by limitation [1.f]. Dr. Phinney did not demonstrate that limitation [1.e] is met by Chatterjee. I reserve the right to provide

further analysis as to “switch network” once I more fully understand Dr. Phinney’s position as to limitation [1.e].

4. Limitations 1(g) – 1(i) Not Met by Chatterjee

172. Dr. Phinney by his reliance on Corbridge and the knowledge of one skilled in the art apparently concedes that Chatterjee does not show limitations 1(g) – 1(i). I agree that it does not.

C. Differences Between Claim 1 and Corbridge

173. Corbridge discloses a communication protocol. However, it does not show the hardware elements of Claim 1. The circuits of Corbridge was far different. For example, it discloses two coils, one for data and one for power transmission. *See, e.g.,* Fig. 9A. In contrast, the claimed coil of the "first circuitry" provides the link for both power transmission and data transmission.

174. I note that Dr. Phinney relies on Corbridge to supply the missing limitations 1.g and 1.h. Ex. 1002, ¶¶ 152. 171. These limitations are:

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

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

175. I reserve the right to fully analyze Dr. Phinney's assertions as to the communications protocol aspect of Corbridge.

D. Comments Regarding "Knowledge of POSA"

176. Dr. Phinney relies on "knowledge of POSA" as to limitations 1.d (Ex. 1002, ¶¶ 138 – 139), 1.e (Ex. 1002, ¶¶ 145), 1.f (¶¶ 146 – 151), and 1.i (Ex. 1002, ¶¶ 174 – 177).

177. Taking these assertions one at a time, I agree that the "power bridge circuit 411" of Chatterjee satisfies limitation 1.d, "configured to receive power..." as stated in ¶ 139. I also agree that Chatterjee teaches receiving power "from a wireless power transmitter." *See* Fig. 3 ("Inductive Link" is shown as going both ways); *also* Fig. 11. Therefore, I am perplexed as to what "knowledge of POSA" Mr. Phinney relies upon in addition to the teachings of Chatterjee. I reserve the right to further analyze this limitation once I fully understand Dr. Phinney's position.

178. For the reasons I have noted above, Chatterjee does not teach the limitation 1.e. Furthermore, Dr. Phinney has not explained how the "knowledge of the POSA" would supply the missing disclosure as to this limitation. It appears that Dr. Phinney only relies on the "knowledge of a POSA" as to the portion of limitation [1.e]; "configured to" "apply said modified form of said power to said load device." Ex. 1002, ¶ 145. I agree with Dr. Phinney that the device of

Chatterjee applied power received to a load device. However, I disagree that merely applying the power received "because it is DC and not AC" meets the limitation "modified power." As I have explained above, this limitation i.e., for example, requires that the receiver be configured to "change impedance of the impedance network and topology of the switch network" to obtain "a modified form of said power" while in receiving power mode.

179. Dr. Phinney relies on the "knowledge of the POSA" to fill in the missing disclosure of Chatterjee, which does not meet the limitation [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." One of the functions described in the '339 Patent is increasing and decreasing power. '339 Patent, Col. 10, ll. 3 – 8. Dr. Phinney asserts:

[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 continues to transmit power in a controlled manner to the second device.

Ex. 1002, ¶ 177, p. 92 (emphasis in bold added). Dr. Phinney did not fully explain the basis for the assertion regarding “knowledge of a POSA.” I reserve the right to conduct additional analysis once I understand Dr. Phinney’s basis.

E. Conclusion – Ground 1 Does not Render Claim 1 Obvious

180. As I have explained above, numerous claim limitations are not met by Chatterjee standing alone. Even assuming that there was a rationale for combining Chatterjee with Corbridge, Corbridge does not make up for many of the missing limitations, including “impedance network” and limitation [1.e]. Furthermore, the ill-defined “knowledge of a POSA” does not make up for the limitations that are missing from the combination of Chatterjee and Corbridge. That is, even assuming a rationale to combine, the combination is missing these limitations. For example, it is my opinion that a POSA in 2012 would not have found it obvious to modify the device of Chatterjee and/or Corbridge to add an “impedance network” “wherein the impedance of the network can be controllably varied during at least the receiving power mode.”

181. In my opinion, Claim 1 is not rendered obvious by Ground 1, the only ground stated in the Petition. I reserve further and more detailed analysis in the event that Dr. Phinney provides additional constructions and/or explanations and/or rationales for combining the three items of Ground 1. I also reserve the

right to address the dependent claims once Dr. Phinney has shown Claim 1 to be obvious, which he has not done so far.

182. In conclusion, a POSITA, viewing Claim 1 as a whole, would **not** find Claim 1 obvious in view of the differences between the claimed invention and the references and/or knowledge of a POSITA set forth in Ground 1. In other words, a POSITA would find the invention of Claim 1 to be non-obvious in view of Ground 1.

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

Executed this 5th day of June, 2024.

/Dr. Randal H. Direen/

DR. RANDAL H. DIREEN